



# O&G

## Magazine

Vol 16 No 1 Autumn 2014

# The pelvic floor

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists

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# From the President



Prof Michael Permezel  
President

The College was delighted to receive official confirmation from the Australian Medical Council (AMC) and Medical Board of Australia (MBA) that the College's specialist education, training and CPD programs will be accredited for a further six years – the maximum time that is able to be granted. Many thanks are owed to College staff and the chairs of College committees; in particular, Ms Georgina Anderson (Office of the President and CEO), Ms Lyn Johnson (Director of Education), Ms Effie Margiolis (Manager Workforce & Evaluation) and Dr Peter White (former CEO).

AMC accreditation comes with a number of conditions and recommendations. The College's six-year accreditation term will be subject to the acceptance of satisfactory progress reports, which must demonstrate that the College is addressing the conditions and considering the recommendations. Over the next six years, Fellows and Trainees will hear from time to time that a change in a policy or regulation is explained by 'it is a condition of AMC accreditation'. While it is often worthwhile exploring strategies to meet each condition, meeting each condition is essentially non-negotiable as they are genuine requirements for the College's specialist programs to be recognised by the AMC – and thereby new Fellows registered

with the MBA and Australian Health Practitioner Regulation Agency (AHPRA) or the Medical Council of New Zealand (MCNZ).

## What is a new Fellow able to do on the day they are awarded FRANZCOG?

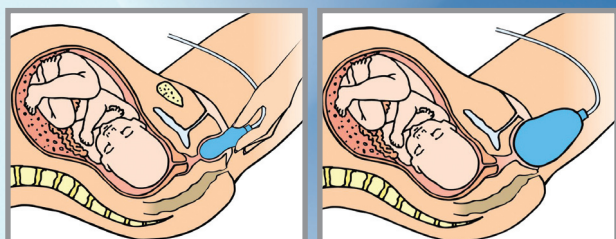
This most obvious question is not as easy to answer as might first appear and yet the answer is essential knowledge for any health service provider assessing the qualification with a view to credentialing for defined areas of practice.

## The common scope of practice

Firstly, there must be a common scope of practice – those areas that all new Fellows are able to satisfactorily perform at the level of a new Fellow. Of course, continued development will occur throughout their professional lives, but at the attainment of FRANZCOG, the Fellow has reached a benchmark of independent practice within the common scope. The common scope of practice essentially consists of basic obstetrics, emergency gynaecology and office gynaecology. Note that this is not the same as the 'core curriculum'. At the end of Core Training, all Trainees are expected to reach senior registrar level across a much wider scope of practice that prepares them for their various senior registrar positions.

Some in the College will be concerned that RANZCOG is insisting that all Fellows will now have to be able to do the common scope of practice. This, of course, is not the case. As a colleague so eloquently put to the AMC, 'After many of years in "ultra-specialised" practice it is possible to achieve a new level of incompetence in

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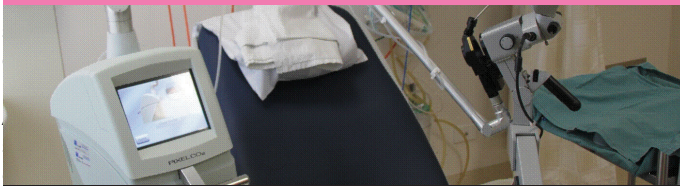


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scope of practice that applies to most new Fellows – in fact, to all those other than Trainees who have elected to undertake subspecialty training or an equivalent level of ‘super-specialisation’ prior to Fellowship. Native repair of uterovaginal prolapse might be such an entity. The new Fellow undertaking maternal fetal medicine training would not necessarily have this within their scope of practice, but it would be expected of any ‘generalist’. Obligating all future generalists to undertake a ‘Generalist Advanced Training Module (ATM)’ is a means of ensuring adequate training across the generalist scope of practice.

Where some may doubt the need for the common scope of practice for a subspecialist Trainee at the time of being granted FRANZCOG, few generalists will demand that the subspecialists must undertake the ‘Generalist ATM’. In fact, that is the essence of the Revised Training Program – give the training to those that will continue to use it.

There will be inevitable conflict among Fellows as to what should be included in the generalist scope. There will be the ‘special interest’ faction that believe Area of Practice X should be ‘restricted’ to only those undertaking an ATM in Area of Practice X. The ‘generalist’ faction takes a contrary view that the area of practice should be in the scope of all generalist Fellows and adequate training should be undertaken during the ‘Generalist ATM’ – thereby ensuring that approximately 70 per cent of new Fellows will have Area of Practice X within their scope. The debate is already very active in many areas of practice. Debate is healthy. Compromise is essential. Become involved with the College to maximise your participation in these important discussions.

#### The special interest scope of practice

With increasing diversity in Advanced Training now possible, the Revised Training Program has its first cohort training in both Australia and New Zealand. As indicated in previous reports, there will be areas of special interest that are only practised at a higher level by a subset of new Fellows. The most obvious special interest is subspecialty training; however, alongside these will sit the new ATMs that will equip generalist Fellows with the knowledge, skills and attributes in special interests of their choosing.

#### Super-specialisation?

A specialist means a medical practitioner in one of the broad specialist disciplines of medicine recognised by APHRA, for example, obstetrics and gynaecology, general practice and so forth. This confers a title protected in law. Only an APHRA-registered obstetrician and gynaecologist can describe themselves as such. A subspecialist in our College is a term that has come to mean a holder of one of five qualifications: Gynaecological Oncology (CGO); Obstetrical and Gynaecological Ultrasound (COGU); Maternal-Fetal Medicine (CMFM); Reproductive Endocrinology and Infertility (CREI); and Urogynaecology (CU) that are registrable by APHRA and, as such, confer a title also protected in law. For example, only a College-certified MFM subspecialist can legally describe themselves as a ‘Specialist in Maternal and Fetal Medicine’.

However, there is no current term to describe the Fellow who has elected to restrict their practice to areas of obstetrics and gynaecology outside of the subspecialties. Some of these paths are now well-established and practised by significant numbers of Fellows. Almost no one, including the MBA, seems to want more subspecialties, yet the College cannot ignore their existence. Where it will become most relevant will be with respect to the requirement that all ‘non-subspecialists’ complete the ‘Generalist ATM’. Could an advanced Trainee exclusively undertake sexual and reproductive health (S&RH)



ATMs and be exempted from the Generalist ATM in the same way as a subspecialist? This is already the case in the UK and the College must give this serious consideration. It would only apply to a small number of advanced Trainees, but they will form an important part of the future workforce with leadership roles in most of the teaching hospitals in areas of S&RH.

### Trainees' Committee

After a term of highly distinguished service, Dr Will Milford has left his role as Chair of the Trainees' Committee and the College welcomes Dr Kate van Harselaar as the new Chair. I would like to acknowledge Will's contribution in many areas of College activity, but particularly his thoughtful assistance in development of the Revised Training Program and his pivotal role in preparation for the AMC accreditation. He has also had a very distinguished career as Training Medical Officer representative on many national bodies. The College conveys best wishes to Will in his forthcoming specialist career.

### Extended leave of absence and fractional training

The issue of extended leave of absence (most commonly parental leave) and part-time training are increasingly important for both the workforce management at health service level and also as a training issue for the College. It is a reality that 80 per cent of new Trainees are female and have been for some years. The College has dual obligations that need to be balanced: to those who are undertaking fractional training or parental leave; and also to those who are not. Financially, there needs to be an attempt at equity with neither subsidising the other. Similar costs are incurred to the College during fractional training as during full-time training, but obviously there is the potential for some reduction during extended leave of absence. The College is currently looking at strategies to make costs as fair as possible, while not simultaneously creating so much administrative work that the overall costs increase.

With respect to quality of training, there are passionate views on both sides. All acknowledge some intensity of training is necessary: ten years at one session a week is not the same as one year at ten sessions a week. The College has long obligated full-time training in year 1 of the FRANZCOG Training Program. A current issue is around the first year of subspecialty training. Again, contrasting opinions are strongly held, but it would appear that at least some subspecialties (MFM, REI and perhaps OGU) will consider allowing fractional training of some form in the first year of their respective training program.

### Workforce

#### Overseas Fellows

My previous comments regarding the proliferation of overseas Fellows in some centres have, predictably, drawn responses – not all of them favourable. The need to maximise training opportunities for Australian and New Zealand Advanced Trainees is obvious, but clearly an Advanced Trainee doing an ATM does not easily replace an overseas Fellow in many units. Thoughtful restructuring will often be required. It has occurred, through necessity, in other jurisdictions following changes in immigration laws and it would be wise and helpful to Advanced Training to consider going down that path before it is forced on us.

### Safe working hours and training

In some health services, the expression 'safe working hours' has come to mean 'rostering to avoid overtime payments'. Such rostering can be merciless for Trainees. Registrars who are rostered overnight on-call can find the consultant performs the elective gynaecological surgical operating later in the week because the hospital will not pay

the registrar any overtime. Many Fellows might think Trainees should attend unpaid for elective gynaecological surgery, but such a system leads to the time-poor or less-motivated Trainee gaining the least experience – to the detriment of women's health. The other strategy used by the 'no overtime' hospital is to flood the hospital with registrar training positions. The amount of gynaecological surgery available to each Trainee is seriously diluted – further impacting negatively on training. The only strategy available to the College is to reduce the number of accredited training posts at each hospital where Trainee logbooks reveal a lack of gynaecological surgical experience. An analysis of Trainee gynaecological procedure numbers across all Australian and New Zealand ITPs has shown wide variations. Hospitals have two possible strategies: accept some overtime payments to Trainees or, as in the case of managing without an overseas Fellow, restructure the service using 'service registrars' (for example, a career hospitalist) for some of the after-hours work.

These problems are not unique to our training program, rather, are shared with other procedural disciplines such as surgery and ophthalmology, although the problems are greatest in O and G because of the general necessity to have a 24-hour cover of an O and G registrar physically present within the hospital. A simple calculation concludes that a minimum of five registrars on 'safe working hours' will be needed for 24-hour registrar labour ward cover – necessitating a volume of gynaecological surgical training per Trainee that a small hospital may be unable to provide. The solution to this problem has to be fewer

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### Safe working hours and workforce

Safe working hours can also impact negatively on workforce planning. Millions have been spent on so-called medical workforce planning, yet for most disciplines, the training workforce is determined by available 'service/training registrar' positions and not by anticipated workforce need. This absurd system has survived until now by virtue of the fortuitous relationship of registrar positions to consultants. Historically (and simplistically), a medical or surgical unit had four or so consultants for each registrar. With a six-year training program, that would mean that an average 24 year consultant practice life would be 'neutral' in terms of workforce numbers. A longer average workforce span led to a steady increase in total workforce in line with population increases. The system no longer works. Ratios are no longer 1:4, but often more like 1:2 when all hospital registrars are considered (unit registrars, emergency department registrar, night registrars, registrar on leave and so forth). The result is a large excess of specialists – ameliorated currently in O and G by changes in the workforce that have increased the number of Fellows working only part-time.

Other disciplines fare worse. A neonatal unit may have a 1:1 ratio of consultants to registrars in a training program of only four years – meaning that for every consultant neonatologist, a new one will

complete training every four years. The only solution to the inevitable workforce excess lies in restructuring – moving from a dependence on Trainee registrars to those same clinical services being provided by career hospitalists or junior consultants. Who is going to incentivise hospitals to make the necessary changes? These are the challenges that lie ahead.

### Summary

The College enters 2014, the second year of the Eighth Council, and into a new era: the AMC re-accreditation is behind us, albeit with conditions to be met in the years ahead; a revised training program has now begun in both Australia and New Zealand; and a new CEO, Mr James McAdam, is at the helm. The College can look forward to an exciting year.

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# From the College



**Dr Sarah Tout**  
**FRANZCOG**  
**Vice-President and**  
**Chair, Training and**  
**Assessment Committee**

logbooks and handbooks have been completed and significant changes to the three- and six-month training reports and assessment tools have all been made. While individual Trainees are governed by the rules and regulations relevant to their starting date, the revised training and assessment documentation is applicable to all Trainees.

‘...the College appreciates the time, commitment and expertise that Fellows continue to give as we strive to ensure the standard of training is high...’

I encourage all Fellows who have any involvement with the FRANZCOG Training Program and who may be responsible for overseeing FRANZCOG Trainees, either as an ITP Coordinator, a Regional Training Committee member, Training Supervisor, consultant, mentor, an assessor of surgical skills or an in-hospital clinical assessor, to make themselves familiar with the revisions to the training program and documentation. These can be found on the College website at: [www.ranzcog.edu.au/education-a-training/specialist-training.html](http://www.ranzcog.edu.au/education-a-training/specialist-training.html).

The monthly Training Bulletin is also an essential source of information and the regularly held Training Supervisor Workshops provide valuable updates and a collegial environment in which to discuss training and assessment-related issues.

The major changes that now apply to both new and current Trainees are as follows:

- The first four years of training are known as Core Training; the final two years are known as Advanced Training.
- Training time is calculated in weeks; one year is equal to a maximum of 46 weeks.
- Training can be any fraction equal to or greater than 0.5 full-time equivalent, provided it is approved by the employer and

As outlined in recent previous issues of *O&G Magazine*, revisions have been made to the FRANZCOG Training Program as a result of a major review. To this end, considerable work has been done over the past 12 months to ensure the smooth introduction of the revised FRANZCOG Training Program for Trainees starting on 1 December 2013. In addition, much work has been undertaken to incorporate aspects of the revised program into the program for current Trainees who began training before this date. As such, new Regulations have been developed, revisions to the FRANZCOG Curriculum,

prospectively approved by the relevant TAC Chair.

- The minimum amount of training that can be credited in any six-month block will be ten weeks FTE.
- The three-month report is a formative appraisal and must be submitted within four weeks of the end of the relevant training period. The ‘warning’ component has been removed.
- The six-month report is a summative assessment and must be submitted within six weeks of the end of the relevant training period. The category ‘borderline’ is no longer available.
- Each six-month period will be assessed as either ‘satisfactory’ or ‘unsatisfactory’. Unsatisfactory means the six-month period is not credited.

The other major changes that will apply only to new Trainees who have commenced or commence their FRANZCOG training on or after 1 December 2013 are as follows:

- Trainees cannot commence their Advanced Training until all requirements of Core Training, including examinations, have been satisfactorily met.
- Advanced Training will be more formally structured. Trainees will be able to either choose to complete further generalist training or develop an area of special interest, such as sexual and reproductive health, through Advanced Training Modules (ATMs), or chose one of the structured subspecialty training programs.
- Core training must be completed within a maximum of six years of time in training. Advanced training within a maximum of three years of time in training.
- The rural rotation of a minimum of six months or 23 weeks FTE must be completed as part of Core Training and only after completing Year 1 (rather than anytime during the six-year program).
- Trainees can have their first attempt at the Written Examination in their second year (or after satisfactory completion of 46 weeks of training), but must have made their first attempt prior to completion of two-and-a-half years or 115 weeks of training.
- Trainees can have their first attempt at the Oral Examination in their third year (or after satisfactory completion of 92 weeks of training) and at least six months after passing the Written Examination.
- The maximum number of attempts at each examination is three.
- Trainees can apply to undertake the FRANZCOG Academic Stream to undertake an approved PhD. Research leave applies. Upon satisfactory completion, Trainees may be exempted from 1 year of Advanced Training.

As always, the College appreciates the time, commitment and expertise that Fellows continue to give as we strive to ensure the standard of training is high and our graduating Fellows have the appropriate skills to best meet the needs of the women they care for.

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# Editorial



Dr Brett Daniels  
FRANZCOG

Pelvic floor considerations run the full gamut of obstetric and gynaecological care. Whether it is attending a normal vaginal delivery or performing a clinical examination of a woman with prolapse, ultrasound assessment of pelvic floor musculature or learning novel surgical techniques, pelvic floor care spans the everyday to the cutting edge.

The obstetrics and gynaecology of the pelvic floor is nothing if not controversial. Will an elective caesarean protect the pelvic floor? Should we use mesh in prolapse repair surgery? What is the place of episiotomy in modern practice? Should urodynamic studies be performed prior to prolapse surgery? Many readers will have faced these questions in their practice and this issue has informative discussions of each of them.

Dr Sylvia Lin and Prof Don Wilson review the evidence from a number of studies, examining the role of mode of delivery in

protecting the pelvic floor. They provide a succinct table of the results of these studies that will be of use to clinicians in assisting their patients considering caesarean to protect the pelvic floor. Prof Malcolm Fraser and Dr Oliver Daly, similarly, provide a balanced discussion of the role of mesh in pelvic organ prolapse surgery that clarifies the current state of play on this controversial and potentially litigious issue. On a perhaps less well travelled route, Dr Vivien Wong and Prof Kate Moore discuss recent research regarding the role of collagen in female pelvic organ prolapse, highlighting that not all pelvic floor dysfunction is necessarily related to childbirth.

On reading the articles while this issue of *O&G Magazine* was being prepared, I could not help but wonder how a similar issue will look in a decade's time. What will be the elective caesarean rate? Will mesh for prolapse repair be a common technique, will it be only in the hands of the subspecialist or will it be a memory, having been deemed surgically and economically non-viable? At this stage none of us know the answers, but it will be an exciting time as the debates continue.



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# Pelvic floor trauma in childbirth



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With advances in imaging techniques, new discoveries are being made about the pelvic floor: before, during and after childbirth.

While textbooks contain little information on this topic, it is clear that many women giving birth to their first child vaginally suffer a degree of permanent damage to their pelvic floor structures. For example, anal sphincter trauma is much more common than generally assumed<sup>1,2</sup>, frequently not recognised in the delivery

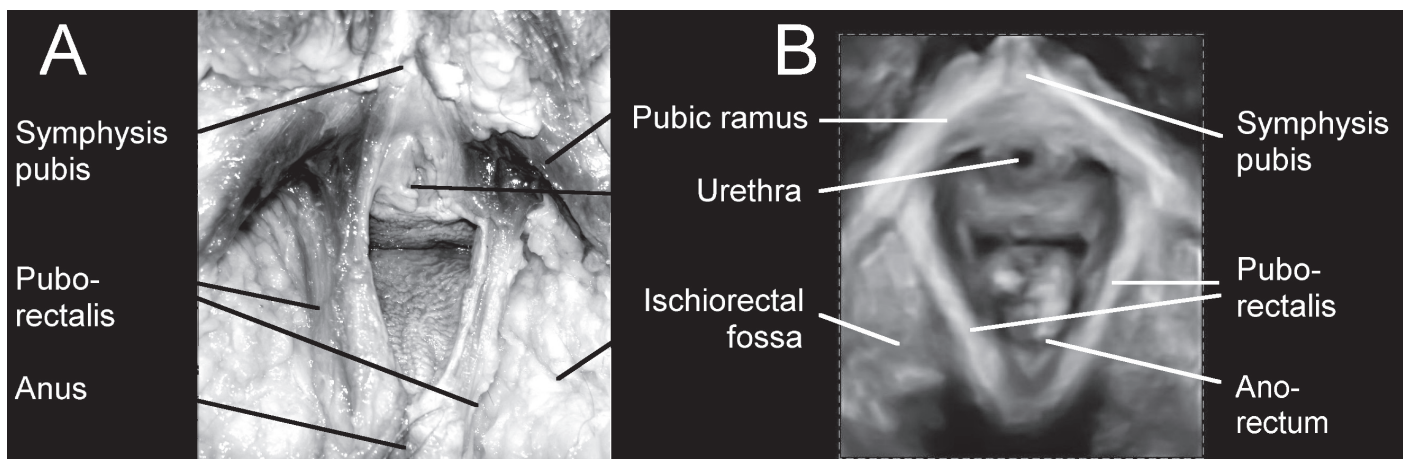
suite<sup>1,2</sup> and often is suboptimally repaired, even in tertiary units.<sup>3</sup> The resulting defects of internal and external anal sphincter muscle are the main aetiological factor for faecal incontinence in later life.<sup>4</sup>

Similarly, it is now clear that pelvic floor trauma encompasses more than what we were taught to identify in the delivery suite. In about half of all women after vaginal delivery there is substantial alteration of functional anatomy affecting the puborectalis component of the levator ani muscle.<sup>5</sup> The integrity of this structure is currently the best-defined aetiological factor in the pathogenesis of prolapse, a condition for which 10–20 per cent of all women will eventually undergo surgery at least once in their lifetime.<sup>6,7</sup>

The levator ani muscle is part of the abdominal envelope, a muscular plate surrounding a central v-shaped 'levator hiatus', which encloses the urethra, vagina and anorectum. It necessarily is a compromise between conflicting priorities: the abdominal organs have to be secured against the pressure differential between inside and outside and against gravity, solid and liquid wastes have to be evacuated in a controlled, socially acceptable fashion and babies are supposed to pass through the levator hiatus, which is a particular challenge in view of the size of the baby's head.

Figure 1 shows the levator ani as seen from caudally, in a fresh cadaver on the left, and in an asymptomatic volunteer on pelvic floor 3D ultrasound on the right. The puborectalis muscle is evident as a v-shaped structure between 5mm and 10mm in thickness, anchored to the inferior pubic rami and the body of the os pubis on both sides.

Both the external and internal anal sphincter are commonly impacted by childbirth owing to their location within the levator hiatus, in immediate proximity to the fetal head on crowning. The anal canal is a tubular structure of 3–5cm in length, with a smooth muscle tube (the internal anal sphincter [IAS]) surrounded in its distal half by a donut-shaped structure of striated muscle (the external anal sphincter [EAS]), see Figure 2 for a tomographic representation in a nulliparous



*Figure 1. A. Intact puborectalis muscle in a fresh cadaver, dissected from caudally. The vulva, mons pubis, clitoris, perineal muscles and perineum to the anus, as well as peri- and postanal skin and the fibrofatty tissue of the ischio-rectal fossa have been removed to allow access to the puborectalis muscle. B. The appearance of the puborectalis muscle in a rendered volume in the axial plane, using translabial 3D ultrasound.*

## Editorial comment

There is no doubt that perineal trauma during vaginal delivery is a hot topic. The development of functional imaging techniques has revolutionised our understanding of the pelvic floor during and after birth. We are fortunate to have one of the foremost international experts in this field as a Fellow of our College.

Those who have been to a College scientific meeting in the last few years will likely have heard Prof Dietz speak on this topic. In many ways, the message he has for us can be considered confronting. With this in mind, we have invited Peter to encapsulate his message and conclusions for the readers of *O&G Magazine*. As always, we hope this article will stimulate discussion and debate and we look forward to hearing from our readership.

A/Prof Steve Robson, O&G Magazine Advisory Committee

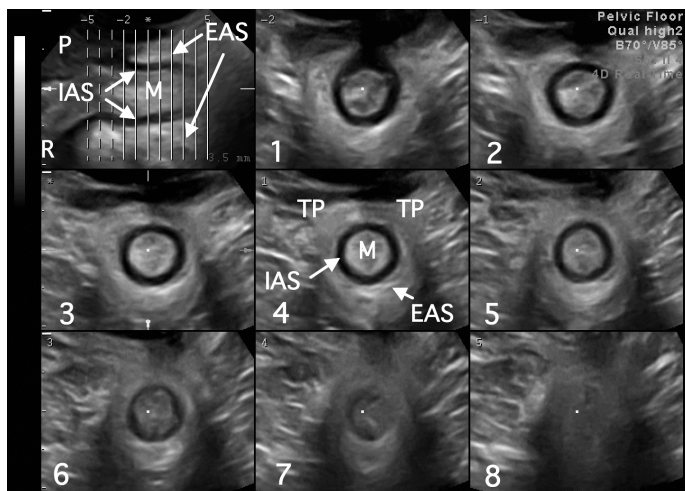


Figure 2. Normal appearances of the anal canal in a nulliparous patient as seen on translabial tomographic ultrasound. The top left image shows the midsagittal plane, the remaining eight slices are placed from just above the EAS (slice 1) to just below the IAS (slice 8), encompassing the entire EAS. Reproduced with permission.<sup>2</sup>

patient. The anal canal undergoes marked displacement and distortion during childbirth. It is protected to some degree by the pyramidal fibromuscular structure of the perineal body, but as this is commonly disrupted during a first vaginal delivery, this protection is rather incomplete.

In the past, episiotomy was employed to prevent extension of a perineal midline tear into the anal sphincter. It is commonly assumed that episiotomy does not protect the anal sphincter<sup>8</sup>, but all studies in this field to date have used clinical diagnosis as an outcome measure. Since we now know that the clinical diagnosis of sphincter tears is often inadequate<sup>1,2</sup>, this issue will have to be revisited. It is conceivable that the association between episiotomy and sphincter tears seen in past trials is a detection artefact, owing to a higher likelihood of correct diagnosis in women in whom tissues were exposed by an episiotomy.

## Trauma to the levator ani

The levator ani muscle plays a major role in childbirth as it is the major soft tissue structure defining the dimensions and biomechanical properties of the vagina.<sup>9</sup> During a vaginal delivery it has to undergo substantial distension.<sup>10,11</sup> Data from muscle physiology research suggests that skeletal muscle will not stretch to more than twice its length without suffering ultrastructural or macroscopic trauma.<sup>12</sup> It is therefore remarkable that in about half of all women there is no appreciable alteration in distensibility or morphological appearance after vaginal childbirth, and we assume that this is somehow owing to the protective hormonal effects of pregnancy.

The commonest form of macroscopic levator trauma is an avulsion:

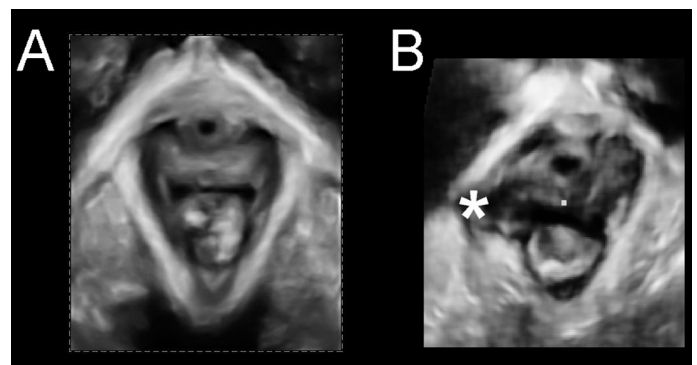


Figure 3. A comparison of ultrasound findings in a normal patient (A) and in a patient with a typical right-sided avulsion (B); rendered volume, axial plane, indicated by a '\*'. It is evident that the morphological abnormality documented here is an 'avulsion' of the puborectalis muscle insertion, i.e., the muscle has separated from its bony insertion.

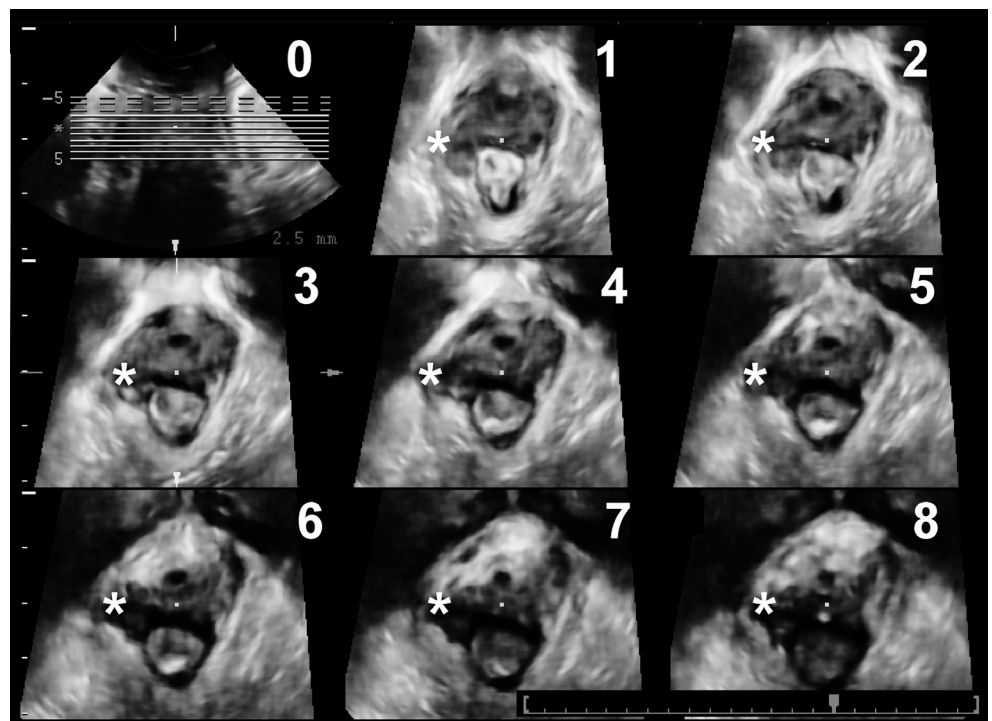


Figure 4. Assessment of the puborectalis muscle by tomographic or multislice ultrasound. Image 0 represents a reference image in the coronal plane. Images 1–8 show slices parallel to the plane of minimal hiatal dimensions. Slices 1 and 2 are 5 and 2.5mm below this plane, slice 3 represents the plane of minimal dimensions and slices 4–8 are 2.5–12.5mm above this plane, likely encompassing the entire insertion of the puborectalis. Reproduced with permission.<sup>20</sup>

a traumatic dislodgment of the puborectalis muscle from its bony insertion (see Figures 3 and 4). This has a substantial impact on hiatal dimensions.<sup>13</sup> In addition, there is irreversible overdistension of the levator hiatus in more than a quarter of all women after vaginal childbirth.<sup>5</sup> Excessive distensibility of the hiatus ('ballooning'), whether as a result of childbirth or congenital, is associated with prolapse<sup>14</sup> and prolapse recurrence.<sup>15</sup> Ballooning and avulsion, while often associated, seem to be independent predictors of prolapse and prolapse recurrence.<sup>15,16</sup> Appearances are rarely consistent with pudendal neuropathy, which in the past was considered the main aetiological factor in pelvic floor dysfunction<sup>17,18</sup>, even in women after severely obstructed labour.<sup>19</sup>

Avulsion is most commonly diagnosed by tomographic ultrasound<sup>20</sup> (see Figure 4) or magnetic resonance imaging (MRI)<sup>21</sup>, but it is palpable vaginally.<sup>22-25</sup> It requires some instruction, but diagnosis



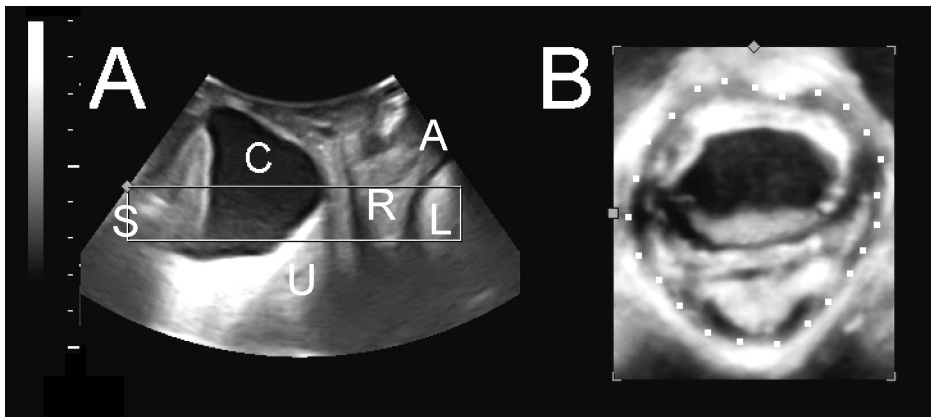


Figure 5. Typical findings in a patient with a third-degree cystocele (indicated with a 'C' in image A), bilateral avulsion and marked hiatal ballooning, the latter visible in the axial plane in B, with a dotted line illustrating the hiatus. S = symphysis pubis, C = cystocele, U = uterus, R = rectal ampulla, A = anal canal.

by palpation can very likely be as valid as diagnosis by imaging.<sup>26</sup> The index finger is placed parallel to the urethra, with the tip of the finger at the bladder neck and its palmar surface adjacent to the posterior/dorsal surface of the os pubis. An intact muscle leaves just enough room to fit the palpating finger between urethra medially and insertion of the puborectalis muscle laterally. If there is no muscle palpable on the os pubis and its inferior ramus immediately lateral to a finger placed parallel to the urethra and if this finger can be moved over the inferior pubic ramus without encountering muscle for 2–3 cm, a diagnosis of levator avulsion is made. Poor contraction strength can help alert the examiner to an increased likelihood of avulsion<sup>25</sup>, and there are a number of other predictors.<sup>27</sup>

Avulsion often causes marked asymmetry of the hiatus<sup>28</sup> and sometimes this asymmetry is evident even on clinical inspection. On Valsalva, the anus and perineum are displaced towards the healthy side, pushed by a prolapse descending preferentially on the avulsed side. On pelvic floor muscle contraction, the perineum and anus are pulled by the contralateral intact muscle, again resulting in displacement towards the healthy, undamaged side.

While about 10–30 per cent of women will suffer macroscopic levator trauma<sup>5,29–35</sup>, there is an even greater number who sustain 'microtrauma', in other words irreversible overdistension of the levator hiatus.<sup>5</sup> The predictors of microtrauma may vary from those that predict levator avulsion.<sup>5</sup> It is not yet clear what the long-term impact of such morphological and functional changes is, but neither ongoing deterioration nor 'healing' is likely to be common.<sup>36</sup>

It is likely that factors such as birthweight, length of the second stage, size of the fetal head and forceps delivery increase the probability of avulsion injury.<sup>5,29–35,37</sup> However, such 'predictors' are of very limited use since they are not available before the onset of labour. In order to prevent levator avulsion, we would need predictors that can be determined during pregnancy. In some studies, avulsion seems associated with maternal age at first delivery.<sup>29,38,39</sup> Finally, there is ample evidence suggesting it is usually the first vaginal delivery that causes by far the most morphological and functional alteration, both in terms of actual tears as well as in terms of levator distensibility or pelvic organ support.<sup>40–43</sup>

Traumatic disconnection of the levator ani from its insertion has substantial consequences for function. Contraction strength as estimated by Oxford grading<sup>25</sup> and instrumented speculum<sup>44</sup> is reduced by about a third, an observation that may help diagnose levator trauma. Avulsion results in a hiatus that is larger (by 20–30 per cent), especially in the coronal plane<sup>45</sup>, more distensible and less contractile.<sup>44,13</sup> Most importantly, avulsion is associated with symptoms and signs of prolapse.<sup>23,25</sup> Women seem to notice the effect of

avulsion as a reduction in contraction strength on pelvic floor muscle contraction<sup>46,47</sup> and as increased vaginal laxity and reduced tone on intercourse.<sup>48</sup>

In the medium to long term, levator avulsion is associated with anterior and central compartment prolapse and likely represents at least part of the missing link between childbirth and prolapse.<sup>49</sup> The larger a defect is, both in width and depth, the more likely are symptoms and/or signs of prolapse.<sup>50</sup> Levator avulsion seems to markedly increase the risk of significant anterior and central compartment prolapse.<sup>51</sup> Figure 5 shows typical findings in a patient with bilateral avulsion, marked hiatal ballooning and a third-degree cystocele.

The most important issue for clinical practice is that both avulsion and ballooning seem to be risk factors for prolapse recurrence both on ultrasound<sup>51–54</sup> and on MRI.<sup>55</sup> This implies that such findings should be obtained preoperatively and are likely to be useful for surgical planning. Use of anchored anterior compartment mesh may partly compensate for the increased recurrence risk conveyed by avulsion.<sup>56</sup> Diagnosing levator avulsion and/or hiatal ballooning may not require imaging. Both avulsion<sup>20</sup> and ballooning (via 'genital hiatus' [gh] and 'perineal body' [pb] measurements included in the International Continence Society Pelvic Organ Prolapse Quantification System [POP-Q] system) can be diagnosed clinically, and we have determined a cut-off of 7 cm for the sum of gh and pb to define ballooning clinically.<sup>57,58</sup>

Avulsion does not seem to be associated with stress urinary incontinence (SI) and urodynamic stress incontinence (USI)<sup>59,60</sup>, and there is conflicting evidence as regards fecal incontinence.<sup>61,62,63</sup> Sexual function may also be impacted, especially owing to reduced vaginal tone or 'vaginal laxity', but there is little information on this issue so far.

### Trauma to EAS and IAS

EAS and IAS trauma is much more common than generally assumed, and commonly missed in the delivery suite. Obstetric anal sphincter injuries (OASIS) are considered an important risk factor for faecal incontinence and are commonly identified among women with anal incontinence in later life.<sup>4</sup> The reported incidence of OASIS varies between 0.5 per cent and five per cent<sup>64,65</sup>, which is clearly an underestimate.<sup>66</sup> Up to 35 per cent of primiparous women have been found to show evidence of OASIS on transanal ultrasound at six weeks postpartum.<sup>67</sup> A meta-analysis of 717 vaginal deliveries showed an incidence of anal sphincter defects in 26.9 per cent of primiparous women<sup>68</sup> on endo-anal ultrasound, and own work using transperineal exo-anal 3D/4D ultrasound demonstrated significant EAS defects in 28 per cent of women after a first vaginal delivery. Of such defects,



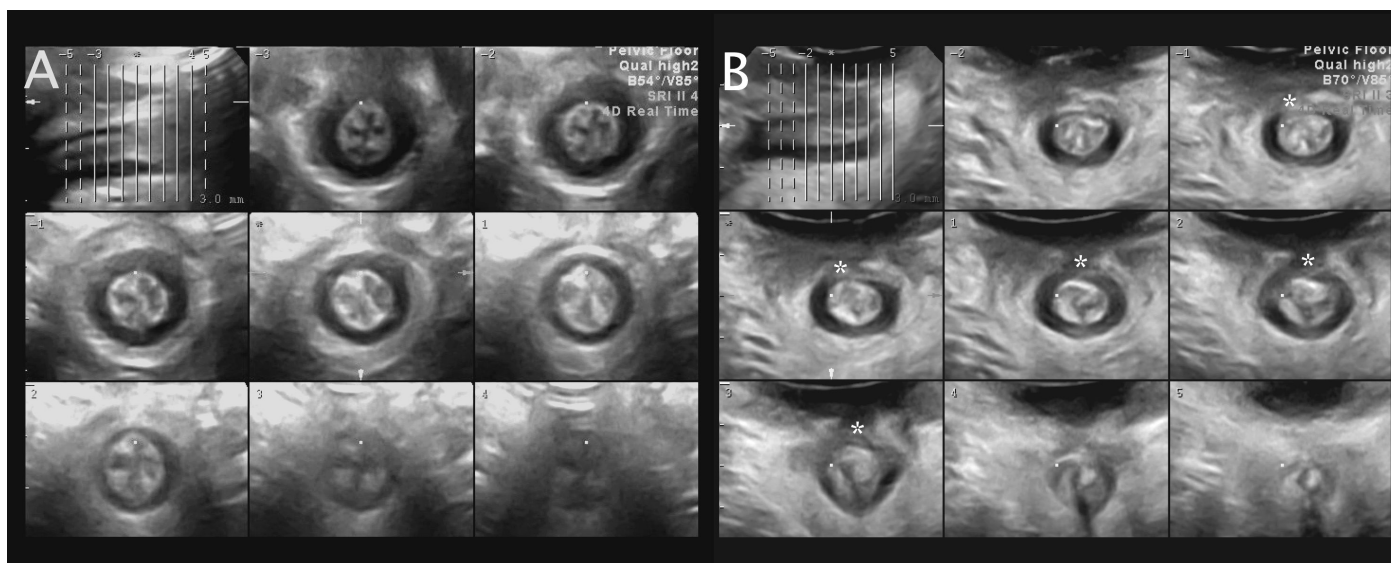


Figure 6. Anal sphincter at 36 weeks gestation (a) and after normal vaginal delivery at term, with a second-degree perineal tear documented in the delivery suite. There is a complete defect of the external anal sphincter (\*) (b). The top left image in both parts shows the anal canal in the midsagittal plane. The rest are coronal slices through the anal canal at 3mm interslice intervals. Reproduced with permission.<sup>57</sup>

87 per cent were undiagnosed clinically.<sup>2</sup> This may be either owing to missed diagnosis or because of clinically occult trauma.<sup>1,69-71</sup> Either way, it is evident that the assessment of anal sphincters requires imaging, since clinical data are of very limited utility.

The anal sphincters are commonly evaluated with endoanal ultrasound, which is regarded as the gold standard. However, this technique is not universally available. In addition, endoanal imaging is invasive, involving the insertion of an ultrasound probe into the anal canal. This distorts anatomy and precludes dynamic evaluation of the anal sphincter and mucosa on sphincter contraction which seems to enhance the definition of muscular defects.<sup>72</sup> The method is probably not suitable for routine imaging after childbirth, and this has hampered translation into clinical practice. Exo-anal or transperineal ultrasound<sup>73,74</sup>, on the other hand, does not have these disadvantages and is increasingly used to evaluate the anal sphincters. A recent study comparing 3D transperineal ultrasound and 2D endo-anal ultrasound in the detection of anal sphincter defects has shown good agreement between the two techniques.<sup>75</sup> One major advantage of the exo-anal method is that it is easily combined with imaging of other pelvic floor structures such as the levator ani muscle. Figure 6 shows a tomographic representation of normal EAS and IAS at 36 weeks and an obvious EAS defect three months after a normal vaginal delivery with only a second degree tear documented at birth.

## Clinical consequences

### Informed consent

First and foremost, we have a legal obligation that arises from the patient's right to know of material risks, a right which in turn arises from the patient's right to decide whether or not to submit to the medical treatment proposed.<sup>76</sup> There can be no doubt that maternal birth trauma is a common enough risk (affecting 30–50 per cent of all primiparae after a vaginal delivery) to require disclosure.

### Maternity services performance

The fiduciary duty we have regarding patient care also implies that we need to provide information to policymakers and health services. We need to promote the use of maternal pelvic floor trauma as a performance indicator of maternity services, since it has potential

consequences for future life, even if it may take decades for clinically overt conditions to develop.<sup>77</sup> As clinical diagnosis is insufficient, assessment of maternal birth trauma may require imaging two or more months after childbirth. Such a postnatal service would not just allow the noninvasive diagnosis of levator trauma and OASIS, but would also provide an opportunity to discuss issues not commonly given a high priority in the immediate postpartum period, such as contraception and sexual health.<sup>78</sup> It would also allow for a debriefing after traumatic childbirth and enable earlier recognition of postnatal depression, a condition that is one of the top causes of maternal childbirth-related mortality.<sup>79</sup>

### Prevention

An immediate clinical consequence should be to discourage forceps delivery. Forceps (as opposed to vacuum) is a modifiable risk factor for both levator avulsion and OASIS and should be avoided if possible. While perineal protection may have some value for the prevention of anal sphincter trauma, all data currently available use clinical diagnosis as main outcome measure and are therefore of very limited utility.

As levator avulsion and obstetric anal sphincter trauma are exclusively caused by vaginal childbirth, elective caesarean delivery would be expected to completely prevent such trauma. On the current state of the literature, it would be difficult to defend a policy that denies women the right to elective caesarean delivery on maternal demand. However, caesarean section has substantial disadvantages, both for mother and infant, which are beyond the scope of this paper. Hence, other forms of prevention may be more practicable, such as attempts to change the biomechanical properties of the birth canal.

There is a commercially available device, the Epi-No™, that is used to dilate the perineum and vagina in the last few weeks of pregnancy, and this device has been shown to reduce perineal trauma.<sup>80</sup> The Epi-No is currently under investigation regarding a potential role in pelvic floor protection in the unit of the author, and results of a pilot study are promising.<sup>81</sup> There are several other interventions that could be tested for a potential protective role. Since the degree of trauma sustained by skeletal muscle on stretching is directly proportional to the amount of work needed to elongate the muscle,<sup>12</sup> it seems reasonable to expect

that muscle paralysis (via a pudendal nerve block or a dense epidural) might effect a reduction of trauma. We have commenced a pilot randomised controlled trial to test such a hypothesis.

## Conclusions

Urogynaecology is undergoing a period of rapid change and development owing to the recent introduction of modern functional imaging. The most marked impact of this change in our diagnostic capabilities has been on the issue of childbirth-related pelvic floor trauma. It is likely that women will increasingly demand action on this count as they become aware of the risks that vaginal childbirth poses to their future health.

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# A connective tissue connection

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The role of collagen and its association with female pelvic organ prolapse.

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Female pelvic organ prolapse (POP) is a common condition, with a 19 per cent lifetime risk of a woman requiring surgical treatment in Australia.<sup>1</sup> Multiple risk factors for prolapse development have been described over the years, including age, parity and vaginal childbirth, with its associated pelvic floor trauma such as levator avulsion.<sup>2</sup> More recently, the focus has shifted towards correlation with genetic traits and underlying connective tissue disorders.

A patient with a family history of POP is two-to-three times more likely to develop prolapse than a patient with a negative family history.<sup>3</sup> Likewise, women with collagen-associated disorders – such as Marfan syndrome or Ehlers-Danlos syndrome – are more likely to present with greater stages of prolapse and higher risks of prolapse recurrences.<sup>4</sup> It has been shown in a population-based cross-sectional study the odds ratio (OR) of 1.8 for a positive association with symptomatic prolapse in women with a history suggestive of deficient connective tissue.<sup>5</sup> These patients may present with clinical features of connective tissue dysfunction such as varicose veins, hernias and haemorrhoids.

Alteration in collagen synthesis and metabolism has been thought to contribute to defective fascia, thus compromising pelvic organ support.<sup>6</sup> Within the connective tissue of supporting ligaments and the vagina is an intricate network of fibrillar components, such as collagen and elastin, as well as non-fibrillar components, such as proteoglycans, hyaluron and glycoproteins. Together, these form the extracellular matrix (ECM). The ECM undergoes a constant remodelling process; synthesis of collagen by fibroblasts and degradation by matrix metalloproteinase (MMPs), which can be inhibited by tissue inhibitors of metalloproteinases (TIMPs).

There are approximately 28 types of collagen within these matrices, with the main subtypes being Type I to Type V. Subtypes more commonly found in the pelvic floor are Type I, which are longer and thicker fibres providing strength, such as those found in ligaments, while Type III collagen contributes to tissue elasticity, often found within fascia and skin. Several studies have looked at ratios of Type I to Type III collagen in supportive pelvic structures, such as uterosacral and cardinal ligaments of women with POP. Unfortunately, data on collagen quantification in these structures have been conflicting as methods of assessing collagen morphology, deciding appropriate sites to biopsy as well as the small sample population studied have all contributed to the heterogeneity. Nonetheless, the overall trend found in most studies have showed a general reduction in total collagen with an increase in the Type III to I ratio, suggesting increased tissue laxity and poor tissue integrity in women with prolapse.

The balance of synthesis and metabolism of collagen involves activity of fibroblasts, elastin and collagen regulators such as the MMPs and TIMP. Collagen fibroblasts alter their actin cytoskeleton when under load thus resulting in poorer function when stretched.<sup>7</sup> In fact, Kokcu

et al<sup>8</sup> have found reduced density of fibroblasts in the uterosacral ligaments and paravaginal fascia in women with prolapse. Elastin is another component found within the ECM, responsible for tissue elasticity and recoil of tissue across all organs of the body. Tissue strength is reliant on the integrity of the elastin and collagen fibre crosslinks. There appears to be a general trend towards decreased level of elastin in the pelvic tissue of women with prolapse.<sup>9</sup>

As opposed to fibroblasts and elastin, an increased MMP expression indicates an accelerated remodelling and collagen degradation process. There are several types of MMP, with expression of MMP 1, 2 and 9 being increased in women with prolapse. It is not known, however, whether these alterations in the ECM are the result of injury caused by increased load on these structures or an intrinsic condition leading to tissue laxity and prolapse. The cause-and-effect relationship is difficult to investigate, especially since many of these studies are on women with prolapse. An ideal study to quantify the natural history of collagen dysfunction and its association with prolapse would be to biopsy unaffected women and monitor over time for prolapse.

‘Several gene mutations have been linked to abnormal extracellular matrix remodelling and associated prolapse development.’

## Genetic predisposition

In the last five years, there has been a growing research interest in identifying genetic variance implicated in POP. Several gene mutations have been linked to abnormal extracellular matrix remodelling and associated prolapse development. It appears genes such as HOXA11 and COL3A1 govern the synthesis of MMP enzymes. Changes or alteration in the genetic coding can affect the regulated function of these MMPs. Mutation in the gene expressing MMP was seen in a study on Taiwanese women with prolapse compared to control. In that study, Chen et al found that women with MMP genetic polymorphism had higher risks of prolapse with an OR 5.41 and 5.77.<sup>10</sup> Connell et al demonstrated that the HOXA11 gene coded for uterosacral ligament development.<sup>11</sup> In genetically modified mice models where the HOXA11 gene was deleted, there was an absent of uterosacral ligament development. Hence it was postulated that the HOXA11 gene regulates the metabolism of extracellular matrix, and it appears that the HOXA11 gene expression is reduced in women with POP.

Other genes involved are those of COL3A1, COL181A and COL1A1. Nucleotide polymorphisms in the COL3A1 genes have been found to be associated with prolapse<sup>6</sup>, which may suggest the association between these gene mutations and that of defective



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collagen structure. This is evident in patients with Type IV Ehlers-Danlos syndrome who have COL3A1 gene mutations. These patients often present with more severe and difficult to treat POP, poorer tissue quality and compromised wound healing.<sup>4</sup>

**Clinical implication**

The aetiology of prolapse is multifactorial and patient education is paramount. The ability to provide as much information on factors that can increase the risk of prolapse development and prolapse recurrence is useful for patient counselling. Unfortunately, to date, the availability of such genetic testing in Australia has been limited, however, it may become more accessible with increased demand by informed clinicians. Increased knowledge of the genetic disorders currently linked to prolapse development means patients with clinical features of a connective tissue disorder can be screened prior to prolapse treatment and warned of the possible increased risk of failure with surgical intervention.

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# Unintended benefits?



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Can pelvic floor dysfunction be prevented by caesarean section? Findings from the ProLong and other epidemiological studies.

Pelvic floor dysfunction (PFD) in women results in the combination of some or all of the following conditions: urinary incontinence (UI), faecal incontinence (FI) and pelvic organ prolapse (POP). It also influences sexual function.

It is a very common problem, with over 46 per cent of women having some form of major pelvic floor dysfunction and is of epidemic proportions in later life.<sup>1</sup> Approximately 11 per cent of women undergo surgery for this condition during their lifetime, seven per cent for prolapse alone.<sup>2</sup> In the USA, POP is thought to lead to over 200 000 surgical operations a year, resulting in an annual expenditure of US\$1 billion.<sup>3</sup> Pelvic floor dysfunction surgery numbers are likely to increase substantially as the population ages.<sup>4</sup> Therefore not only does this have significant cost implications for health services throughout the world, but it also has a significant effect on

the quality of life for a large number of women. Consequently, it is of great importance to identify possible aetiological factors with a view to subsequent prevention or reduction of its impact.

Pregnancy and childbirth are believed to be significant predisposing factors for PFD in women. Modern imaging techniques of 3D/4D ultrasound and magnetic resonance imaging (MRI) have shown that trauma and avulsion, in particular, to the levator ani muscle, have been reported in 20–40 per cent of primipara.<sup>5</sup> Damage to the pudendal nerve and endo pelvic fascia have also been described with vaginal birth.<sup>6</sup>

Obstetric demographics have changed over the last few years: there is now a definite trend in the developed world for women to be older when they have their first baby, babies are heavier and mothers' BMIs are greater than in previous years. These are all risk factors for PFD. Women are also having fewer babies.<sup>7</sup> Consequently, more women are asking the question about whether caesarean section is protective for subsequent pelvic floor dysfunction.

To answer this and to examine the relationship of other aspects of obstetric practice with subsequent pelvic floor dysfunction (UI, FI, POP and sexual dysfunction), we started our collaborative

longitudinal study ProLong (PROlapse and incontinence LONG-term research study). This commenced in 1993–94 and involved the Universities of Otago, Birmingham and Aberdeen in the UK. This is the largest ongoing prospective study in this field and involves a cohort of nearly 8000 women of whom just under 50 per cent returned questionnaires at three months, six and 12 years after delivery.<sup>8,9</sup> Women were also examined at the 12-year follow up.<sup>10</sup> It is planned to carry out the 20-year follow up in 2014. In this article the 12-year results of the ProLong study will be presented and compared with other epidemiological studies, with particular emphasis on whether caesarean section is protective for subsequent PFD.

## Urinary incontinence

At 12 years after delivery, urinary incontinence is very common, with just over 50 per cent of women having this complaint. Women who delivered exclusively by caesarean section were less likely to have UI in comparison to women who delivered vaginally, (vaginal delivery 55 per cent versus caesarean 40 per cent, OR 0.46:95 per cent CI 0.37–0.58), but not if they had a combination of caesarean and spontaneous vaginal births.<sup>10</sup>

A similar reduction is seen at 20 years after delivery in the Swedish National Survey of pelvic floor dysfunction, the SWEdish Pregnancy Obesity Pelvic floor (SWEPOP) study. This involved just over 5000 primiparous women who delivered in 1985–88 with no further births and were sent and returned a questionnaire in 2008. In that study, the prevalence of urinary incontinence after vaginal delivery was 40.3 per cent in comparison to delivering by caesarean section, which was 28.8 per cent [OR 1.67: 95 per cent CI 1.45–1.92].<sup>11</sup>

Both studies showed that there was no difference with an emergency or elective caesarean section. Other risk factors for UI are older maternal age at first birth, having four or more babies and higher BMI. Age at delivery increased the UI risk by three per cent annually, and there was an eight per cent increased risk of UI per current BMI unit in the SWEPOP study.<sup>11</sup>

Exclusive caesarean section delivery would appear to offer only partial protection for UI. However, 40 per cent of these women still report incontinence in our ProLong study, confirming a significant pregnancy effect.

## Faecal incontinence

At three months after delivery, women who delivered exclusively by caesarean section were less likely to have faecal incontinence in comparison to women who delivered vaginally. However, at six and 12 years after delivery, any protection was lost.<sup>9,10,12</sup>

However, one or more forceps delivery would appear to be a significant risk factor for FI three months, six and 12 years after delivery (OR 2.08, 95 per cent CI 1.53–2.85).<sup>10</sup>

Similar findings of lack of effect of caesarean section on FI was

noted in the Cochrane Review involving seven studies.<sup>12</sup> This lack of effect was irrespective of whether the caesarean was elective or emergency.

It is surprising that caesarean section does not prevent FI, especially with the associated perineal trauma with vaginal birth. However, it is now believed that pregnancy and not just labour and delivery is an initiating factor<sup>13</sup> and it may also affect defaecation afterwards.

## Pelvic organ prolapse

Caesarean section would appear to confer more protection for POP in comparison to UI. In the ProLong study, 762 women were examined and just over 50 per cent had stage 2 prolapse.<sup>14</sup> Exclusive caesarean section was associated with a reduced risk of objectively measured signs of prolapse 12 years after delivery (vaginal delivery 29 per cent versus caesarean five per cent, OR 0.11; 95 per cent CI 0.03-0.38)<sup>14</sup> and symptoms of prolapse 20 years after delivery in the SWEPOP study (vaginal delivery 14.6 per cent versus caesarean 6.3 per cent, OR 2.55; 95 per cent CI 1.98-3.28).<sup>15</sup> Both studies showed other risk factors for POP were older maternal age at first birth and higher parity; and in the SWEPOP study symptomatic POP increased three per cent with each unit increase of current BMI and by three per cent for each 100g increase of infant birth weight. Mothers under 160cm who delivered a child with a birth weight >4000g had a double prevalence of symptomatic prolapse compared with short mothers who delivered an infant weighing <4000g (24.2 v 13.4 per cent, OR 2.06; 95 per cent CI 1.19-3.55).<sup>15</sup>

In another Swedish study<sup>16</sup>, a cohort of almost 30 000 women having their first and all subsequent deliveries by caesarean section, were matched with over 60 000 women having only vaginal births and they were linked with the Inpatient Register of Incontinence and Prolapse Surgery over a mean follow up of 26 years. There was a significant increase in prolapse surgery with vaginal delivery in comparison to caesarean section (hazard ratio 9.2; 95 per cent CI 7-12.1) and a dramatically increased risk with forceps (hazard ratio 20.9; 95 per cent CI 5.5-79.9) in comparison to a caesarean delivery.<sup>16</sup>

## Sexual function

In the six-year ProLong follow up of 2765 women who completed the Golombok and Rust (Reference Inventory of Sexual Satisfaction) women who suffered from UI or FI scored lower on all questions pertaining to sexual function.<sup>17</sup> Type of delivery, however, appeared to have only little effect, except women having caesareans rated their vaginal tone better than those having other types of delivery.<sup>17</sup> Similar findings were found in a recent study using newer validated questionnaires including the Prolapse Incontinence Sexual Questionnaire Short Form (PISQ-12).<sup>18</sup> At 12 months postpartum there was no difference in sexual function between women who had a vaginal delivery compared to caesarean section. Women who had an episiotomy had worse sexual function at six months; however, this had resolved by 12 months post-birth.

Overall, the literature suggests there is no significant difference in sexual function between women who had a vaginal delivery compared to women who had an elective caesarean delivery in the long term. There may be some difference in the short term, when any insult to the perineum heals, however this does not appear to be significant in the longer run.

## Prevention of PFD

Prevention of PFD should be discussed with every pregnant woman as part of their routine antenatal care. This should include pelvic floor muscle training, modifiable risk factors (avoid smoking, constipation and maintain a normal BMI<sup>19</sup>) and possible elective caesarean section for women at greatly increased risk of PFD.

At present, it is difficult to identify these at-risk women and a major priority for future urogynaecological research is to identify this group of women. Unfortunately, there is no currently available antenatal biochemical or genetic test of constitutionally/genetically weak connective tissue (which is another risk factor for PFD). We are currently working on a predictive score for PFD using our databases, which we believe will be helpful to identify these at-risk women and also help to counsel women regarding prevention of PFD, including elective caesarean section.

Table 1. ProLong and other epidemiological studies – conclusions to date.

Urinary incontinence	Faecal incontinence	Prolapse	Sexual satisfaction
Proportion of women who experience urinary incontinence increases from about a third soon after delivery to over half 12 years later.	The risk of long-term faecal incontinence is significantly higher after having had one or more forceps deliveries.	Stage 2 prolapse 'normal' for parous women.	Minimal effect of mode of delivery on sexual satisfaction.
Partial protection from delivery by caesarean section exclusively, but prevalence still high.	No increased risk by vacuum extraction.	Exclusive CS delivery significantly reduces risk of objectively measured prolapse 12 years after delivery and a reduced risk of symptoms by 20 years.	Incontinent women scored worse than continent women for all sexual satisfaction questions.
No difference between elective and emergency caesareans.	No evidence of a reduced likelihood of long-term faecal incontinence for women who had delivered exclusively by caesarean section.	Having a first baby at over 30 years of age increases risk of POP.	
Protection lost with subsequent vaginal deliveries.		Second and subsequent babies increase risk of POP.	
Other risk factors for urinary incontinence:		Women having only vaginal deliveries (and, in particular, forceps delivery) have an increased risk of POP surgery.	
<ul style="list-style-type: none"> <li>older maternal age at first birth;</li> <li>having four or more babies; and</li> <li>higher BMI.</li> </ul>			

## Conclusion

Based on the current epidemiological evidence, caesarean section offers partial protection for pelvic organ prolapse and, to a lesser degree, UI. It appears to offer no benefit in reduction of faecal incontinence, nor has any significant effect on sexual function. A major priority in urogynaecological research is to identify at-risk women who may benefit from elective caesarean section to prevent subsequent PFD.

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# The final stretch



Dr Brett Daniels  
FRANZCOG

Increasing numbers of women are using, or being encouraged to use, perineal stretching programs in the weeks before birth – do these programs work?

Perineal trauma during vaginal birth is a concern for both women and the professionals caring for them. Trauma may result in both short- and long-term sequelae including pain, incontinence, dyspareunia and psychological distress. There is an increased risk of perineal

trauma in primiparous women, women receiving instrumental deliveries and/or episiotomy and deliveries of high birthweight babies. For these reasons, it is attractive for women to be able to prepare their perineum for childbirth to try and reduce the incidence and severity of damage. The methods of doing this include the EPI-NO® childbirth training device and antenatal perineal massage.

The EPI-NO was invented by a German obstetrician as a childbirth and pelvic floor trainer. It consists of an inflatable silicone balloon that is attached to a hand-operated pump equipped with a pressure display. Women are instructed to insert the balloon into their vagina and inflate it until they feel pressure, but not pain. They then can contract and relax their pelvic floor muscles and gently expel the inflated device to simulate childbirth. Women are instructed to use the device from 36 weeks gestation and gradually increase the size to which the balloon is inflated. Women will generally use the device for one or two sessions of about 15 minutes daily. Proponents of the device suggest it may reduce perineal trauma by allowing gentle slow stretching of the perineal structures in the antenatal period, rather than a rapid traumatic tear during delivery. Shek et al draw the analogy of gradual stretching being used to avoid muscle injury in sports training.<sup>1</sup>

In 2004, Kovacs et al performed a pilot study in Melbourne in which 39 women who used the EPI-NO device for 15 minutes a day for 14 consecutive days between 37 and 39 weeks gestation and then had a vaginal delivery, were compared to 248 control women who had vaginal births at the same unit in the same period. While these are very small numbers, the authors found the use of the Epi-No significantly increased the rate of intact perineum (46 per cent in the study group, 17 per cent in the control group), and reduced the risk of tearing (28 versus 49 per cent). Rates of episiotomy and instrumental delivery did not significantly differ between the two groups. Hillebrenner et al performed a prospective study comparing 50 primiparous volunteers who used the EPI-NO who used the device for ten minutes per day from 38 weeks gestation until spontaneous vaginal delivery.<sup>2</sup> The labour outcomes for these women were compared to all women fulfilling the same inclusion criteria and delivering at their unit in the study period. The authors report a significantly reduced episiotomy rate in the EPI-NO compared to the control group (82 versus 47 per cent). They also reported a significantly higher neonatal Apgar score at one minute, but not at five or ten minutes.<sup>3</sup>

Kok et al reported a further prospective uncontrolled study of the EPI-NO in Singapore in 2004. The authors compared episiotomy rate, perineal trauma and postpartum analgesia requirements in 31 primiparous women who had used the EPI-NO from 37 weeks until delivery, with 60 consecutive primiparous women delivering in the unit over the same period. Women trained with the EPI-NO were instructed to use it for a maximum of 15 minutes per day with a mean frequency of use of five times per week for two weeks. The authors report a significantly decreased rate of episiotomy at vaginal in the EPI-NO group compared to the control group. It should,



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however, be noted that the rates of episiotomy for the two groups were 65 and 93 per cent, respectively.<sup>4</sup>

More recently, there have been a number of randomised controlled trials of the EPI-NO. Ruckhäberle et al reported a multicentre trial in which 276 nulliparous women were randomly allocated to either use the EPI-NO for at least 15 minutes per day from 37+1 weeks of gestation, while the control group received routine obstetric care.<sup>5</sup> Data for four women were not available at follow-up. There was no significant difference in mode of delivery between the two groups. There was, however, a significantly higher rate in intact perineum at vaginal delivery in the EPI-NO compared to the control group (37 versus 26 per cent). However, there was no significant difference in the degree of perineal tear or rate of episiotomy (41 versus 50 per cent). The authors reported no significant differences in duration labour, umbilical artery pH at birth or Apgar scores. The study showed no significant differences at six months in bladder neck mobility as measured by introital ultrasound, occult anal sphincter trauma measured by endo-anal sonography, or anal pressure at rest or with squeezing. During training with the device, eight per cent of women reported bleeding, nine per cent reported pain and six per cent abandoned training before delivery. There was no difference in vaginal infection rates between the two groups.

Shek et al report an Australian randomised controlled trial of 200 nulliparous singleton pregnancies, with 104 women receiving training in the EPI-NO and asked to use it up to two 20-minute sessions daily from 37 weeks gestation until delivery, while the control group of 96 women received normal care.<sup>1</sup> Of the 146 women who returned for postpartum assessment at about five months after delivery, there was no significant difference in rates of episiotomy (EPI-NO: 22 per cent; control: 29 per cent), intact perineum (64 versus 74 per cent) mode or duration of delivery or Apgar scores. The authors' main aim was to examine for levator ani muscle avulsion and microtrauma using 4D ultrasound. In a treatment received analysis there was a non-significant trend for both levator avulsion (seven versus 12 per cent) and levator microtrauma (21 versus 30 per cent) in the EPI-NO compared to the control group.

While studies of the EPI-NO are of variable quality, it does appear there may be a beneficial effect of the EPI-NO on reducing perineal damage during vaginal delivery, especially with nulliparous women. Furthermore, there doesn't seem to be an increase in pelvic floor damage or infection associated with antenatal use of the device.

An alternative to the EPI-NO device is antenatal perineal massage. Women may either perform perineal massage themselves – gently stretching their perineum by placing their thumbs inside their vagina and applying pressure to their perineum – or their partners may perform similar massage using their fingers. Beckmann and Stock performed a Cochrane review that included four randomised controlled trials including nearly 2500 women of antenatal perineal massage to reduce perineal trauma. Nulliparous women receiving antenatal perineal massage had a significantly reduced risk of requiring suturing (RR=0.91, 95 per cent CI=0.86-0.96) or an episiotomy (RR=0.84, 95 per cent CI=0.74-0.95). Multiparous women who received perineal massage had significantly reduced pain at three months postpartum compared to control women (RR=0.45, 95 per cent CI=0.24-0.87). There were no significant differences for either nulliparous or multiparous women for degree of perineal tear, rate of instrumental deliveries or urinary, flatal or faecal incontinence.

Both antenatal perineal massage and the use of the EPI-NO device appear to provide some benefit in reducing perineal trauma with vaginal childbirth. Furthermore, they do not seem to cause significant perineal trauma or infection. Many women may find their use an acceptable method for improving perineal outcomes of birth.

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## VOLUNTEER OBSTETRICIANS NEEDED IN ETHIOPIA

Up to one in 16 women are dying from pregnancy and related conditions during their lifetimes in sub-Saharan Africa. Almost all of these deaths can be prevented. Ethiopia accounts for more maternal deaths than any other country in the region.

Dr Andrew Browning, currently resident in Tanzania, is seeking volunteer qualified obstetricians and midwives to work in regional hospitals in Ethiopia.

One such hospital is in a town called Barhir Dar in Northern Ethiopia. It seeks to serve the millions of women who cannot afford basic maternity care in the government hospitals.

The volunteers will have the chance to impact on the lives of women and their families in a very real way and also to train the local health staff in emergency obstetric care.

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# The unkindest cut?



**Lesley Dixon**  
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Midwifery Advisor  
**New Zealand College of  
Midwives**

Does episiotomy still have a role to play in preventing injury to the pelvic floor during birth?

A recent newspaper article has highlighted the issue of performing an episiotomy during a normal birth – especially when done without the woman's consent. Amy Herbst is an American opera singer who gave birth to a boy in an Army hospital in Kentucky, USA, in 2012.<sup>1</sup> She was reported to be suing the government for \$2.5 million

for having a procedure (episiotomy) that was not discussed with her and has left her with anal incontinence and dyspareunia. Aside from the issue of informed consent, it is interesting to see the link being made between the use of episiotomy and resulting incontinence and dyspareunia. It seems we have come a long way from the 1970s and 1980s, when episiotomy was commonplace and considered to be the best way of avoiding severe perineal tears and pelvic floor trauma.

Driving the change has been research demonstrating that a policy of routine episiotomy does not prevent severe perineal trauma or morbidity during normal birth. The latest Cochrane systematic review on the subject<sup>2</sup> reported on eight studies, involving 5541 women, comparing routine episiotomy with restricted use of episiotomy concluded: 'restrictive episiotomy policies appear to have a number of benefits compared to policies based on routine episiotomy.' Findings included less posterior perineal trauma, less need for suturing and fewer postpartum healing complications. No differences were found in pain measures or the incidence of severe vaginal or perineal trauma, but an increased risk for anterior perineal trauma was noted in the restricted group. Anterior perineal trauma is usually associated with minimal long-term morbidity. Thus there is clear evidence to recommend restrictive use of episiotomies during normal birth, although further trials are needed to explore the optimal use of episiotomy during assisted births, preterm and breech births and births where there is an expectation of a large baby or an imminent tear.

Despite this evidence, episiotomy is often reported as being the most commonly performed surgical procedure in the world and there is wide variation and variability in rates of episiotomy between countries. In Europe the rates of episiotomy for women having a vaginal birth in 2010 varied, with a high of 75 per cent in Cyprus (other countries at about 70 per cent included Poland, Portugal and Romania), rates of 43–58 per cent were reported in Flanders, the Czech Republic and Spain, while rates of between 16 per cent and 36 per cent were reported from England, Wales, Scotland, Finland, France, Germany and Switzerland.<sup>3</sup> The lowest rates were reported as 4.9 per cent in Denmark and 7.2 per cent in Sweden and Iceland. Most of these countries have seen a reduction in their use of episiotomy since 2004, in line with the Cochrane recommendations.

New Zealand and Australia have national rates that are comparable to the moderately low European countries, with New Zealand reporting episiotomy rates of 12.5 per cent in 2010 and Australia 16.3 per cent (this included episiotomy and laceration).<sup>4,5</sup> The New Zealand College of Midwives publishes a report annually outlining the clinical outcomes for midwife members who work as a Lead Maternity Carer and provide continuity of care to a caseload of women. The 2011 report provides data from 866 midwives who provided care to 31 739 women, of these women 8.6 per cent had an episiotomy, a further 50 per cent of women had an intact/grazed perineum with 2.3 per cent having a third-degree tear and 0.2 per cent a fourth-degree tear.<sup>6</sup> Australia has similar statistics, with the rate of third- and fourth-degree tears varying between regions from a low of 1.1 per cent to a high of 3.0 per cent, resulting in a national rate of 1.8 per cent for 2010.<sup>5</sup>

Primiparous women are more likely to have an episiotomy so it is useful to compare rates of episiotomy for the standard primiparous woman. The Australia and New Zealand clinical indicators have identical definitions supporting comparison and demonstrate an episiotomy rate of 30.3 per cent in Australia and 19 per cent in New Zealand, with a further 4.8 per cent in Australia and 1.1 per cent in New Zealand of women having an episiotomy and a third- or fourth-degree tear (or repair).<sup>7,8</sup>

## Reducing perineal trauma during normal births

Factors that may increase the risk of perineal trauma are nulliparity, prolonged second stage and malposition. However, there are many other aspects of the second stage that should be considered when discussing increased/decreased perineal trauma – these include maternal position during the second stage, fetal size and position and the speed of the descent of the presenting part.

In New Zealand, when working in partnership with women, midwives will discuss various aspects of the second stage. This discussion generally involves talking about finding the most comfortable positions during labour and birth, with advice that the woman should adopt the position most comfortable for her at this time. This concept has been supported by Gupta and Hofmeyr<sup>9</sup> in their review of position during the second stage of labour. Personally, I have found when women are supported to adopt a position of comfort they will frequently give birth in a kneeling or hands-and-knees position.

As midwives, we have often been taught to put pressure on the baby's head at crowning to support flexion of the head while simultaneously guarding the perineum by placing a hand/swab against it as support. This is obviously easier to do when a woman is in a semi-recumbent position or lying on her side. Comparisons of this technique with a hands-off approach are included in a Cochrane review of perineal techniques during the second stage of labour to reduce perineal trauma.<sup>10</sup> The review found that hands off or hands poised did not have a significant effect on third- and fourth-degree tears. What was found to help

reduce third- and fourth-degree tears were warm compresses to the perineum during the second stage. In my midwifery practice, it will depend on the woman's position and speed of descent of the presenting part as to whether I place hands on the baby or the perineum, and whether or not I can provide warm compresses to the perineum.

Another issue that needs consideration is the speed of the descent of the presenting part during the second stage. Perineal tissue needs time to stretch to its fullest potential during the second stage. A slow, steady progressive descent of the presenting part will help maximise the stretch and minimise trauma. So patience and positive encouragement are necessary along with a discussion with the woman about the need to stay in control when pushing. Frequently, once the head has crowned, midwives will encourage the woman to breathe or pant rather than push to ensure a slower descent of the head at this point. Pushing and bearing down methods are the subject of a Cochrane protocol that will aim to compare directed pushing during the second stage with supporting the woman's instinctive responses.<sup>11</sup> It will be interesting to see the results of this review once it is completed.

The size of the baby and optimal position for labour may also have an impact on perineal trauma. As such, we need to review BMI and fetal occipital posterior positions when considering perineal outcomes, especially in view of the increasing trend towards obesity that is currently occurring in both New Zealand and Australia.

In summary, perineal trauma often occurs spontaneously during birth, although obviously avoiding episiotomy can reduce the incidence of unnecessary perineal trauma. The incidence of severe perineal trauma, resulting in longer term morbidity, appears to be low. It varies between countries, often owing to differences in definitions and practice. However, the resulting pain and discomfort and longer term morbidity has a major impact for women so we need to continue to discuss and debate the optimum means of reducing perineal trauma during birth.

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# Explaining episiotomy



Dr Louise White  
RANZCOG Trainee

In the community, there is a wide range of opinion regarding the place of the episiotomy in the care of women. Thus, it is important we continuously re-evaluate our practice in a woman-centred approach, so we can communicate both the potential benefit and risk involved with episiotomy.

The incidence of episiotomy has reduced in the past two decades in Australia, with a change toward restricted over routine episiotomy. Even so, 35 per cent of primiparous Australian women having a vaginal birth underwent episiotomy in 2012.<sup>1</sup>

## Indications for episiotomy

The recent trend in Australia has been away from a routine use of episiotomy in favour of restrictive use. This transition came from evidence showing restrictive policy to be associated with less posterior perineal trauma, less suturing and fewer healing complications as compared to routine episiotomy.<sup>2</sup> Importantly, no difference was found between restrictive and routine episiotomy in rates of severe lacerations, dyspareunia, urinary incontinence or pain measurements.<sup>2,3</sup> Restrictive episiotomy is, however, associated with more anterior perineal traumas.<sup>2</sup>

As per the RANZCOG College Statement, episiotomy should be considered where there is:

- a high likelihood of severe laceration;
- soft tissue dystocia;
- a requirement to accelerate the birth delivery of a compromised fetus;
- a need to facilitate operative vaginal delivery; or
- a history of female genital mutilation.<sup>4</sup>

Operative vaginal delivery is one instance in which the decision of whether to employ episiotomy or not must be made on a case-by-case basis, using well-considered clinical judgement. The literature is unclear as to whether a routine episiotomy in this setting is advisable. Retrospective cohort studies have demonstrated significant risk reduction of obstetric anal sphincter injury (OASIS) with routine episiotomy during operative vaginal delivery.<sup>5</sup> One study went so far as to estimate one OASIS injury could be prevented by routine episiotomy in every 12 vacuum deliveries and five forceps deliveries.<sup>6</sup> Conversely, another did not find altered risk of OASIS in restrictive versus routine episiotomy.<sup>7</sup>

## Mediolateral episiotomy

In Australia, the type of episiotomy most commonly performed is mediolateral. This is described as an incision made under appropriate analgesia, 3–5cm in length from the fourchette at an angle 60–80 degrees to the midline at the time of distension of the perineum by the presenting part. After delivery, the angle becomes 45 degree from midline. Anatomical structures cut include: vaginal epithelium; transverse perineal and bulbocavernosus muscles; and perineal skin. The mediolateral episiotomy is preferred over medial episiotomy as it is associated with lower rates of OASIS injuries.<sup>8–10</sup> It is also preferred over a lateral episiotomy, which is associated with more suturing and longer repair times, but no reduction in OASIS injury.<sup>11</sup>

## The pelvic floor and incontinence

The impact of episiotomy on the pelvic floor is debatable. Recent studies have evaluated both quantifiable assessment of pelvic floor function and impact on women, however, findings are conflicting.

A study comparing women with mediolateral episiotomy to women with spontaneous laceration or intact perineum at three months postpartum found significantly lower values in pelvic floor strength on digital test and vaginal manometry in the episiotomy group. However, no difference in incontinence or prolapse was found.<sup>12</sup>

A number of studies have found no impact of episiotomy on the pelvic floor. A recent study found no difference in overall pelvic organ prolapse quantification (POP-Q) assessment at six months postpartum in women who had episiotomy versus those with spontaneous lacerations.<sup>13</sup> Furthermore, pelvic floor function at five to ten years after birth of first child was assessed using a subjective questionnaire and POP-Q assessment. The authors found forceps deliveries and perineal lacerations, but not episiotomies, were associated with pelvic floor disorders (classified as overactive bladder, stress incontinence, prolapse beyond the hymen).<sup>14</sup> Episiotomy was also shown not to be associated with avulsion of the levator ani at its pubic insertion on 4D ultrasound scan.<sup>15</sup>

## Pain and dyspareunia

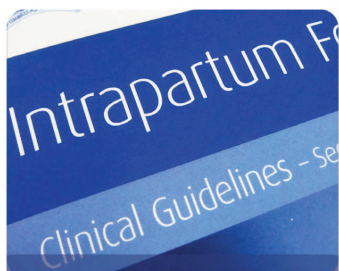
Perineal pain is a common experience for women in the immediate postpartum period after vaginal birth.<sup>16</sup> Intensity of pain in the first week postpartum is related to degree of perineal trauma.<sup>17</sup> Yet the effect of episiotomy versus spontaneous perineal laceration on long-term pain is unclear. Some have found no difference in pain at six-weeks postpartum between episiotomy and spontaneous laceration.<sup>17,18</sup> However, others have documented significantly higher rates of perineal pain and dyspareunia at three months in women with mediolateral episiotomy.<sup>12</sup>

As in all aspects of our clinical practice, we aim to provide the best outcome for both mother and baby. Episiotomy is one of the most commonly performed surgical interventions, yet research is still needed to fully evaluate its risks and benefits in different clinical scenarios. It is important that we communicate clearly to women when deciding to perform an episiotomy so they can participate in their own healthcare in an informed way. Given the time-pressured environment in which most deliveries occur, we must recognise that this will represent an ongoing challenge for obstetricians and midwives alike.

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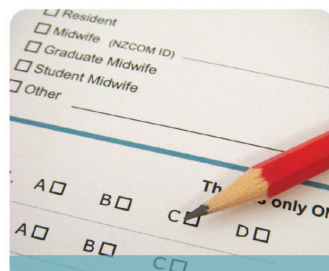
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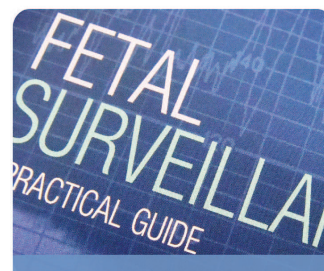
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# Acute management of OASIS



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Obstetric anal sphincter injuries are a significant risk to the maintenance of anal continence in both the short and long term. This risk can be significantly reduced by identifying the injury, reconstructing the sphincter complex and optimising recovery.

This article will outline the process of recognition, repair and postoperative care to minimise the adverse effects on the woman's quality of life and future pregnancies of obstetric anal sphincter injuries (OASIS).

## Recognition and diagnosis

'No finger, no diagnosis!' is the decree of Mr Abdul Sultan,

consultant obstetrician and gynaecologist with a special interest in urogynaecology at Croydon University Hospital and honorary Reader at St George's, University of London. The UK NICE Intrapartum Care Guideline states: 'If any evidence of perineal trauma is identified on initial visual assessment following vaginal delivery, further systematic assessment must include a rectal examination to exclude OASIS.'<sup>1</sup> Without a digital rectal examination, OASIS cannot be excluded. Even those appearing to have an 'intact perineum' may have vaginal tears and these must be excluded after all vaginal deliveries.

Before beginning the assessment, explain the reason for the examination, obtain consent and provide adequate analgesia. In those requiring further examination, the recommended rectovaginal technique is to: position the patient into lithotomy to improve wound visualisation; and insert index finger into the anal canal and thumb into the vagina. Aim to 'pill-roll' the sphincter between the thumb and finger, starting from the midline then moving laterally in both directions to ensure the sphincter is complete along both its

circumference and length. Identify the following:

- External anal sphincter (EAS) – similar appearance to raw beef. The ischioanal fat superficial and lateral to the EAS can be useful in differentiating the EAS from the transverse perineal muscles. Also, by pulling on the ends of the EAS, the posterior aspect the anus will lift.
- Internal anal sphincter (IAS) – similar appearance to raw chicken, found deep to the external sphincter, remembering that it does not extend to the subcutaneous portion of the EAS.
- Rectal mucosa, also excluding any buttonhole tears.

All perineal injuries should be classified according to the RCOG OASIS Classification<sup>2</sup> (see Figure 1). Buttonhole tears are not included in this classification and should be documented separately. If there is uncertainty about the severity of tear it should be classified at the higher grade to ensure appropriate vigilance is given to the repair and follow-up.

## Preparation

### Do I really need to repair this in theatre?

The default answer to this question is yes. However, if the same conditions and results can be achieved on the labour ward, this may be acceptable in some circumstances, for incomplete external sphincter disruption only. The requirements, whether the repair is performed in theatre or in labour ward, are the same:

- clean conditions;
- anaesthesia – regional or general anaesthesia to allow sphincter relaxation;
- adequate wound exposure:
  - good lighting
  - adequate positioning in lithotomy
  - skilled assistance
  - good haemostasis; and
- equipment: additional clamps for grasping the sphincter (such as Allis clamps) and sutures (such as 4x artery clamps). A self-retracting retractor (for example, Weitlaner) can be invaluable.

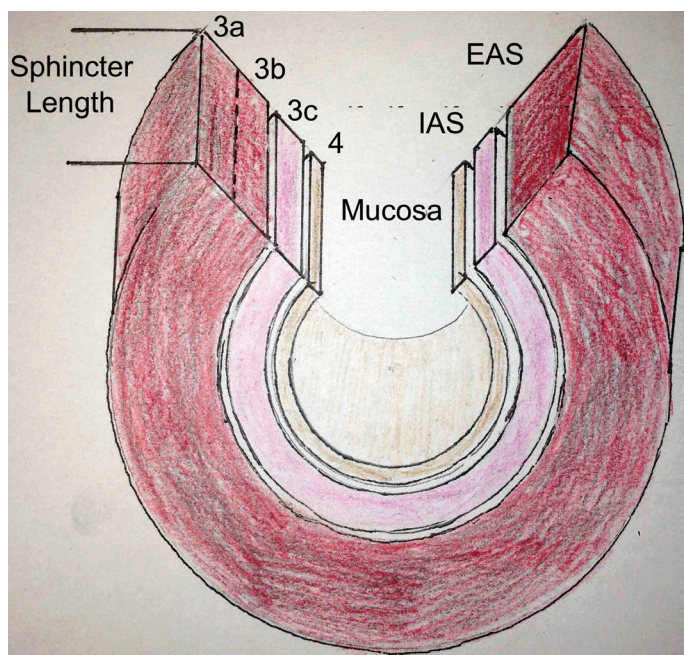


Figure 1. Anal sphincter complex and OASIS classification.

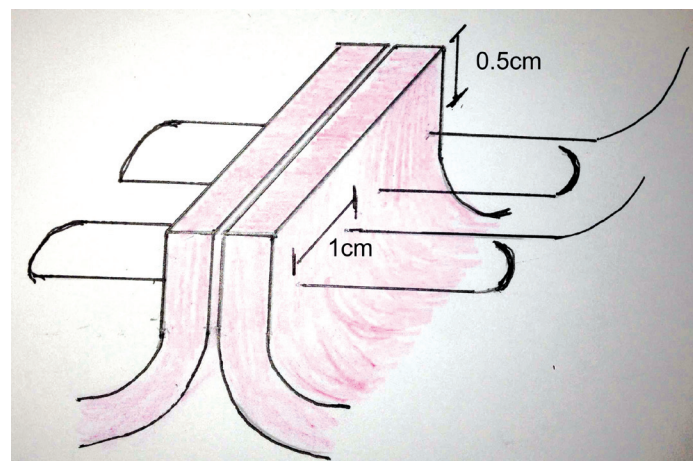


Figure 2. End-to-end repair with horizontal mattress technique.

In addition to these requirements, a single dose of a second-generation cephalosporin (such as Cefoxitin) administered intraoperatively significantly reduces perineal wound infections from 24.2 per cent to 8.2 per cent ( $p < 0.05$ ).<sup>3</sup> Clindamycin or lincomycin are suitable alternatives in those allergic to cephalosporins.

Sometimes there are inevitable delays in gaining access to theatre. Nordemstam and colleagues reported equivalent functional outcomes between those women whose injuries are repaired immediately compared to those waiting up to 12 hours.<sup>4</sup> However, tissues tend to become more oedematous and friable with time, making the repair more challenging. As well, other practical issues such as ongoing bleeding need to be considered. All things considered, OASIS repairs are a priority and should be dealt with as soon as possible.

### Reconstruction

1. Achieve adequate haemostasis to provide good wound exposure.
2. Begin repair with the deepest injured structure.

### Rectal mucosa

Re-appose the rectal mucosa with a standard 3-0 braided or monofilament synthetic suture in an interrupted or continuous fashion, taking care to incorporate the apical angle of the tear. When using synthetic sutures, the knots can be tied either in the lumen or extraluminally, unlike catgut which should be tied within the lumen.

### IAS

The IAS should be repaired separately to the EAS to ensure it is reconstructed anatomically. It provides 80 per cent of resting anal pressure and when not intact may cause urgency symptoms, as well as passive faecal and flatal incontinence. A 3-0 delayed absorbable monofilament suture using a horizontal mattress technique 0.5cm from the torn edge with 1cm bites distributes the tension across length of the wound (see Figure 2).

### EAS

Whether performing an end-to-end or an overlapping EAS repair, the aim is to re-appose the full depth and length of the EAS to maximise the functional anal length. The choice of technique is dependent on the following:

- Degree of sphincter disruption – (3a or incomplete 3b) – an

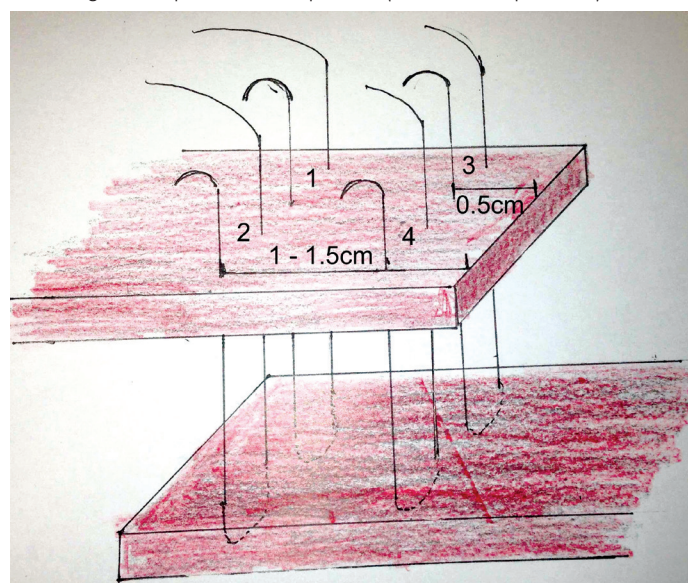


Figure 3. Overlap technique with order of sutures.

end-to-end approach is used. A complete overlap is not possible in these situations and it is not advised to cut the remaining intact sphincter to achieve the overlap.

- The surgeon's confidence in dissecting the EAS to enable an adequate overlap.
- The training and experience of the surgeon.

The steps of the repair are:

- Identify and grasp the full length and depth of each end using two atraumatic forceps (for example, Allis clamps).
- For either technique, two or three sutures are usually adequate. Figure-of-eight sutures should not be used because of the risk of ischaemia.
- The sutures should be placed from the proximal aspect to the distal.

### End-to-end

This is the same as described for the IAS, an important principle is tying the knots once all the sutures are placed.

### Overlapping (see Figure 3 and 4)

- Ensure adequate length of the overlapping end and, if necessary, dissect the EAS laterally from the ischioanal fat to create enough length.
- The suture is inserted 1–1.5cm from the torn edge to be overlapped, from top to bottom.
- Place the suture to full thickness from top to bottom 0.5cm from the torn edge of the underlapping end. Bring the suture back through the underlapping edge from bottom to top taking a 1cm bite, again 0.5cm from the torn edge.
- Place the return suture from bottom-to-top again 1–1.5cm from the edge of the overlapping torn edge, then cut and clamp the suture ends.
- Once the full length is overlapped, tie the sutures.
- Suture the loose edge of the overlapped end to the underlying end, with a similar technique to the other sutures. A full thickness bite of the underlapping end does not need to be taken.
- Check there is good sphincter length and bulk.

The literature demonstrates superiority of an overlapping repair in reducing faecal urgency (32 per cent versus 7.1 per cent, RR 0.12,  $p=0.04$ ), and lower median modified Wexner anal incontinence score (1 versus 0,  $p=0.05$ ), as well as improved anal incontinence (62.9 versus 32 per cent,  $p=0.02$ ) at 12 months.<sup>5</sup> However, this was in the hands of two experienced surgeons and this is the only study that documented separately repairing the IAS, which may have an impact on the outcomes also.

Williams and colleagues showed equivalent outcomes using a 2-0 standard braided suture (Vicryl) versus a 3-0 delayed absorbable

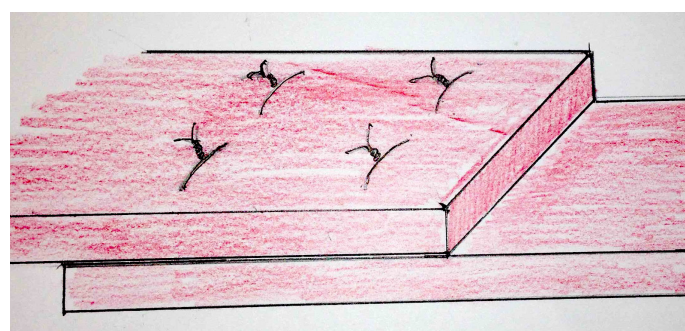


Figure 4. Completed overlap repair.



monofilament (PDS) to reconstruct the EAS.<sup>6</sup> However, some clinicians prefer the reassurance of the delayed absorption over the concern of suture migration and pain associated with monofilament sutures.

It is important to reconstruct the perineal body both to restore anatomy and overlay enough tissue to prevent suture migration and pain. The repair is completed with a rectovaginal examination to ensure good sphincter bulk and exclude any unintended anal perforation by the sphincter sutures.

### Documentation

Standardised documentation of the diagnosis, repair technique and postoperative management is essential for the purposes of audit, quality improvement and follow-up. Using an electronic or paper-based structured form may increase the likelihood that all information is recorded and optimal intra-operative and post-operative management is provided.

### Complication minimisation

#### Analgesia

At the time of repair, administration of a long-acting NSAID, for example, Diclofenac 100mg PR, has been shown to result in less pain and require less additional analgesia up to 48 hours following repair.<sup>7</sup> Following this, strict oral paracetamol and an NSAID should be prescribed to reduce the need for opiates. Perineal cooling in the form of ice packs or gel pads for the first two days may also result in less perineal pain.<sup>8</sup>

#### Antibiotics

While we have good evidence for an initial dose of a cephalosporin, there is no direct evidence for ongoing antibiotics. Many clinicians prescribe a week of a broad spectrum oral antibiotic such as Amoxycillin with Clavulanic acid for five days, which seems to offer few risks and may reduce wound complications, particularly in those at higher risk of wound infection.

#### Catheterisation

Postoperative bladder drainage with an in-dwelling urinary catheter is recommended for at least the first 12 hours following the repair. Oedema and pain in addition to the other peripartum risk factors (for example, regional anaesthesia, instrumental delivery, high birth weight and prolonged labour), all increase the risk of postpartum urinary retention. This risk can be further minimised by performing a formal trial of void to ensure effective voiding after catheter removal.

### Bowel motions, dietary measures and laxatives

The objective of any dietary measure is to prevent constipation promoting the passage soft frequent motions with minimal pain or need to strain. The most important dietary advice is to maintain a good fluid intake – at least two litres per day – especially if breastfeeding. There is no evidence demonstrating benefit of any dietary restrictions, including low residual diets.

A non-bulking osmotic laxative in the form of polyethylene glycol (PEG) should be prescribed for all OASIS patients. PEG-based laxatives have been shown to be more effective and cause less abdominal bloating and flatulence than lactulose in those with constipation.<sup>9</sup> Bulk-forming laxatives (such as Psyllium) are not recommended as routine first-line management, since they are associated with increased anal incontinence; however, they should be considered in those developing constipation. Those who have been unable to pass a bowel motion by day three should be reviewed.

### Debriefing

Prior to discharge, all patients should be debriefed about the type of injury they have had, any potential contributors, how it may affect them, prevention of complications and when to seek advice. In addition to addressing the woman's individual situation and concerns, written information detailing potential issues, prevention and management should be provided.

### Conclusion

The best opportunity we have to minimise the effects of OASIS is to recognise the primary injury providing the opportunity to optimally reconstruct the sphincter complex. With good postoperative care and support, most women will make a good recovery with minimal, if any, impact on their quality of life in the short and long term.

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# Prolapse assessment



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Assessment of the woman referred to the general gynaecology clinic for management of prolapse – a guide for Trainees.

Depending on the patient population, somewhere between ten and 30 per cent of women will report symptoms suggestive of pelvic organ prolapse (POP) at some time in their lives. Although this is usually a benign condition, prolapse can have a marked effect on a woman's quality of life (QoL), potentially interfering with work, leisure activities, urinary and anorectal function, and sexual intimacy. For this reason, it is important that any woman who is referred for assessment of a possible prolapse is given a careful and thorough history and examination, to provide her with the best possible information about her condition and options for management.

## Taking a relevant history

In addition to reading the referral letter, it is important to spend time listening to the woman and the issues she describes. Occasionally, completely asymptomatic women will be referred with 'prolapse' after examination for some other purpose (typically a Pap smear) revealed findings that concerned the family doctor. In most cases, though, women will give a history that suggests POP may be a problem. One of the lessons of POP assessment is that the symptoms a woman reports may bear little relation to the

clinical findings and extent of any POP present. Some women report very bothersome symptoms, yet have a minimal degree of POP, and conversely other women seem to be little troubled, yet have impressive clinical findings.

Although assessment of the signs of POP – in particular, bulging or protrusion from the vagina – is important, it is vital to consider symptoms in context with the woman's overall functional capacity and wellbeing, including urinary and bowel problems, and sexual function and satisfaction. Because such symptoms can be embarrassing to admit, if the woman doesn't volunteer information, it must be specifically sought in a tactful and sensitive manner.

Ask the woman to describe the symptoms as she experiences them. This will typically be a vaginal bulge, but it may not be present all the time. Straining, prolonged standing or walking, and worsening symptoms at the end of the day are common, as is reduction of the bulge and abatement of symptoms when recumbent. The presence of a permanent bulge may suggest an advanced stage of POP (see Figure 1). In association with bulging, women may describe a 'bearing down' or dragging sensation, and sometimes low back pain. With severe prolapse, there may be ulceration (commonly seen with procidentia), but this should always provoke further assessment to rule out pre- or frankly malignant disease.

## Continence and urinary symptoms

POP and problems with urinary continence commonly occur together and these may not be volunteered. Ask about the symptoms of urge incontinence, incomplete emptying of the bladder and bladder overactivity. These can occur with urinary retention and rapid bladder refilling and irritation. Also, specifically ask about involuntary loss of urine with straining, such as jumping and coughing or sneezing. When a large degree of anterior vaginal wall prolapse is present, this may lead to kinking of the urethra, with the potential for voiding dysfunction and episodes of retention or difficulty in initiating micturition. Some women will provide a history of recurrent urinary infections. Incontinence with intercourse may also be a significant symptom.

## Bowel symptoms

Where there is a degree of posterior compartment prolapse, women may report difficulty in emptying the bowel. This may be the result



Figure 1. Sometimes the diagnosis of POP is obvious, as in this case of procidentia. Image courtesy of Dr David Knight.





Figure 2. A comfortable couch that ensures the woman is not lying fully recumbent, with access to the perineum, is important for accurate and thorough assessment of POP.

of the full rectum bulging forward rather than out through the anus with straining. In some cases, women will need to put their fingers in the vagina to try to assist defaecation. This may lead to chronic incomplete rectal emptying with resulting anal overflow incontinence and frequency. The dissipation of expulsive forces during attempted emptying of the rectum with the rectum protruding into the vagina is termed a 'defaecatory disorder.' These problems can be acutely embarrassing and require privacy and sympathetic questioning to fully evaluate, for obvious reasons.

## Prolapse and sexual function

Another issue women may be reluctant to bring up is sexual difficulty. This is commonly reported by women with prolapse, for various reasons. The vaginal bulge of POP may be a hindrance during intercourse and may be uncomfortable, especially if there is associated vaginal and vulval atrophy. Damage to the levator



Figure 3. The basic equipment required for assessment of POP.

muscles, including avulsions, often widen the genital hiatus and may be associated with reduced sensation and satisfaction, even reduced capacity for orgasm. Women are also often sensitive about their appearance and may wish to avoid sexual intimacy for these reasons. All of these factors can impact quite severely on body image, self-esteem and confidence, affecting relationships adversely.

## The broader history

Once a focused and detailed history of prolapse and associated pelvic symptoms has been taken, a broader history should be sought. In a younger woman, whose family is not complete, it is important to have a clear idea about plans for future childbearing.

A detailed obstetric history should be taken, including the number of pregnancies and deliveries, mode of delivery, birthweights and complications. POP is much more common in parous women than nulligravid women and each additional delivery increases the risk of prolapse. Other strong risk factors include: the woman's age and, particularly, the time since menopause (particularly for women with an early menopause); overweight and obesity; previous surgical procedures for POP; and a history of POP in first-degree female relatives.

## Box 1. Commonly-used systems for the documentation of examination findings in POP

### Pelvic Organ Prolapse Quantification (POP-Q) system

This system uses a series of standardised points and measurements to provide very formal measurement of prolapse, allowing a staging. There are multiple resources available to help in familiarising yourself with this system, including some excellent tutorials on YouTube™. The points (A, B, C, and D) as well as the measurements are illustrated in the article on p49.

### Baden-Walker system

This is a more descriptive system, not requiring formal measurement with rulers.

Grade	Posterior urethral descent, lowest part other sites
0	Normal position for each respective site
1	Descent halfway to the hymen
2	Descent to the hymen
3	Descent halfway past the hymen
4	Maximum possible descent for each site

### Shaw system

The Shaw system is another descriptive system.

Anterior wall	Upper 2/3 cystocele	Lower 1/3 urethrocele	
Posterior wall	Upper 1/3 enterocele	Middle 1/3 rectocele	Lower 1/3 deficient perineum
Uterine prolapse	Grade 0	Normal position	
	Grade 1	Descent into vagina, not reaching introitus	
	Grade 2	Descent to the introitus	
	Grade 3	Descent past the introitus	
	Grade 4:	Procidentia	



Figure 4. Wide and open genital hiatus, with anterior and posterior compartment prolapse, in a patient about to undergo pelvic floor reconstruction.

Previous treatment for POP should be enquired about, such as surgery or use of pessaries. If pessaries have been used, how well did they control the symptoms and did they precipitate other problems, such as urinary problems or defaecatory dysfunction? If surgery has been performed, what exactly was done, and what were the results? Was there a short- or long-term benefit? These are important questions, since previous use of mid-urethral tapes, sacrospinous suspensions and colpopexy procedures have been associated with a risk of later anterior compartment prolapse. Similarly, colposuspension procedures can be associated with development of enterocele.

A general gynaecological history is important, since some women may have other problems, such as menstrual disorders, that also require assessment and management. Other significant issues include previous hysterectomy and the use of hormone replacement therapy.

Many other health problems will impact on either the woman's overall QoL or her suitability for various treatments. Make sure a thorough drug history is taken that may be clinically relevant, such as anticholinergics, diuretics and drugs effecting coagulation. Also, women who smoke should be encouraged to quit, and any medical condition stabilised.

The management of any POP must be undertaken within the overall context of a woman's life and responsibilities. It is important to take a social history, as women need care and support in the post-operative period and may face difficulties in caring for partners or relatives if they undergo surgery, including the need for heaving lifting. Advice should be given about the need to abstain from intercourse after vaginal surgery until the post-operative visit. Make sure you understand a woman's occupation and its demands, as this can affect the time required away from work. POP can have a significant effect on QoL, and a formal assessment can be

performed using a validated questionnaire, such as that of Digesu and colleagues (see further resources at the end of this article).

### Examination

Conducting a useful clinical examination requires some basic items of equipment. Perhaps most importantly, a suitable examination couch is essential (see Figure 2). This should allow the clinician good access to the perineum. A couple of simple items are all that are required to complete the examination and it is useful to use a hand mirror, so that women can see what the findings are and have them explained (Figure 3).

Assessment of the woman's general state of health is important and will include weight, body mass index and blood pressure, as well as assessment of any varicose veins or hypermobile joints, since these can be markers of a tendency to connective tissue laxity which predisposes to POP and, importantly, to recurrence after surgical repair.

On examination of the abdomen, inspect for incisions of previous surgery (which may be associated with intra-abdominal adhesions affecting subsequent surgical approaches) and to exclude masses or ascites (which are embarrassing to discover later). The presence of umbilical or other herniae can, again, indicate underlying connective tissue weakness and may require concomitant surgical correction.

On inspection of the vulva, note the presence of any atrophy and whether there is any ulceration of prolapsed tissues that may necessitate therapy with oestrogens, especially if surgery is planned. The normal genital hiatus is closed, with an area of only a few square centimetres, and an open hiatus with the vaginal walls visible indicates probable damage to the levator muscles, usually an avulsion injury (see Figure 4). Another important indicator of levator avulsions is midline asymmetry, sometimes apparent with straining.

With the woman reclining, but not lying flat, ask her to strain or bear down. If there is a bulge from the vagina, note whether the pattern of rugae (formed by muscle and connective tissue deep to the skin) is present, which indicates an intact fascial layer in the midline and a probable lateral defect, or absent, suggesting a midline defect with only skin and attenuated connective tissue present. In some cases, straining or coughing will precipitate stress urinary loss or rectal prolapse, both of which are important findings.

Examination with a bivalve speculum allows assessment of the cervix (including a Pap smear, if appropriate), but not prolapse. The use of either a Sims' speculum or a disassembled bivalve speculum is required to carefully assess the anterior and posterior compartments and to assess the supports of the cervix or the vault if there has been a previous hysterectomy. It is common to require Rampley's sponge-holding forceps to aid in support of the vaginal walls, as this can obscure the view. At the completion of the speculum examination, perform a bimanual examination to check the uterine size and mobility, as well as to exclude unsuspected adnexal pathology, such as ovarian tumours. This also allows an assessment of vaginal muscle tone. Rectal examination is not usually required unless specifically indicated, but may distinguish rectocele from enterocele. Make sure you ask the woman to direct your attention to any other findings she has noted, that you haven't discovered or that she wants to draw your attention to.

### Quantifying and documenting the findings

As well as recording detailed notes about the findings, it is important to standardise descriptions, particularly if referral for a

subspecialist opinion is being contemplated. Rather than vague descriptions (moderate prolapse) time spent using a formal descriptive system such as the POP-Q, Baden-Walker or Shaw systems (depending on local custom) is time well spent. These systems are briefly described in Box 1. It is beyond the scope of this article to detail these various systems.

### Conclusion

Take a thorough history and perform a careful physical examination of women who are referred for assessment of prolapse. Make sure you understand each woman's life circumstances and responsibilities, as these can have a very important influence on the treatment you initiate. Examination should be carried out with

dignity and care, using some basic tools that aid in the accurate evaluation of anatomical and functional defects. Encourage the woman to view your examination and its findings with a hand mirror and explain what you find as you go along. Use a standardised assessment system to document your findings and make sure you explain everything in understandable terms. Good luck.

### Further reading

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## SUBSPECIALTY NATIONAL SELECTION INTERVIEW DATES 2014 (2015 ENTRY)

The closing date for National Selection applications is  
**Monday 31 March 2014**

CU National Selection 2015 entry interviews are scheduled for  
Friday 2 May 2014

COGU National Selection 2015 interviews are scheduled for  
Friday 9 May 2014

CMFM National Selection Interviews are scheduled for  
Friday 16 May 2014

CGO National Selection Interviews are scheduled for  
Friday 23 May 2014

CREI National Selection Interviews are scheduled for  
Friday 30 May 2014

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Additional details about the selection process can be found on the RANZCOG website: [www.ranzcog.edu.au/education-a-training/subspecialist-training.html](http://www.ranzcog.edu.au/education-a-training/subspecialist-training.html).



# Pessaries, please



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It is time to lock away your inner surgeon and spare a thought for conservative management of prolapse.

Pelvic organ prolapse (POP) is any descent of the anterior, posterior or apical vaginal compartments. Roughly a third of women aged 20–59 have some degree of vaginal wall prolapse.<sup>1</sup> Women have an 11 per cent lifetime risk of undergoing surgery for POP or urinary incontinence<sup>2</sup> and the failure rate of such surgeries is high.<sup>3</sup>

When discussing symptoms, it is necessary to distinguish between 'physical bother' and 'mental bother'<sup>4</sup>, and to explore the expectations of women. Physical bother includes pelvic heaviness; vaginal bulging, incomplete emptying of bowel or bladder; assisted defecation; and interference with sexual intercourse. Mental bother refers to the patient's mental concern that something is wrong in the absence of physical symptoms.

The 12-year follow up of the ProLong study<sup>5</sup> illustrated that POP is a common finding in asymptomatic women, with stage 2 or more POP identified

in 56 per cent of participants. Only 24 per cent of these would be considered a 'significant' prolapse (at or beyond the hymenal remnant). This correlates with the findings of others.<sup>6,7</sup> Women suffering from only mental bother may find this information reassuring and not require further treatment.

A concern often raised is that POP will worsen with age and cause symptoms in the future. However, there is evidence to the contrary. Dietz challenged conventional thinking in an analysis of 971 datasets that illustrated a limited association between age and progression of prolapse.<sup>8</sup> The weak association between age and worsening POP was reversed after menopause and POP was at least as likely to improve as deteriorate after menopause. This negates the argument of proceeding to surgery earlier, as POP does not inevitably worsen with age.

Clinicians should reassure women and explain the natural progression of vaginal changes relating to pregnancy, childbirth and ageing and not offer women treatment in the presence of a clinically diagnosed but asymptomatic POP. Options for conservative management include lifestyle modifications, pelvic floor muscle training (PFMT) and pessaries.

## PFMT – cue the Kegel

Delancey demonstrated the role of pelvic floor muscles in supporting pelvic organs. It would theoretically make sense that increasing the strength, endurance and coordination of the pelvic floor muscles would improve support structures in the presence of POP. PFMT improves the musculature through: firstly, strength training, increasing muscle volume and elevating the levator plate; and, secondly, timed contraction of the musculature to counteract an anticipated increase in intra-abdominal pressure to reduce the subsequent pelvic organ descent.

A timed, effective contraction of the pelvic floor muscles can reduce the occurrence of leakage in stress urinary incontinence (USI).<sup>9</sup> Anecdotally, it is expected to have a similar positive effect on POP.

During PFMT, therapists perform a thorough examination, including assessment of the patient's ability to contract pelvic muscles in isolation and the strength with which these contractions occur. Subsequent sessions are tailored to the patient's specific needs. The bulk of PFMT will be performed independently and, therefore, the success of the treatment depends primarily on the patient's commitment.

The POPPY trial<sup>10</sup> compared an individualised PFMT program to a lifestyle advice leaflet. The trial's primary endpoint was self-reported POP symptoms at 12 months. Women in the PFMT group showed a significantly greater improvement in symptoms at six and 12 months. These findings held, irrespective of prolapse stage, age or attitude towards surgery. Clinical improvement in POP quantification (POP-Q) stage was measured as a secondary endpoint. The PFMT group's prolapse stage was improved and women were more likely to have a less severe grade of prolapse after six months, but these findings did not reach significance.

The Cochrane review<sup>11</sup> of PFMT identified four trials comparing PFMT to no treatment for POP. Three of these reported on POP symptoms and a fourth only on severity of prolapse. Despite differing symptom questionnaires, all three trials showed a significant improvement in prolapse symptoms. As a secondary outcome, the clinical stage of prolapse was also improved in all three trials that reported on prolapse severity.

These findings support the use of PFMT as a treatment for women with POP. However, the results described are short-term outcomes only and there is no single regime that has been shown to be superior. Also, the minimum term required to achieve muscle hypertrophy is 15 weeks of specific directed muscle training.<sup>12</sup> It has been shown that, even with significant improvement in symptoms, women will over time give up on their exercise regime.<sup>13</sup>

## Pessaries

A pessary is a minimally invasive mechanical device designed to passively support the prolapsing vaginal walls. Ancient Egyptians were the first pessary users and describe POP in their scriptures. 'Pessary'



also appears in Greek and Latin literature. Hippocrates described using half a pomegranate inserted into the vagina for POP. Pompeii yielded a bronze, cone-shaped pessary, which was presumably fastened around a woman's waist to prevent dislodgement.<sup>14</sup>

The first recorded female gynaecologist, Trotula, developed a rounded ball pessary in 1050 AD, consisting of rolled up strips of linen inserted into the vagina. In 1559, Stromayr improved the ball pessary by dipping it in wax and covering it in oil. Ambrose Plate designed the first ring pessary in the 16th century using a combination of waxed cork and hammered brass. Hodge patented the first lever pessary using newly discovered vulcanised rubber in the 1860s. The hard rubber was replaced by polystyrene plastics in the 1950s, and more recently by silicone.<sup>14</sup>

The benefit of a pessary is immediate relief of symptoms once the correct size and type of pessary has been fitted. Indications for use include primary treatment of POP, diagnosis and pre-operative evaluation and temporary treatment of POP.<sup>15</sup>

Pessaries are divided into two groups: support and space-filling. Modern-day pessaries are manufactured from medical-grade silicone – more durable, with virtually no risk of allergic reactions.<sup>15,16</sup> Ring pessaries are a reasonable first-line option, successfully supporting a number of defects including cystocele, enterocoele and uterine or vault prolapse.<sup>15,16</sup> Wu et al demonstrated that the majority of patients can be fitted with a ring pessary.<sup>17</sup> Following successful fitting of a ring pessary, patients can be managed in the community by their general practitioner, reducing the inconvenience of return visits to an outpatient clinic for pessary care (see Figure 1).

The Gelhorn is a second-line option for when ring pessaries do not sufficiently reduce a prolapse or the woman is unable to retain the ring pessary. Because of a suction effect created when the Gelhorn is inserted, these pessaries remain in place when ring pessaries have been expelled.<sup>16</sup> This also means they are less likely to be managed in the community setting and necessitates replacement in the outpatient clinic. Many other pessaries are available, but used less frequently (see Figure 2).

A pessary should fit comfortably and the woman should be unaware of its presence; able to void and defecate without difficulty. Ideally, patients should undertake activities such as standing, walking, bending and bearing down in clinic to ensure the pessary will remain in-situ.<sup>18</sup> Consider using oestrogen cream in the presence of vaginal atrophy and ensure an appropriate follow-up guideline is available.

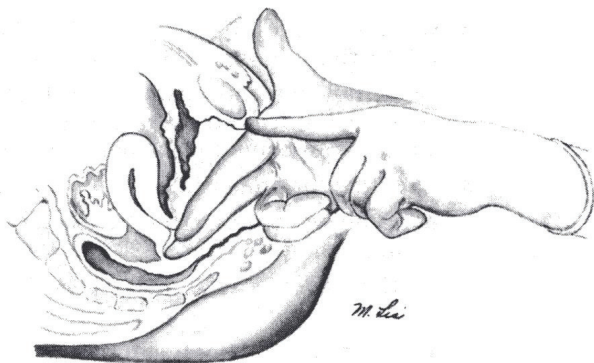


Figure 1. A guide to fitting a ring pessary: insert fingers deep into the posterior fornix; make note of where the hand comes into contact with the pubic bone; and compare to pessary.

Most POP symptoms are relieved by a correctly fitted pessary. Clemons illustrated a 92 per cent satisfaction rate at two months following pessary insertion.<sup>19</sup> Symptoms of bulging are relieved in at least 70 per cent of cases and pressure symptoms will improve in approximately 40 per cent of cases.<sup>20</sup> If a pessary is considered successful a month after fitting, the majority of women will continue using the pessary for symptom control at five years.<sup>21</sup>

Factors predictive of an unsuccessful fitting include a vaginal length less than 6cm, a wide introitus more than four finger breadths, the presence of a rectocele, previous vaginal surgery and co-existing USI.<sup>22</sup>

Side effects of pessaries include unmasking occult USI. Clemons<sup>19</sup> reported a 22 per cent risk of occult USI in women with stage 3 and 4 prolapse, but rates of 36–72 per cent have been reported. Other side effects include expulsion, pain and vaginal ulceration.<sup>16</sup> The latter should be treated by removing the pessary and applying vaginal oestrogen cream until the ulceration has healed. More serious complications, for example fistula and sepsis, remain rare.<sup>18</sup> Abdool<sup>22</sup> compared symptoms of women treated with a pessary to women who underwent surgery at one year after treatment. Both groups showed statistically significant improvements in pre-treatment symptoms and the rates of improvement were similar in both groups. The surgical group reported a higher frequency of sexual intercourse, although this was not significant once controlled for age. The mean age of the pessary group was significantly older than the mean age of the surgical group yet they showed similar improvements in symptoms.

There is little data to guide us in the use of ring pessaries. A 2013 Cochrane review on the use of pessaries included one randomised controlled trial comparing the use of ring pessaries to Gelhorn pessaries. There were no significant differences noted between these two types of pessaries.<sup>23</sup>

## Lifestyle changes

A cross-sectional study of the Women's Health Initiative (WHI) trial participants quotes the risk of having a uterine prolapse, cystocele or rectocele to be 30–50 per cent higher in women with a BMI over 25 compared to women with a BMI of less than 25.<sup>24</sup> It has previously been shown that a ten per cent weight loss is as successful in treating USI as other non-surgical treatments and reduces incontinent episodes by up to 50 per cent.<sup>25,26</sup> The question beckons whether a similar weight loss would herald an improvement in POP symptoms.



Figure 2. Some of the many types of pessary.

A secondary analysis of WHI trial participants<sup>27</sup> evaluated the relationship between weight changes and progression or regression of POP over a five-year period. The group illustrated significant associations between POP and age, ethnicity, parity, waist circumference, smoking, total hormone usage and urinary incontinence. Being overweight or obese at baseline was significantly associated with worsening prolapse in all compartments. A ten per cent weight loss was associated with less than five per cent reduction in cystocele and rectocele, but an eight per cent worsening of uterine prolapse. Weight loss showed no effect on severe stages of prolapse. A waist circumference of more than 88cm was associated with more than 20 per cent worsening in cystocele and rectocele. Conversely, a reduction in waist-to-hip ratio was found to be associated with regression of both cystocele and rectocele.

A cause/effect relationship exists between prolapse and constipation.<sup>28,29,30</sup> It is unclear whether constant straining with constipation causes POP, or whether POP causes constipation.<sup>31</sup> A diet deficient in dietary fibre is the most common cause for constipation.<sup>32</sup> The recommended daily dietary intake of fibre is 20–25g<sup>33</sup>, but most western diets contain only 5–10g per day. Lubowski showed that excessive straining for prolonged periods of time causes worsening neuropathy and pelvic floor dysfunction.<sup>30</sup>

Shariati et al<sup>31</sup> demonstrated that a gradual increase in dietary fibre intake to 28g per day significantly decreased straining with bowel movements, which may decrease some risk factors for POP. The group also found an improvement in the symptom reported questionnaires of patients who suffer from a rectocele, but also those who have POP signs other than rectocele. Those patients who did have a rectocele showed more clinical improvement as the study period progressed. The recommendation is for patients with a symptomatic rectocele be trialled on a course of fibre supplementation and then referred for surgery if their symptoms are not felt to be sufficiently improving.

## Summary

POP is an important public-health issue. Careful assessment is essential, with emphasis on the woman's symptoms, concerns and expectations. Conservative management of POP is an acceptable and effective option for a number of women we see. Further research into conservative management is encouraged and the primary outcome measure should be symptomatic relief, with anatomic improvement a secondary measure.

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# Lauding the pelvic floor



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There's more to training the pelvic floor muscles than the odd tight squeeze.

The 'pelvic floor muscles' (PFM) could use a makeover, a revamp or rebranding, to better reflect the positive functions that they perform for us all and what they are capable of achieving if retrained under expert guidance. Concerning though the national statistics are, most people are not incontinent – and nor do

they have other disorders associated with poor pelvic floor muscle control. Even symptomatic people are usually not so for their entire adult lives. As the only transverse load-bearing muscles in the body, the PFM deserve more applause for the roles that they play in pelvic organ support, continence and sexual function.

In Western culture, strong abdominal muscles are presented in the media as *de rigueur* for health, fitness and, most importantly, for attracting a mate – just look at the cover of *Men's Health* magazine (any issue). Funnily, the rectus abdominis are afforded the catchy tag of 'abs', the similarly sought-after pectoralis major – 'pecs', and yet the sexiest muscles in the whole body have the rather dreary epithet 'pelvic floor'. Sartorial selection can do wonders for the neglected or ageing abs and pecs, quietly concealing them from all but oneself and one's lover and (on occasions) the GP. Incontinent women sometimes resort to wearing dark trousers, but there are more serious sequelae for neglected, ageing or malfunctioning PFM. Prolapse, urinary incontinence, anal incontinence, defaecation dysfunction and

pelvic pain can cause private misery, social isolation and diminished quality of life.

As they are unseen and only ever linked to embarrassing conditions, the PFM are relatively unmarketable. The mention of the term 'pelvic floor' brings guilt (I never do those exercises) or shame (I have a problem and I should have done those exercises) rather than positivity and hope. How can we rebrand the PFM? Even we health professionals, who don't mind a bit of Latin, cannot agree upon nomenclature. Name a pelvic structure, attach the suffix '-ygeus' or '-alis', and there's a fair chance you'll find an author including it under the mantle of 'pelvic floor'. Anyone who passed first-year anatomy can name the component muscles that form quadriceps femoris – even if they have not been clinically intimate with a thigh for decades. It's possible to work very close to the PF muscles on a daily basis and not be on first name terms with them or know what they do.

Enter the physiotherapist with training in continence and pelvic floor rehabilitation. It is very often necessary for the physiotherapist to address pelvic symptoms beyond those stated on the doctor's referral letter. Many patients have symptoms in a pelvic compartment that is not their referrer's specialty and therefore fail to mention the problem to their doctor. A physiotherapist's scope of practice is much greater than most people realise and we know our limitations too; recommending medical, surgical and dermatological reviews where appropriate.

Women often do not know where their pelvic floor muscles are. A woman who clutches her abdomen and states, 'I just draw everything

## Box 1. Case Study – 'Jane'

Jane, aged 31 (G2P2), presented with a five-month history of worsening urinary urgency, burning, discomfort, frequency and nocturia. Her bladder never felt empty, she had post-void leakage and mild stress urinary incontinence (SUI). She complained of pelvic dragging and intermittent vaginal bulge. She experienced deep dyspareunia.

Jane's babies were born at term by normal vaginal delivery and were each <3500g. She had been referred to an obstetrician and gynaecologist six weeks after her first delivery complaining of pelvic organ prolapse (POP). She was assessed as having a 'small cystocele and rectocele' and was advised that her symptoms would improve after weaning the baby – as they did. POP symptoms recurred after second delivery, but were less bothersome and resolved more quickly. Jane is a pre-school teacher. She frequently lifts her own small children at home, walks for exercise and her BMI is 22.

## Medical/surgical history

Left developmental hip dysplasia, which required surgery as a small child. Since onset of urinary and prolapse symptoms, Jane has tried PFM strengthening exercises. She is not sure if her technique is correct as there has been no improvement.

## Assessment

- Midstream specimen of urine negative.
- Urinary tract/pelvic ultrasound – nothing abnormal detected. Bladder volume 600cc. Post void residual – negligible.
- Bladder diary: 19 voids per 24 hours (average). Minimum voided volume: 10mL, maximum voided volume: 400mL. Persistent feeling of bladder fullness/urge after voiding. Nocturia x3. Appropriate fluid intake.
- Anorectal function – prone to constipation. Bristol stool form scale: type 2.
- PV examination: Unable to provoke POP in any compartment. Normal perineal muscles. No puborectalis avulsion palpable. Overactive levator ani – very tense at rest with modified Oxford grade 2 contraction – unable to relax muscles or repeat contraction. Left obturator internus (OI) hypertonicity and tenderness, with palpable myofascial trigger points.



up' is very likely to be increasing her intra-abdominal pressure (via abdominal muscle recruitment and breath holding), sending her pelvic organs and pelvic floor in the wrong direction. She may have tried exercises but not seen any results: 'I've tried pelvic floors and they don't work'. There is abundant evidence for including supervised pelvic floor muscle training (PFMT) in first-line management of stress, urge and mixed urinary incontinence.<sup>1</sup> The evidence for the role of PFMT in the management of pelvic organ prolapse symptoms is compelling.<sup>2</sup> Even when a woman chooses a surgical solution, the role of PFMT in supporting surgical repair is clear.<sup>3</sup> The research tells us that PFMT is effective, so if your patient states that the exercises did nothing for her, what's going on?

### Not all pelvic floors are equal

A one-size-fits-all approach is not helpful. PFM are assessed (by PV and, if necessary, via digital rectal examination) for strength, flexibility, coordination and control. At first touch the resting tone or feel of the muscles offers some clues. Are the muscles flaccid or hypertonic or normal at rest? Does muscle palpation elicit pain? Is there palpable puborectalis avulsion? How strongly can the PFMs contract? How long does the contraction last and how many times can it be repeated? Does the pelvic floor relax fully after contracting?

PFMT begins with motor skill training. It is very difficult for patients to self-monitor, particularly when the PFM are very weak or very tight, as there may be little or no proprioception in these situations. Correct technique is essential, otherwise PFMT is at best ineffective, and may be detrimental.

Neuropraxia, lumbar spine pathology, upper motor neurone lesions or obesity? These are some of the situations that PFMT cannot always completely overcome.

### Not all lifestyles are equal

Specificity is essential in PFMT. What forces does this woman's pelvic floor have to withstand domestically, occupationally, recreationally? Does she have a chronic cough? What's her general fitness like and what does she do to maintain it? These considerations enable the physiotherapist to shape PFMT to the individual.

Strength, coordination, timing, control, endurance – if the muscles are not trained appropriately, PFMT will not achieve its full potential. Physiotherapists are able to judiciously apply adjunctive therapies for example, neuromuscular electrical stimulation (NMES) and biofeedback devices (such as real-time ultrasound, manometry) when indicated.

### Not all patient adherence is equal

If your patient states PFMT failed, clarify that rehabilitation of the PFM was supervised by an appropriately trained physiotherapist, exercise dosage was applied as recommended, they attended review appointments and gave themselves sufficient time to achieve results (12–26 weeks). The benefits of physiotherapist-supervised PFMT are illustrated in the case study (see Box 1).

It would be great to see a 'Jane' or two on television, or smiling from a magazine cover... 'I cured myself with PFM training! I no longer worry about my bladder all day and I'm enjoying my life again!' A round of applause...for the (unfortunately named) 'pelvic floor'.

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### Box 1 cont. Pelvic floor rehabilitation program for Jane

- PFM 'down-training' program – Jane was not expected to strengthen her PFM until she learned the motor skill of releasing/relaxing PFM contractions.
- Digital stretching of puborectalis/pubococcygeus and release of trigger points in left obturator internus (PV). Re-education of PFM exercise technique during examination.
- Bladder retraining. Taught techniques for dampening detrusor contractions by activating posterior tibial nerve<sup>4</sup> and with appropriate recruitment of PFM. Guided through gradual lengthening of time between voids.
- Soluble fibre supplement, daily. Posture and dynamics for defaecation corrected.
- PFMT to improve levator strength and control after successful down-training component. Eventually achieved grade 4 modified Oxford.
- Treatment of left hip complex to allow full rehabilitation of OI.
- Maintenance program, including functional bracing of PFM (to minimise area of levator hiatus during increases in intra-abdominal pressure).

### Outcomes for Jane

At discharge, after five treatments over eight weeks, Jane was voiding eight times per 24 hours, with nocturia x0-1. No bladder irritation or POP symptoms. Dyspareunia had resolved completely. Jane was very happy with results of physiotherapy and left with a maintenance program of exercises and lifestyle advice.

### Points of interest

- Pelvic floor physiotherapy does not begin and end with levator ani strengthening.
- Obturator internus hypertonicity is often associated with urinary symptoms of urgency and frequency, yet the mechanism is not perfectly understood.<sup>5</sup>
- Jane's bothersome POP symptoms could not be explained by examination and did not recur at all during treatment period.
- Jane was highly motivated to overcome her distressing symptoms and adhered to her physiotherapy program with great dedication.

# Clinically useful measures



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Urodynamic assessment before surgery for pelvic organ prolapse – why Australasian gynaecologists choose to use it.

The management of more advanced and symptomatic pelvic organ prolapse (POP) is far more complicated than merely identifying the cause of a patient complaint of a bulge and arranging surgery. It involves the interpretation of possible pathogenesis and all relevant symptoms, signs, POP and intercurrent diagnoses. There may still be a role for conservative management (for example, pessary) for a time. Surgical options need clear aims and the best available evidence-based techniques, with the principle *primum non nocere* (first do no harm) foremost in the clinician's mind as benign pathology is involved.

The distortional and pressure effects of uterovaginal prolapse (see Figure 1) can have significant impact on other pelvic organs, particularly the lower urinary tract and anorectum. As part of this more informed approach to POP surgery, the need for a more comprehensive assessment of the interaction between POP and lower urinary tract function has been increasingly recognised. Up to 70 per cent of surveyed gynaecologists in Australia and New Zealand would seek urodynamic assessment prior to major prolapse surgery.<sup>1</sup> Goals and outcomes for POP interventions, in terms of lower urinary tract function, can be determined. Surgeons can tailor the interventions appropriately, duly counsel and obtain consent from their patients, with the minimisation of adverse functional outcomes. Effects of POP interventions on anorectal dysfunction are, unfortunately, less predictable.

## Tertiary clinical assessment

A common scenario is that the urodynamics, formally defined as the 'functional study of the lower urinary tract'<sup>2</sup>, follows previous primary practitioner and specialist clinical assessments. It is desirable that a mid-stream urine (MSU) is performed prior to urodynamics to eliminate urinary tract infection (UTI), with recurrent UTI (three or more proven UTIs in the previous 12 months) a common comorbidity with symptomatic POP. The tertiary clinical assessment as part of the urodynamics should be as comprehensive as possible. In addition to specific vaginal prolapse symptoms<sup>2</sup>, potential prolapse-related urinary tract, anorectal and sexual dysfunction symptoms might be revealed. The more\* or most common\*\* of such symptoms, in the author's experience, are listed in Table 1.

Table 1. The symptoms that women presenting with POP more\* or most\*\* commonly describe.

Potential prolapse-related symptoms	
Vaginal prolapse	Bulge**, pelvic pressure**, low (sacral) backache*
Urinary tract	Frequency**, recurrent UTI**, incomplete emptying**, slow stream*
Anorectal	Incomplete defecation**, digitation*, rectal urgency*
Sexual	Dyspareunia*, vaginal laxity*
Other possible associated symptoms	
Urinary incontinence**	Stress, urge, postural, nocturnal, coital
Bladder storage*	Urgency, nocturia

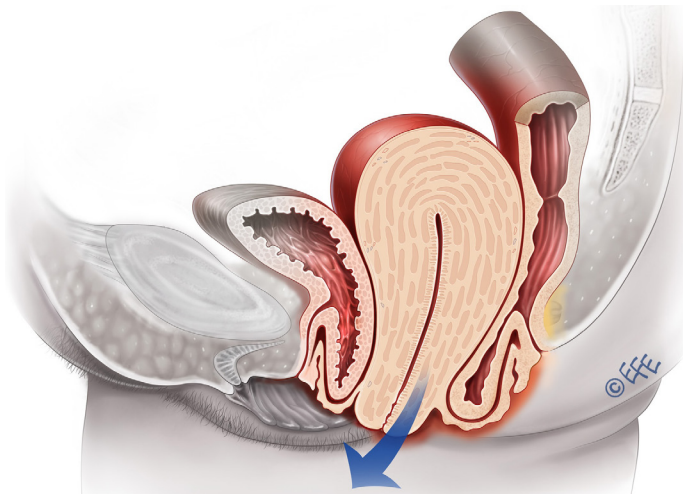


Figure 1. Uterine prolapse, cystocele and rectocele. (Illustration available at [www.medicalartbank.com](http://www.medicalartbank.com) © Dr Levent Efe, CMI.)

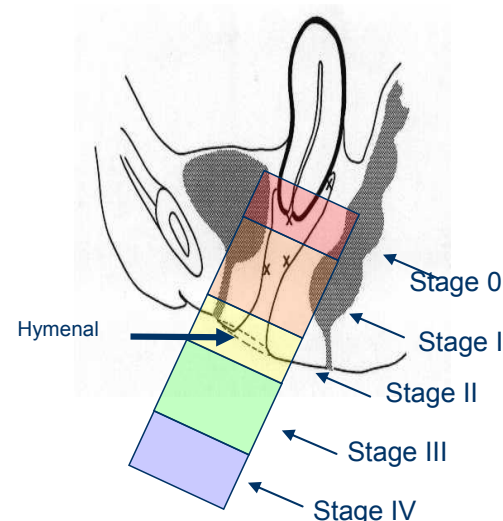


Figure 2. Stage for POP – I-IV.<sup>2,3</sup>

The tertiary clinician should opine in regards to the stages and components of POP present using the internationally recognised quantification (POP-Q)<sup>2,3</sup> schema (see Figure 2). Unlike the examination for the sign of stress incontinence (presenting bladder volume comfortably full), which will generally precede the examination for POP, all examinations for POP should be performed with the woman's bladder empty (and if possible an empty rectum).<sup>2</sup> The urodynamic report should include relevant findings from other examinations: external (vulval, perineal, urethral, perianal); vaginal (Sims/Graves speculum); bimanual (uterine, adnexal, other pelvic pathology); and abdominal/neurological (as indicated).

### Urodynamic testing

The clinical sequence of (urodynamic) testing<sup>2</sup> involves a woman attending with a comfortably full bladder, assessment for stress incontinence (fuller bladder), free (no catheter) uroflowmetry and post-void residual urine volume (PVR) measurement, assessment for prolapse (bladder empty) prior to filling and voiding cystometry. Foci of this tertiary assessment are the relationship of any POP with voiding function; evaluating urinary incontinence and other lower urinary tract symptoms; eliminating other intercurrent pathology with the assistance of imaging; presenting relevant diagnoses; and suggesting possible management strategies.

### POP and voiding function

POP will often have a negative impact on voiding function. The effect of uterine prolapse, cystocele or vaginal vault descent is more a 'kinking' one with that a rectocele more a 'pressure' effect on bladder outflow through the urethra. The two main basic parameters of voiding function are uroflowmetry and the PVR. In the above clinical sequence of testing<sup>2</sup>, the uroflowmetry precedes the PVR.

### Uroflowmetry

Uroflowmetry is the study of urine flow over time to achieve urine flow rates (see Figure 3a), maximum (MUFR –  $Q_{max}$ ) and average (AUFR –  $Q_{ave}$ ) for variable voided volumes. These data can be referenced to nomograms<sup>5</sup>, which plot the dependency of urine flow rates on voided volume (see Figure 3b). Under the tenth centile of the nomogram<sup>5</sup> for the MUFR and average AUFR, on repeated measurement, would be deemed to be abnormally slow. Most commercial uroflowmeters are accurate once calibrated.

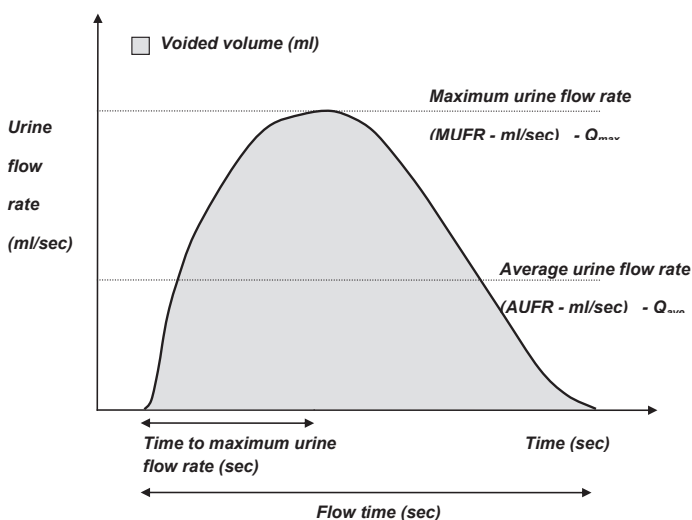


Figure 3a. A schematic representation of urine flow over time.<sup>2</sup>

### Postvoid residual

PVR can always be measured, following primary or specialist care assessment, as part of a renal tract ultrasound looking for reasons behind recurrent UTI or other urinary tract symptoms. Most convenient tertiary assessment is by transvaginal<sup>6</sup> or translabial ultrasound.<sup>7</sup> As most PVR readings still tend to be low, the technical limitations of transabdominal ultrasound makes this less accurate. Urethral catheterisation (most effective by short plastic catheter) is a less accurate and more invasive alternative. Another advantage of ultrasound is that the PVR can be checked by an 'immediate' second attempt at voiding (see Figures 4a and 4b).<sup>8</sup>

It has been shown that increasing stage POP will lead to increasing PVR<sup>8</sup> and slower urine flow.<sup>9</sup> More sophisticated testing, voiding cystometry, is performed to determine the function of the bladder (detrusor) musculature during voiding. A chronic PVR of over 30ml<sup>10</sup> has been shown to be associated with a significant increase in the prevalence of recurrent UTI, a most common clinical association of symptomatic POP. Surgical cure of POP can generally be expected to be associated with improved voiding parameters (little or no PVR; improved urine flow) and symptomatic function and a reduction in the prevalence of recurrent UTI.

### Incontinence and other lower urinary tract symptoms

Apart from POP, voiding dysfunction and recurrent UTI, the other three most common diagnoses (prevalence of at least ten per cent in women presenting for tertiary assessment including urodynamics with symptoms of lower urinary tract dysfunction<sup>2</sup>) in pelvic floor dysfunction are urodynamic stress incontinence (USI), detrusor (bladder) overactivity and bladder oversensitivity. Each of these can occur concurrently with POP, again influencing expectations and management including patient counselling.

### USI and POP

USI is defined<sup>2</sup> as 'involuntary leakage, associated with increased intra-abdominal pressure, in the absence of a detrusor (bladder) contraction'. Establishing this conclusively requires the urodynamic investigation of filling cystometry though the sign of clinical stress leakage<sup>2</sup> or leakage that occurs simultaneously with coughing or other causes of raised intra-abdominal pressure is strongly suggestive. Sometimes POP can conceal this sign. The occult stress

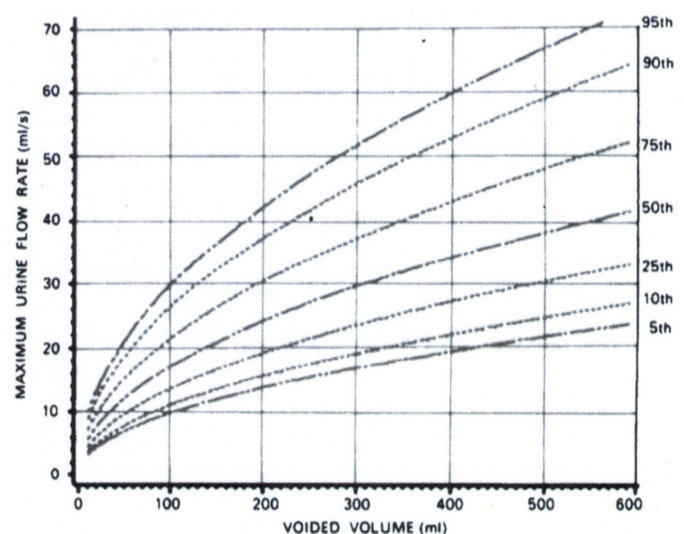
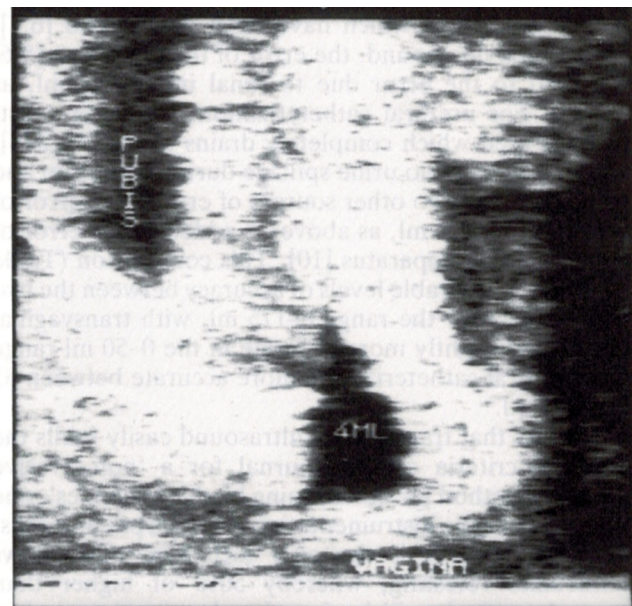


Figure 3b. The Liverpool nomogram for the maximum urine flow rate in women<sup>2,5</sup> (under the tenth centile on repeat measurement can be regarded as abnormally slow).





Figures 4a, 4b. An image of postvoid residual of 65ml by transvaginal ultrasound<sup>6</sup>, reducing to 4ml with a subsequent attempt at voiding.

incontinence<sup>2</sup> might only be revealed with POP reduction, better preoperatively, when appropriate counselling can occur, rather than postoperatively when it can create patient dissatisfaction as a POP problem is replaced by an incontinence problem.

A clear diagnosis of USI may require counselling on the need for a continence procedure at the time of a proposed POP procedure. This is a very common occurrence.

## Detrusor overactivity, bladder oversensitivity and POP

Detrusor (bladder) overactivity is defined<sup>2</sup> as 'the presence of involuntary bladder (detrusor) contractions during filling cystometry'. Bladder oversensitivity is defined<sup>1</sup> as 'increased perceived bladder sensation during bladder filling and decreased bladder (maximum cystometric) capacity in the absence of any abnormal increases in bladder pressure'. Both of these diagnoses, generally associated with such symptoms as nocturia, urgency, urge incontinence and frequency, rely on filling cystometry to confirm. Figure 4 shows a schematic diagram of filling cystometry showing detrusor overactivity. The different lines of the trace show filling volume;  $P_{ves}$  cm H<sub>2</sub>O or the bladder pressure during filling;  $P_{det}$  cm H<sub>2</sub>O or the detrusor (true bladder) pressure ( $P_{ves} - P_{det}$ ) during filling;  $P_{abd}$  cm H<sub>2</sub>O or the abdominal (generally rectal) pressure during filling; and flow rate (ml/sec).

These diagnoses may occur in association with POP and it's important to know they exist, though there is no clear relation with POP. From a preoperative counselling point of view prior to prolapse surgery, one could suggest to a patient that anatomical restoration might see some relief though perhaps not cure, with ongoing medical treatment possibly necessary.

## Imaging and intercurrent pathology

Imaging, particularly by ultrasound, has become an extremely important addition to urodynamic assessment. Many women will have already had the benefit of a pelvic ultrasound prior to the urodynamics. Mention, however, has already been made of the very important use of transvaginal or translabial ultrasound to assess for postvoid residuals. Other uses of the same imaging are to assess: uterine version; bladder neck/urethral morphology/mobility pre- and postoperatively; and descent of pelvic organs.

For women who have not had ultrasound imaging prior to urodynamic testing, there can be an eight per cent detection of significant pathology, not otherwise likely to be detected clinically and with the potential to alter management. These include<sup>2</sup>:

- intercurrent pelvic pathology (uterine especially large or fibroid uteri, endometrial pathology, adnexal pathology);
- bladder abnormalities (tumour, foreign body); and
- urethral abnormality (for example, diverticulum).

More sophisticated analysis of soft tissue pelvic floor/levator defects would generally require the use of 3D or 4D ultrasound.<sup>2,11</sup>

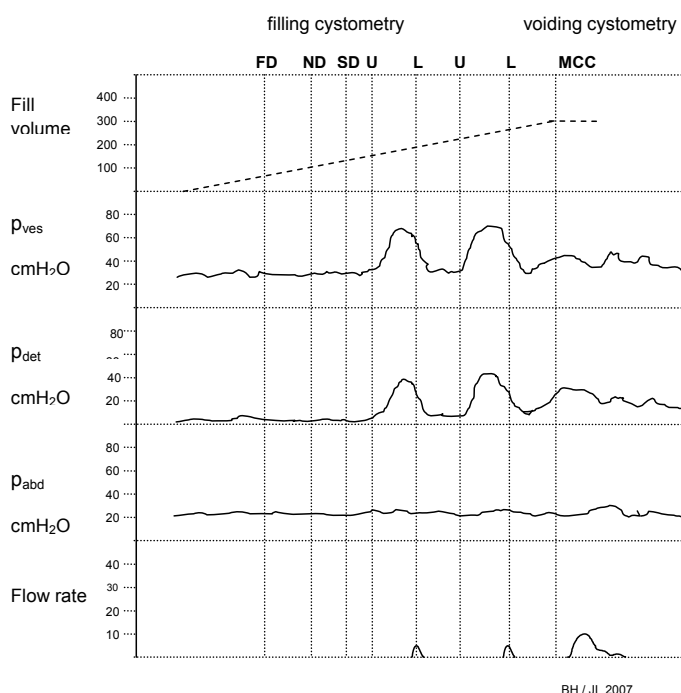
Radiological studies – such as videocystourethrography (VCU)<sup>2</sup> or the synchronous radiological screening of the bladder and abdominal pressures during filling cystometry<sup>2</sup> – are less routinely used than they were 20 years ago. Intravenous urography (IVU)<sup>2</sup>, often by computed tomography, may be used if upper urinary tract pathology is suspected and micturating cystogram (MCU)<sup>2</sup> can be useful to evaluate vesico-ureteric reflux, some fistulae and diverticulae.

## POP and defecatory function

POP, particularly posterior vaginal compartment prolapse, can impact on defaecatory function. Restoration of the posterior vaginal anatomy in a way where all defects from vaginal vault to perineum are addressed in a systematic way is probably more likely to result in a more satisfactory anatomical and functional result than less comprehensive ad hoc and subjective approaches. Particular care is needed in anatomical restoration of the posterior vaginal compartment to avoid any negative impact on both defaecatory and sexual functions.

In individual cases, there can be a need for additional specialised anorectal functional assessment, which is generally not the province of a gynaecologist or urogynaecologist but rather than of a colorectal surgeon. The most common investigations performed as part of that assessment are:

- Anal ultrasound (endosonography)<sup>2</sup>, the gold standard investigation in the assessment of anal sphincter integrity. There is a high incidence of defaecatory symptoms in women with anal sphincter defects.



A 54-year-old female with urgency and frequency. Phasic detrusor activity during filling. Leakage is associated with urgency and detrusor contractions. FD = First Desire to Void, ND = Normal desire to void, SD = Strong desire to void, U = Urgency, L = leakage, MCC = Maximum Cystometric Capacity.

Figure 5. Filling cystometry – detrusor overactivity.<sup>2</sup>

- Defaecograph<sup>12</sup>, to demonstrate normal anatomy of the anorectum as well as disorders of rectal evaluation. Barium paste is inserted rectally over a translucent commode. Rectoceles, enteroceles, rectal intussusception and mucosal prolapse may be diagnosed as well as a spastic pelvic floor (anismus).
- Anorectal physiology: the functional study of this area.

### Diagnoses and possible management strategies

There is a need to base diagnoses for female POP on the correlation between a woman's symptoms, signs and any relevant diagnostic investigations.<sup>2</sup> Other possible (common<sup>2</sup> – over ten per cent prevalence) diagnoses include, with the approximate prevalence in women presenting for comprehensive assessment including urodynamics with POP and/or symptoms of lower urinary tract dysfunction:

- urodynamic stress incontinence<sup>2</sup> (up to 72 per cent<sup>2</sup>);
- detrusor overactivity<sup>2</sup> (13–40 per cent<sup>2</sup>);
- bladder oversensitivity<sup>2</sup> (10–13 per cent);
- voiding dysfunction<sup>2</sup> (14–39 per cent<sup>2</sup>); and
- recurrent urinary tract infections<sup>2</sup> (11 per cent or 19 per cent), depending on whether the cut off is three or two symptomatic and medically diagnosed UTIs in the previous 12 months.

It is therefore not an infrequent scenario with more major prolapse cases (for example, a woman with symptoms of POP, stress and urge urinary incontinence, voiding dysfunction, recurrent UTI and signs of recurrent stage 3 vaginal prolapse) that as many as five diagnoses might be present after comprehensive clinical and urodynamic assessment:

- recurrent UTI (on history);
- stage 3 (on examination) POP (cystocele, rectocele, vaginal

vault descent);

- voiding dysfunction (abnormally slow free uroflowmetry and high PVR);
- USI – partially protected by the obstructive effect of the prolapse and likely to be revealed to an even greater degree by prolapse surgery; and
- mild detrusor overactivity.

The full knowledge and experience of the tertiary assessor is required to propose a triage of management. In the above scenario, one option, after appropriate pre-operative counselling, might be:

- surgical management of POP and voiding dysfunction by her undergoing a sacrospinous colpopexy, anterior and posterior repair, with a concomitant retropubic stress incontinence surgery for the USI;
- ongoing UTI prophylaxis (for example, Hiprex/Vit C both BD) at least till the postoperative visit which would include PVR reassessment; and
- ongoing expectant or medical management of any residual urgency/urge incontinence (detrusor overactivity component) according to symptoms.

### Conclusions

The interpretation of possible pathogenesis and all relevant symptoms, signs, POP and intercurrent diagnoses in cases of more advanced and symptomatic POP can require a tertiary assessment including urodynamics by an appropriately skilled assessor. With the increasing awareness of the possible complexity of such cases, it is not surprising that more Australasian gynaecologists are 'choosing to use it'. They can then tailor the interventions appropriately, duly counsel and consent their patients, with the minimisation of adverse functional outcomes.

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# Surgical management of POP



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There are a plethora of surgical procedures available for pelvic organ prolapse (POP) repair. Perhaps the most important factor is to consider the apical compartment when performing any repair, as failure to address this will lead to an increase in recurrence risk. A customised approach to POP surgery is essential.

POP is an increasing problem as the western population ages. In the US, about 200 000 prolapse surgeries are performed annually, with 11–19 per cent of women requiring POP or continence surgery by the age of 80.<sup>1</sup> POP can be found in up to 50 per cent of parous women on vaginal examination, however, if symptom free no intervention is required. For women with prolapse symptoms – such as a bulge, dragging, back pain,

voiding, defaecatory or sexual dysfunction – conservative or surgical options are available. A discussion of conservative options is not within the remit of this short article, but is generally most suited to women who have not completed their family, are medically unfit or do not wish to undergo surgery.

POP is divided into compartments: the anterior compartment (cystocele or urethrocele), apical compartment (vault or uterine prolapse) and posterior compartment (rectocele or enterocele). In reality, many women have multi-compartment prolapse. Use of a

POP quantification (POP-Q) exam (see Box 1) will help to delineate the extent of prolapse in each compartment so a surgical plan can be created.

The options for surgical repair are wide and choice will depend on a number of factors, including the stage of prolapse, compartments involved, the patient's age, lifestyle, sexual activity, BMI, comorbidities and previous history of POP surgery. The operating surgeon should have the ability to tackle a prolapse repair using a variety of surgical approaches so that surgery can be customised for the individual patient. The aim of prolapse surgery should be to: restore vaginal anatomy and improve or maintain bladder, bowel and sexual function. For elderly women, obliterative surgery may be the most appropriate surgical option.

## Apical compartment prolapse

Abdominal sacrocolpopexy (ASC), sacrospinous or ileo coccygeus suspension fixation and uterosacral suspension are the most commonly performed apical suspension procedures. Open ASC is traditionally performed through a Pfannenstiel incision, although increasingly via a laparoscopic or robotic approach. To date, robotic procedures do not confer an advantage over laparoscopic procedures, but do incur a longer operating time and higher cost. Open procedures are associated with a longer hospital stay and more postoperative pain, but no difference in patient satisfaction or surgical outcomes.

### Box 1. POP-Q exam

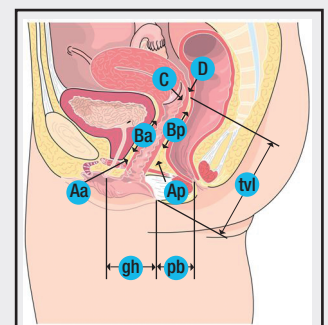
The POP-Q exam<sup>12</sup> is used to quantify, describe, and stage pelvic support. There are six points measured at the vagina with respect to the hymen. Points above the hymen are negative numbers; points below the hymen are positive numbers. All measurements except tvl are measured at maximum Valsalva.

Point	Description	Range of values
Aa	Anterior vaginal wall 3 cm proximal to the hymen	-3 cm to +3 cm
Ba	Most distal position of the remaining upper anterior vaginal wall	-3 cm to +tvl
C	Most distal edge of cervix or vaginal cuff scar	
D	Posterior fornix (N/A if post-hysterectomy)	
Ap	Posterior vaginal wall 3 cm proximal to the hymen	-3 cm to +3 cm
Bp	Most distal position of the remaining upper posterior vaginal wall	-3 cm to + tv

*Genital hiatus (gh)* – Measured from middle of external urethral meatus to posterior midline hymen. *Perineal body (pb)* – Measured from posterior margin of gh to middle of anal opening. *Total vaginal length (tvl)* – Depth of vagina when point D or C is reduced to normal position.

### POP-Q staging criteria

Stage 0	Aa, Ap, Ba, Bp = -3 cm and C or D ≤ - (tvl - 2) cm
Stage I	Stage 0 criteria not met and leading edge < -1 cm
Stage II	Leading edge ≥ -1 cm but ≤ +1 cm
Stage III	Leading edge > +1 cm but < + (tvl - 2) cm
Stage IV	Leading edge ≥ + (tvl - 2) cm





Success rates after ASC range from 76–100 per cent, with a four per cent reoperation rate for prolapse.<sup>2</sup> The incidence of mesh extrusion with ASC using polypropylene mesh is low, at around 0.5 per cent, increasing if a hysterectomy is performed concurrently. Recent studies show performing a subtotal hysterectomy will minimise the risk of mesh extrusion. In the recent FDA statement, mesh used in ASC was retained for use as a Class 2 product under the 510K ruling and has not been associated with the incidence of complications associated with vaginal mesh.

## Sacrospinous fixation

Sacrospinous fixation (SSFxn) provides excellent vaginal vault support (see Figure 1), with recurrence rates ranging from 2–19 per cent and objective cure rates of 67–97 per cent.<sup>3</sup> Traditionally, sutures are placed in the right suture suspension lift. Some advocate bilateral SSFxn; however, this approach requires an adequate vaginal vault width and length and, to date, hasn't been associated with improved outcomes. Sacrospinous hysteropexy is gaining in popularity, with a reported reduction in surgical time, risk of complications and blood loss, but a possible increase in recurrence rates, and may best be reserved for older women with small atrophic uteri and no cervical hypertrophy until more data are available.

Braided sutures, such as Ethibond, are associated with an increased risk of suture extrusion, infection and granulation formation. Monofilament sutures, such as prolene or PDS, are more suitable. The incidence of buttock pain with SSFxn is around ten per cent. This is usually short lasting and careful placement of sutures 2cm medial to the ischial spine and the use of a suture carrier such as the I stitch or Capio will reduce the risk of damage to the sciatic nerves sitting posterior to the ligament.

The incidence of haemorrhage with SSFxn is low, at 1.8 per cent, despite popular belief most haemorrhage during sacrospinous fixation is a result of damage to the inferior gluteal artery, which runs behind the sacrospinous ligament, rather than damage to the pudendal artery. This is best treated with packing and interventional radiological techniques. The recent Cochrane review by Maher et al concluded that ASC, when compared to SSFxn, was associated with a lower rate of vaginal vault prolapse and reduced dyspareunia rates, but a higher cost and longer operating and recovery time than vaginal surgery. SSFxn results in a posterior angulation of the vagina and this has been associated with an increased risk of cystocele formation.

## Uterosacral ligament suspension

Uterosacral ligament suspension (USL) suspension provides a more anatomical axis to the vagina than SSFxn (see Figure 2), but owing to the attenuation of the ligaments would be less suitable for women with advanced stages of prolapse. Success rates are quoted at 81–98 per cent.<sup>4</sup> Many different approaches are described all with the aim of placing several permanent or absorbable sutures from the USL to the vaginal vault, thus resulting in vault elevation and reduction of enterocele. Care needs to be taken in suture placement to avoid ureteric entrapment or kinking and performing a cystoscopy at the time of surgery is essential. Sutures placed too deeply may result in pain or numbness along the S2, S3 dermatomes.

There is, as yet, no RCT comparing SSFxn with USL suspension for apical support, but a trial is underway.

## Anterior vaginal wall prolapse repair

Traditional native tissue repair involves the plication of the pubocervical fascia using an absorbable suture. Of anterior

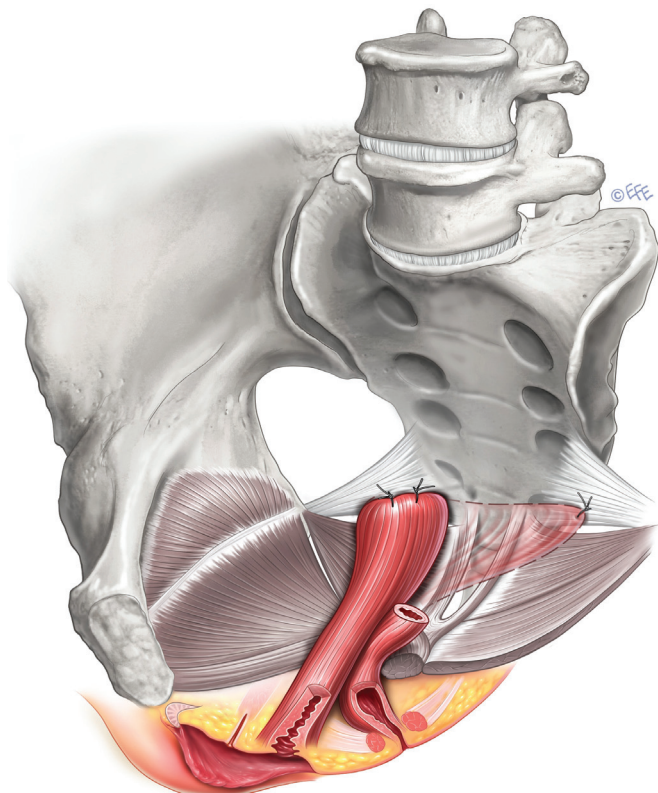


Figure 1. Sacrospinous ligament fixation.  
Image courtesy IUGA, copyright Levente Efe.

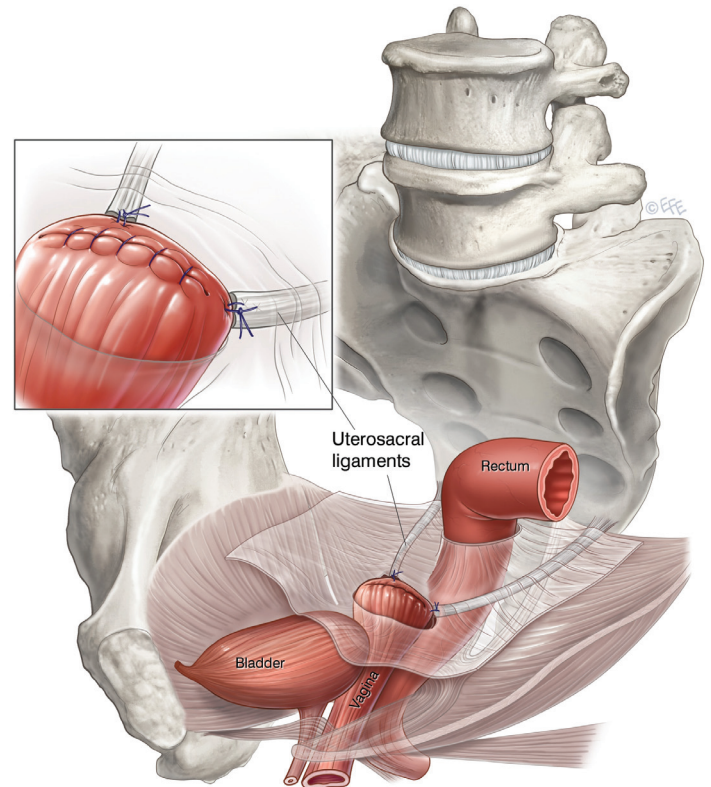


Figure 2. Uterosacral ligament suspension.  
Image courtesy IUGA, copyright Levente Efe.

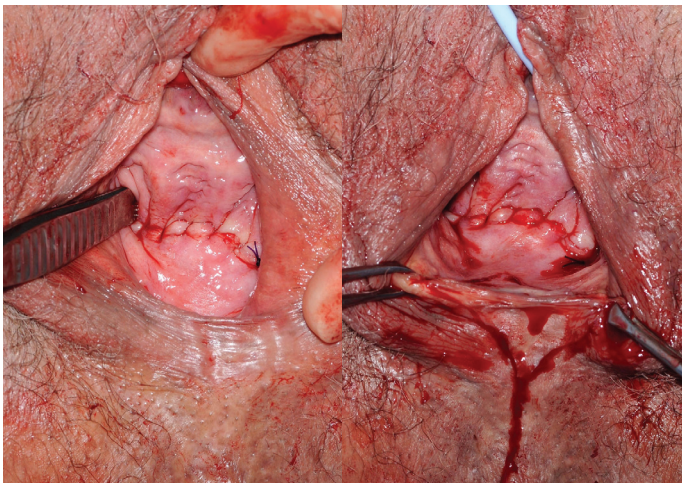


Figure 3. LeFort colpocleisis, on the right completion of Le Fort colpocleisis with a perineorrhaphy.

compartment prolapses, 50–60 per cent have an additional element of apical prolapse, which will need to be addressed to get a good anatomical result. Failure to do so may, in part, account for the recurrence rates of up to 40 per cent reported in the literature.<sup>5</sup> Attaching the pubocervical fascia to the vault or cervix with a suture will also aid support. Paravaginal repair techniques have largely fallen out of favour owing to a lack of efficacy.<sup>6</sup> In 2010, in the US, a quarter of prolapse cases were managed with a mesh implant. In 2008 and 2011, the FDA issued statements regarding the safety and efficacy of vaginal mesh implants, this was followed by a frenzy of lawsuits and an inevitable decline in mesh use.<sup>7</sup> Data from randomised controlled trials, summarised in a Cochrane Review in 2013<sup>8</sup> and the FDA report, found that use of surgical mesh for anterior compartment repair has potentially higher anatomical success rates than repair without mesh, but results in similar subjective success rates and a higher complication rate than traditional vaginal surgery. Judicious use of vaginal mesh by experienced surgeons is therefore recommended with stringent patient counselling prior to implantation. The IUGA round table discussion document<sup>9</sup> is a useful source of guidance on which patients may benefit from vaginal mesh.

### Stress urinary incontinence

Detailed discussion of stress urinary incontinence (SUI) is not within the remit of this article; however, *de novo* SUI needs to be considered in all women with advanced POP. Urodynamics with a pessary in situ can be performed before surgery and a continence procedure performed at the time of POP repair. Another approach is to warn the patient of the risk of *de novo* SUI (about eight per cent) and perform a two-stage procedure if necessary.

### Posterior compartment repair

The posterior compartment is supported by the level 1 support systems (uterosacral and cardinal ligaments), level 2 supports (with the endopelvic fascia) and level 3 supports (the perineal body). The puborectalis portion of the levator ani muscles is particularly important in maintaining the rectal angle and also the genital hiatus. Assessment of these supports prior to surgery is important so a suitable repair can be performed. Many women suffer from symptoms of obstructed defaecation. This may be owing to a prolapse, but also to intussusception or rectal prolapse and assessment with a defaecating proctogram or MRI before surgery may be indicated, particularly if symptoms do not match examination findings.

Native tissue repair is customarily performed as a site-specific repair or a traditional rectocele repair. Anatomical cure rates are very similar with both techniques at 80–100 per cent. The addition of a perineorrhaphy will reduce vaginal calibre and add support, but care should be taken not to narrow the vagina excessively. Levatorplasty does narrow the vagina, however, it may also result in dyspareunia and pelvic pain and should be performed with caution, if at all, in sexually active women. Use of reconstructive materials (synthetic or biological) to augment the repair of posterior vaginal wall prolapse is not supported by current evidence<sup>8</sup> and should only be considered in exceptional cases.

### Obliterative procedures

Colpocleisis is an extremely effective procedure for women with advanced POP, with success rates in excess of 90 per cent.<sup>10</sup> The procedure is quick, simple and can be performed under local anaesthetic if required. LeFort or partial colpocleisis (see Figure 3) involves removal of a strip of vaginal mucosa anteriorly and posteriorly and should be performed for women with an intact uterus. Total colpocleisis involves the removal of all vaginal mucosa. In both cases, 3–4 cm of vaginal mucosa should be retained distally so the urethra is not distorted. The incidence of SUI following colpocleisis is up to 30 per cent, a mid-urethral sling may therefore be of benefit at the time of surgery.<sup>11</sup> Colpocleisis precludes future penetrative sexual activity, so careful counselling is required prior to surgery. Women should be screened before surgery for endometrial thickness and have a normal cervical screening history, as the cervix will no longer be accessible following surgery.

For illustrated patient information brochures on POP surgery and more, visit the International Urogynecological Association website at: [www.iuga.org](http://www.iuga.org), they are free to download.

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# A simple guide to procidentia

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Procidentia refers to the complete prolapse beyond the level of the hymen distally so the uterus (or vaginal vault if uterus is absent) is permanently protruding out of the vagina.

Pelvic organ prolapse (POP) is defined as the symptomatic descent of one or more of: the anterior vaginal wall, the posterior vaginal wall, and the apex of the vagina (cervix/uterus) or vault (cuff) after hysterectomy, according to the International Continence Society (ICS) definition and standardisation nomenclature 2009. In practical terms, it refers to a caudal displacement of the female pelvic organs as a result of weakening of supporting tissues of the vagina and uterus, resulting in extrusion of the pelvic organs to the genital hiatus. There have been a number of methods used to quantify the degree of severity of POP, but only one system has been validated for inter and intra-observer reproducibility, which is the POP quantification (POP-Q) ICS quantification system (see box on p49).

Scandinavian studies involving asymptomatic women invited for assessment reported that 55 per cent of women aged from 40–49 years had, on examination, POP of greater than grade two in at least one compartment.<sup>1</sup> Of women aged between 50 and 79 years in the Women's Health Initiative (WHI) study, 41 per cent had POP, with 34 per cent having a cystocele, 19 per cent a rectocele and 12 per cent found to have uterine prolapse. Studies from the USA, looking at operations for POP, suggest that one in nine women will require an operation by the age of 80 years. However, since many women do not seek medical assessment, it is very likely that the burden of disease in the population is underestimated.

Important risk factors include parity, since the incidence of POP increases with increasing parity: up to 80 per cent of women who have had four or more vaginal deliveries will have POP.<sup>1</sup> In those women who were able to activate pelvic floor muscles sufficiently,

this incidence was reduced by nearly 50 per cent. Use of forceps for delivery also increases the risk significantly, with other less-important factors being the duration of labour, use of episiotomy, birthweight, and previous hysterectomy. There are racial variations, with studies from the USA reporting that Asian women have a higher incidence and African women have a lower incidence.<sup>3</sup>

The support mechanisms of the uterus and vagina are still not fully understood, but relate to a complex interaction of fascial integrity and ligamentous connections to bony structures. Endopelvic fascia surrounds the vagina, but controversy still exists as to whether there are distinct layers or spaces or whether the vaginal mucosa and muscularis merge or interdigitate with collagen and elastin submucosally. This sock-like tissue then coalesces with the cervical cuff cranially to integrate with uterosacral and cardinal ligaments as well as laterally to the underlying levator ani muscle attaching to the arcuate line of the levator fasciae pelvis, which runs from the ischial spine to the pubic insertion of puborectalis. Caudally the fascia connects to the perineal membrane and perineal musculature. The support of the urogenital organs have been segregated into three different levels: Level 1 being the uterosacral/cardinal complex cranially, level 2 the endopelvic fascia surrounding the upper two-thirds of the vagina and level 3 the lower third of the vagina as it attaches to the levator ani and perineal membrane.<sup>4</sup> In reality, this is an integral system of support with multiple potential areas for disruption or weakness.<sup>5</sup> Underlying this is a secondary support mechanism of the levator ani muscle, and in particular the puborectalis 'sling' that acts to support the vagina at the level of the levator hiatus, and the disruption of which is common after vaginal childbirth<sup>6</sup>, predisposing to POP in later life.<sup>7</sup>

A careful history of urinary, bowel and coital symptoms is important to optimise patient centred outcomes. There are a number of validated questionnaires for this, for example being the Australian pelvic floor questionnaire.<sup>8</sup> Examination needs to quantify the POP and any other associated urogenital weakness. The investigations required with procidentia are few, but renal ultrasonography and mid-stream urinalysis may be important, owing to potential for kinking of the ureters leading with consequent hydronephrosis and urine stasis due to incomplete emptying. In addition, some authors have suggested urodynamic investigations prior to surgery to help identify occult stress urinary incontinence and to attempt to predict those women with underlying voiding dysfunction. Assessment of POP is largely clinical, augmented by imaging modalities such as ultrasonography and MRI. For practical purposes, although such investigations may be useful for a research aspects, they are not usually warranted.

Management can be non-surgical, with the use of pessaries, although successful long term treatment may be difficult. The use of pessaries is beyond the scope of this article. Whatever treatment is chosen, pelvic floor rehabilitation with continence nurses or physiotherapists trained in women's pelvic health, is an important adjunct to obtaining a successful long-term outcome. Often, women with procidentia have poor coordination of pelvic muscle relaxation and contraction, associated bowel dysfunction, and underlying urinary incontinence



*Procidentia is easy to identify.*



and this complex range of pathology should be managed as a 'global' pelvic disorder. Weight loss, smoking reduction and improvement of bowel habit, although not proven to improve outcome, are important to address prior to surgery.

### Surgical options: to conserve or not?

This is a controversial area and there is limited work to suggest uterine preservation offers any advantage. There are a plethora of operations with advocates extolling the advantages of each based on personal experience (bias) and limited cohort studies, usually retrospective. So definitive recommendations for surgery are limited to major studies as summarised in the Cochrane review. The Cochrane review of 2013 would suggest abdominal sacrocolpopexy, either by open or laparoscopic technique, may offer marginally better outcome for uterine or vault prolapse mainly in terms of vaginal length and sexual outcomes as well as recurrence rates when compared to total vaginal mesh implants. However, operating times were longer and there was a longer period before a return to work.

Surgical options for procidentia include: vaginal hysterectomy with anterior and posterior traditional colporrhaphy; or vaginal hysteropexy utilising uterosacral and cardinal ligament complex; sacrospinous fixation; or abdominal or laparoscopic hysteropexy, with or without mesh.

Surgical options for vault prolapse include: abdominal or laparoscopic sacrocolpopexy, with or without mesh; sacrospinous fixation; McCall culdoplasty; uterosacral fixation – intra- or extra-peritoneal; ileo-coccygeal fixation; or vaginal mesh colpopexy with or without fixation to sacrospinous ligament using biological or synthetic polypropylene.

Colpocleisis is a surgical option for both procidentia and vault prolapse. As in any surgery where the uterus is conserved, an endometrial assessment should be undertaken at the same time.

Evidence for synthetic mesh augmentation is present for sacrocolpopexy and vaginal mesh kits.<sup>9</sup> With increasing concern about the complications of mesh-augmented repair vaginally, mainly as a result of vaginal contraction, pain and mesh exposure post-operatively, there has been a move back to native tissue repair. Simple vaginal hysterectomy with or without associated anterior and posterior vaginal repair is associated with relatively poor long-term outcome and logically, unless level 1 weakness is addressed at the time of surgery, simply removing the uterus unless related to elongation of the cervix makes little sense.

Sacrospinous fixation using needle holders and sutures, or reusable deployment and capture devices and disposable suture catch devices have made this procedure easier to perform. However, significant lateral dissection is required to identify the portion of the sacrospinous ligament that is safe to use, which is approximately 2cm cranial and medial to the ischial spine. Risks include deployment too deep, resulting in injury to the pudendal bundle or inferior gluteal vessels or sciatic nerve. Buttock pain can be a complication of this procedure, but with newer catch devices seems to be reduced and limited in duration. Persistent severe pain lasting more than 48 hours may require release of the sutures. Although traditionally unilateral, because of concerns of tethering and tenting of the vagina, bilateral fixation is increasingly undertaken with excellent elevation and can be done without painful tethering. Long-term outcomes suggest higher recurrence rates, compared to sacrocolpopexy, and when undertaken posteriorly can result in increased de novo anterior compartment prolapse. Anterior fixation, although technically more challenging, may improve this outcome and some centres advocate a four-point

fixation, incorporating both anterior and posterior level 1 support to overcome this.

Uterosacral fixation can be undertaken at the time of hysterectomy when anatomy is easier to define or by means of plication for uterine sparing and some studies have suggested good results.<sup>10,11</sup> For vault prolapse, intra-peritoneal fixation can be technically challenging and all of these procedures run an increased risk of ureteric injury. Extra-peritoneal fixation has also been shown to have good results and avoids entering into the abdominal cavity.<sup>12</sup>

Ileococcygeal fixation is technically easier, but results in lower success rates. The McCall, or a modified McCall procedure utilising the uterosacral ligaments, is a relatively straightforward procedure that results in good anatomical correction. Colpocleisis involves permanent closure of the denuded anterior and posterior vaginal mucosa, aiming to obliterate the vaginal cavity. It is suitable for the elderly and has relatively low morbidity.

In summary then, the optimal surgical treatment of procidentia depends on patient-focused outcomes, including desire to maintain sexual intercourse, desire to keep her uterus and the history of previous pelvic surgery. At this stage, further studies are required to clarify the best treatment for this end-stage disease.

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# Decline and fall

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Lessons learned from the troubled history of transvaginal mesh kits.

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In this article we will discuss the events befalling transvaginal mesh (TVM) over the last four years, where we are now and the

necessary considerations when using of TVM for the prevention and treatment of recurrent pelvic organ prolapse.

## The decline in the use and availability of TVM

Since 2010, we have witnessed both a fall in the usage as well as the commercial availability of transvaginal mesh products. Although the volume of TVM procedures is not publicly available, US industry sources quoted by the Federal Drug Administration (FDA) would suggest an almost 60 per cent fall in the use of TVM, which now comprises only ten per cent of pelvic floor reconstructive procedures. In Australia such data is not available, however, in the authors' practice TVM now comprises well below ten per cent of pelvic reconstructive procedures.

Over a similar period, we have seen industry voluntarily withdraw several products. Ethicon has withdrawn all TVM products from the market, while Boston Scientific has withdrawn the Pinnacle™ Posterior kit and Bard the Avaulta™ kit. This trend has not been restricted to synthetic mesh products, with Cook announcing they will no longer market their Biodesign™ biological transvaginal graft, citing the prohibitive cost of running FDA mandated '522' post-market surveillance studies. These decisions are without doubt a direct consequence of commercial pressures resulting from regulatory changes, but may also be a consequence of medico-legal challenges. In addition, there is the growing clinical sense that perhaps TVM is not the sole answer to recurrent prolapse prevention and treatment that we all sought.

## Medico-legal and financial pressures; innocent victims

The 2011 FDA statement altered the risk classification of TVM to a class III product: a high-risk device. This statement not only clearly stated that the additional complications associated with TVM were 'not rare', but also required manufacturers to perform post-market surveillance studies to assess the safety and effectiveness of such products. The cost of a single 522 study is estimated to be millions of dollars and thus far the FDA has ordered no less than 95 post-market studies involving an astonishing 34 manufacturers of TVM.

If this was not enough, the medico-legal industry is in a feeding frenzy, with several law firms offering free case reviews to those who may have had TVM, symptomatic or not, in an attempt to build class actions. There are said to be hundreds of class actions currently in progress, with several commencing in Australia. Two individual lawsuits have so far been reported successful in the USA, with \$5.5 million awarded against Bard and a further \$11 million against Johnson & Johnson. American Medical Systems recently reported establishing a fund of \$54.4 million to settle a number of claims.

Performing a Google search using the term 'transvaginal mesh'

demonstrates the current profile of TVM: the top-five ranked sites are all associated with law firms. This unbalanced landscape not only affects the psychology of manufacturers and company shareholders, but also the general public's perception of TVM. The scattergun technique commonly employed by law firms to gather potential plaintiffs also catches other mesh products in its indiscriminating net. Type 1 polypropylene products used in mid-urethral slings and abdominal apical support procedures have now been drawn into the spotlight of adverse publicity, despite their FDA risk classification remaining unchanged as a class II (low to medium risk), as well as being products with strong level 1 evidence supporting their efficacy.

Unsurprisingly, patient advocacy groups have been vocal in their condemnation of mesh products. This has become a deeply emotional and personal issue for some, which is understandable given the reported morbidity caused in particular cases.

TVM has become the rope in the tug-of-war between the remaining mesh-kit producers and the medico-legal industry. Whether TVM kits will remain commercially available seems to be moving slowly, but inexorably, beyond the reach of any evidence-based clinical rationale.

## The TVM evidence loses weight in more ways than one

The theoretical rationale for TVM has changed little since 2010. However, the size of the overall high-quality evidence base has actually shrunk considerably, owing to the fact that many of the papers published in the literature now relate to kits that are no longer manufactured. Haya & Maher recently re-analysed the Surgical Management of Pelvic Organ Prolapse Cochrane Meta-analysis<sup>1</sup> data to include only currently available kits.<sup>2</sup> This resulted in only five RCTs being eligible for re-analysis:

- Nguyen et al, 2008 – Perigee™ transobturator mesh system (AMS);
- Sivaslioglu et al, 2008 – self-fashioned lightweight PP mesh;
- Nieminen et al, 2010 – self-fashioned lightweight PP mesh;
- Thijs et al, 2010 – Perigee transobturator mesh system (AMS); and
- Menefee et al, 2011 – free-fashioned PP mesh.

These studies recruited a sum total of 242 women and reported results on only one commercial mesh kit: Perigee. In this re-analysis the anterior anatomical recurrence rates (Stage <2 POP-Q), were similar to the original meta-analysis, with 42.8 per cent versus 13.1 per cent (RR 3.3 CI 2.2-4.1) seen in the suture colporrhaphy versus anterior mesh groups, respectively. However, there were neither differences in reoperation rates for anterior prolapse nor patient quality of life. In other words, although there appeared to be an anatomical 'failure', no one was seeking further surgery for it. In addition, the mesh groups had greater blood loss (+74ml, C.I. 54-98) and longer operating times (+15mins, C.I. 7-22). We would not be so concerned about these results if it were not for the complications associated with mesh usage, namely symptomatic

mesh exposure, chronic pain and dyspareunia. Ten per cent of the mesh group underwent specific surgical intervention for mesh exposure that was seen in 14 per cent of patients. Recently, Crosby et al reported that while 95 per cent of mesh exposures were successfully treated, only 51 per cent of pelvic pain apparently associated with mesh was successfully treated surgically.<sup>3</sup>

If we look at the evidence for the two low-weight anchored mesh kits commonly used and still currently available in Australia, Elevate™ (American Medical Systems, Minnetonka, USA) and Uphold™ (Boston Scientific), there are no published RCT data. Regarding the Elevate kit, two out of the three published observational studies, one retrospective the other prospective, demonstrated a 92 per cent < Stage 2, anatomical success rate when used in the anterior or posterior compartment. However, these two studies were conducted by investigators with a potential financial conflict of interest and did not compare results with native tissue techniques. A third prospective study of anterior, posterior and combined Elevate performed by investigators with no such conflicts of interest demonstrated a much lower success rate (69 per cent) as defined by an absence of POP-Q ≥ Stage 2. Two-thirds of anatomical recurrences were in the treated compartment however no patient had repeat surgery by 12 months. The mesh exposure rate was 4.5 per cent.<sup>4</sup> In the case of the Uphold device, there are actually no published studies independent of those authors who have a clear financial conflict of interest.

Another important fact when considering Elevate and Uphold mesh kits is that these kits are designed to provide level 1 apical as well as level 2 support. As a consequence, they are not necessarily comparable with the previous generations of TVM. We still await the results of the mandated 522 studies, to assess the benefit of these meshes compared with native tissues using outcome measure recommended by IUGA/ICS but these are likely to be several years away. By then, the party may be over.

### Should we continue to use transvaginal mesh?

There are women who by virtue of poor connective tissue or its exposure to intolerable stressors may benefit from a graft augmentation. However, the 'but' comes in with the issue of selection and engaging in a comprehensive discussion of the options, so arriving at the right operation for the right patient, performed by the right surgeon.

To support the decision-making process there are key resources that can assist clinicians and patients. The two most useful resources are:

- Polypropylene Vaginal Mesh Implants for Vaginal Prolapse (C-Gyn 20) RANZCOG guideline outlining the key issues of informed consent, patient selection and the role of surgical training and experience.<sup>5</sup>
- The American Urogynecologic Society 'Informed Consent Toolkit' for patients and clinicians regarding the use of mesh in the surgical treatment of prolapse.<sup>6</sup>

### Management of surgical innovation and new products

We do not have the answer for all women with pelvic organ prolapse (POP), so there will always be a role for new surgical techniques. However, we need to recognise the lessons offered by the mesh revolution of the last decade:

- Unchecked commercial interest and clinician zeal accelerates the adoption of medical products at a faster rate than the naturally conservative evolution of medical practice would normally allow. This increases the risk of exposing patients to unknown harms that may exceed any perceived benefits.
- Before adopting a new product or technique, ensure level-1

evidence is available for its overall benefit. Failing this, use of such products should only be under the auspices of a well-designed study with long-term monitoring of important outcomes. This recommendation should not be optional and national regulatory bodies need to be more critical and vigilant in this regard.

When considering the use of a new POP product, assess the quality of the supportive evidence as suggested by the ICS/IUGA terminology on the reporting of POP surgery trials:

- How was treatment success defined and were all important outcome measures reported?
  - Anatomical – POP-Q and what stage?
  - Subjective – Patient-reported outcomes (bulge, lower urinary tract, bowel and sexual function), patient satisfaction and quality of life measures.
  - Duration of follow-up: early (one year), intermediate (more than three years), late (five years).
  - Complication rates and peri-operative outcomes.
  - Repeat surgery – same compartment, different compartment and complication related or unrelated?
  - Did blinded, independent reviewers without a conflict of interest assess the outcomes?
- Also consider whether your patient would meet the inclusion criteria for the study.
- No two mesh kits are the same. Training for each kit is vital to understand patient selection, surgical technique and the additional risks.

By applying this approach, we can ensure that TVM remains an option for those at highest risk of POP recurrence who stand to benefit most, perhaps justifying the additional risks associated with synthetic grafts.

If we look back critically and honestly at the introduction of TVM, we can perhaps admit to ourselves that we were too easily persuaded about mesh benefit when the evidence was clearly incomplete and sadly remains so to this day. When the next innovation emerges we can at least ensure we and our patients are better prepared to meet and benefit from it.

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# Faecal incontinence



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The management of faecal incontinence in the post-obstetric/pelvic floor patient.

An accepted and standardised definition of faecal incontinence (FI) does not exist, but usually it incorporates the involuntary loss of control of bowel motions, occurring with any level of frequency.<sup>1</sup> It usually also includes flatus incontinence, particularly in patient-generated definitions.<sup>2</sup> It can also be further stratified by the type of stool lost and frequency. However, the condition means different things to different patients, all of which can be

socially disabling and distressing. Typical symptom complexes include one or several of urgency, post-defaecatory soiling, flatus incontinence, insensate soiling and frank FI. While the condition may have an obstetric aetiology, it may not necessarily present in the puerperium. In fact, many patients do not manifest the impact of their historical obstetric trauma until decades later, particularly once postmenopausal. Likewise, patients who manifest early faecal incontinence disorders following obstetric trauma may not develop a long-standing problem. This underscores the multifactorial nature of the continence mechanism and its disorders.

## Mechanism of faecal continence

Normal bowel continence is a multifactorial mechanism, which is important to keep in mind when assessing a patient reporting these symptoms. The mechanism can be considered as five main components:

1. Stool consistency: even the most normal of anal sphincters can fail in the setting of severe diarrhoea, a point familiar to any individual who has experienced gastroenteritis. This becomes an important area to address in all disorders of bowel continence.
2. Rectal structure and function: pathology of the rectum may present with alteration of continence, be it inflammatory bowel disease, mucosal or rectal prolapse or neoplasia. Indeed 'postpartum faecal incontinence' can be the presenting symptom of a rectal tumour (author's own experience). Likewise, prolapse-related disorders of the rectum, such as distal rectal atonia and rectocele, can produce a reservoir effect that can predispose to leakage.
3. Anal sphincter structure and function: this refers to function of both the (involuntary) internal anal sphincter (IAS), and the (voluntary) external anal sphincter (EAS). However, it also refers to pelvic floor activity, ensuring that obstetric-related injuries such as levator muscle avulsion and levator ani denervation are considered.
4. Local reflexes: local and lower motor neurone reflex activity controls much of the involuntary sphincter activity. An example of a local reflex is the rectoanal inhibitory reflex (RAIR), which is essential to anal 'sampling' of rectal contents to distinguish gas from liquid and solid. This can be interrupted by a variety

of disorders, including rectal prolapse and following colorectal surgery.

5. Descending neurological control: normal bowel control, of course, relies on normal upper motor neurone function, from frontal lobe to spinal cord. This is an important factor in continence disorders of those in the highest prevalence group, the elderly.<sup>2</sup>

## Pathophysiology

Approximately 20–25 per cent of primiparous women will experience some early postpartum alteration of faecal continence after vaginal delivery.<sup>3–4</sup> For the majority of patients, this consists of flatus incontinence, with the rate of frank FI being less than five per cent.<sup>4</sup> Typically this has been ascribed to obstetric anal sphincter trauma, which is not an uncommon event. The incidence of a third- or fourth-degree obstetric anal sphincter tear is around one per cent<sup>5</sup>, although estimates vary as high as nine per cent.<sup>6</sup> However, approximately one-third of women show evidence of occult anal sphincter defects on postpartum endoanal ultrasonography<sup>7</sup>, although the relevance of these is unclear according to a recent longitudinal study.<sup>8</sup> This last point reinforces the fact that, while a significant obstetric tear can cause IAS and EAS damage, several other events in parturition can affect bowel continence. Pudendal neuropathy, direct pelvic floor musculo-aponeurotic injury and endopelvic fascia disruption can all affect bowel continence early in the postpartum period. The risk factors for all of these injuries are well-described – vaginal delivery, primipara, large birthweight, prolonged second stage, forceps delivery, epidural usage and racial group. Therefore a sphincter injury may in reality be a 'marker' of some or all of the above possible occult injuries coexisting.

## Patient assessment

The first task is to explore the patient's symptomatology – what does the patient mean by 'incontinence'? Do they have urgency, post-defaecatory soiling, flatus incontinence, insensate soiling or frank FI? Urgency is suggestive of typical EAS injury, whereas flatus incontinence is more likely where there is an IAS injury. Frank FI may suggest a more significant combined injury. Insensate soiling and post-defaecatory soiling may have a sphincteric cause, but may also indicate underlying rectal prolapse or rectocele. There is, of course, overlap within these broad categories and more than one symptom may be present. The symptoms are a guide to diagnosis and treatment options. It is important to establish the frequency and severity of the FI and, in particular, how it affects the patient's ability to carry out their normal daily activities. A comprehensive medical, surgical and obstetric history must be taken, including medication usage.

The information available from physical examination is vital. The anus may be patulous at rest, suggestive of IAS dysfunction. It may also be descended at rest, or the perineum may be obviously 'ballooned' outwards. Further excessive descent (>3cm) may be noticed on straining. A rectal prolapse may appear on straining. Digital rectal examination can estimate resting and squeeze activity

of the anal sphincter, although this does not necessarily correlate with the results of anal manometry.<sup>9</sup> Relative contributions of the puborectalis (PR) muscle and EAS to the anal squeeze function can be noted. Asking the patient to bear down during digital rectal examination can unmask a non-relaxing PR muscle. The same manoeuvre may reveal uterine prolapse or bring a rectal intussusception down onto the examining finger. The presence or size of a rectocele can also be assessed. Rectal loading may be present as a cause of FI owing to faecal overflow. Rigid proctosigmoidoscopy may reveal a luminal or mucosal abnormality, rectal mucosal prolapse or haemorrhoids.

### Conservative management

Before any special tests need to be done, the patient may benefit greatly from conservative management. This falls into three main categories – dietary changes, pelvic floor rehabilitation and medications. These can be remembered as the ‘Three Ls’ – low fibre diet, ‘levator’ exercises and loperamide. Consider the following factors:

- Patients with FI are generally better off with a firm bowel motion rather than soft. This can be achieved by decreasing dietary fibre, and in some cases eliminating fibre supplementation (for example, proprietary Psyllium-based supplements). With correct dietary advice this is achievable while still maintaining a well-balanced diet. Patients with flatus incontinence should be given advice about wind-promoting foods and which to avoid, and also be encouraged to avoid stimulants such as caffeinated beverages, alcohol, nicotine and artificial sweeteners.
- Pelvic floor rehabilitation includes sphincter exercises, pelvic floor muscle training and biofeedback. A recent Cochrane review has found a paucity of evidence around which of these is superior in FI, and whether they offer any benefit over optimal conservative management.<sup>10</sup> A single centre randomised trial of this very question showed a good short-to-medium-term response to optimal conservative management, with no extra benefit derived from the addition of biofeedback or sphincter exercises.<sup>11</sup> Excluding this latter study, the overall quality of studies in this area is questionable and, certainly, no detrimental effect has been shown. There is room for further investigation in this area, but pelvic floor rehabilitation continues to be encouraged in the interim.
- Addressing medications is two-fold – examining whether the patient is on any detrimental medications (for example, laxatives, Metformin) and recommending the use of a constipating agent such as loperamide. The effect of loperamide is dual – firming the stool consistency by delaying colonic transit and also improving the tonic activity of the IAS.<sup>12</sup> This can be particularly useful in IAS dysfunction, where the patient may report insensate FI or post-defaecatory soiling. Starting at a very low dose (for example, 1mg daily) can avoid an episode of severe constipation that can diminish patient compliance.

Conservative management also includes general advice about perianal hygiene and skin care, and the use of barrier or protective creams such as zinc-based preparations.

### Specialist assessment

If conservative measures fail, specialist assessment in a colorectal pelvic floor clinic is warranted. This consists of a review of the history and examination, and special tests. These include anal sphincter manometry, anal sphincter ultrasound imaging and tests of anorectal function, such as anal sphincter electromyography, pudendal nerve terminal motor latency and rectal balloon

volume sensation testing. Complementary to this is defaecating proctography, essentially a bowel-emptying X ray. Transperineal ultrasound is an emerging modality, although it is not mainstream in colorectal practice at this stage. Functional magnetic resonance imaging does not as yet have an established role.

### Specific treatment

Overlapping anal sphincter repair (OLSR) still has a place in the management of post-obstetric FI, but its role is decreasing. It is most suited to patients who have symptoms of EAS dysfunction, for example, urgency and frank FI. In particular, these patients who also have evidence of anatomical deficits, such as cloaciform defect, make ideal candidates. Patients who undergo OLSR at a younger age have a more sustained result than those over 50 years old.<sup>13</sup> In general, OLSR in the elective setting for post-obstetric FI is not undertaken until the patient is one-to-two years postpartum and has completed their family.

Increasingly, posterior compartment prolapse-related disorders are receiving attention as a cause of FI. A symptomatic rectocele can be treated with good effect and low morbidity with a transanal rectocele repair.<sup>14</sup> High-grade internal rectal prolapse is being addressed by way of laparoscopic anterior mesh rectopexy, with significant improvements in FI and quality of life.<sup>15</sup> FI owing to symptomatic rectal mucosal prolapse, likely part of the pelvic organ prolapse spectrum, responds well to office-based local therapy such as rubber band ligation.

Sacral nerve stimulation (SNS) has changed the landscape of FI management over the last decade. The percutaneously-placed, continuous S3 nerve root stimulation has proven significant effects on FI symptoms and quality of life. Initially used after failure of conservative and surgical management, it is gradually moving up the FI treatment algorithm, being employed much earlier in a patient's treatment in a bid to avoid other unnecessary surgeries. For instance, it has proven efficacy whether the EAS is intact or not, hence lessening the need for EAS repair, particularly in patients over 50 years of age where the long-term benefits of OLSR are unclear. It has the advantage of a ‘test’ phase for two weeks, prior to permanent implantation if the patient responds to treatment. The mechanism of action is not well-understood, but is likely to be via improved anal motor and rectal sensory function, via upper and lower motor neurone-mediated effects.<sup>16</sup>

Transcutaneous posterior tibial nerve stimulation (PTNS) is an emerging potential alternative to SNS. It has the advantage of not requiring a permanent implant and is applied by the patient themselves in the manner of a TENS machine. It is thought to work by neuromodulating pelvic S3 activity, by peripheral stimulation of the nerve. Despite initially promising reports, its efficacy is not yet proven.<sup>17</sup>

For a small proportion of patients, the above interventions will either be ineffective or contraindicated. In this situation it may be necessary to consider some form of bowel irrigation treatment (either transanal or antegrade via an ostomy) to avoid soiling accidents. These are often intensive to manage and sometimes ultimately diverting colostomy needs to be considered.

### Summary

FI is a multifactorial disorder and there is a move away from a ‘sphincter-centric’ treatment approach. Patients may present several years following an apparent obstetric anal injury and this often reflects a multifactorial failure of the continence mechanism.

Optimisation of conservative measures can be very effective. In those who fail these simple measures, there is a range of surgical options, with the potential for significant improvements in continence and quality of life.

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# What a stitch up!

Dr Carol Breeze  
FRANZCOG

The trials and tribulations of organising a perineal repair workshop for the North Queensland Obstetrics and Gynaecology meeting.

Dr Samantha Scherman  
FRANZCOG

Over a glass of Sauvignon Blanc, back in 2012, the decision was made to resurrect the North Queensland Obstetrics and Gynaecology meeting. This conference started as an educational and social forum to bring together the O and G community of North Queensland. Unfortunately, over time the conference had faded away and, during the bonhomie that evening, we nominated ourselves to set about re-establishing it.

As the conference was to be held over a three-day long weekend, we allocated the final day as a perineal trauma repair workshop. Conference delegates included Fellows and Trainees, as well as practising GP obstetricians and FRANZCOG candidates. We felt all of these delegates could benefit from an update on perineal injury and, particularly, anal sphincter repair, the latter being a vital skill in order to try and prevent long-term faecal incontinence issues following obstetric perineal trauma. We also felt some of our delegates, primarily owing to distance and lack of locum access, may have found it extremely difficult to attend similar workshops at larger conferences further afield.

Several issues had to be addressed during the organisation of the workshop. The day was divided into two sessions. The morning session was dedicated to lectures on perineal and anal sphincter anatomy; the role of physiotherapy following perineal trauma; description of, and supporting evidence for, the different techniques of anal sphincter repair; and case discussions with the expert panel. We were extremely fortunate to have urogynaecologist Dr Peta Higgs, colorectal surgeon Dr Richard Turner and continence nurse specialist Karen Boundy to present in the morning session and to act as facilitators in the afternoon session.

The afternoon session was a hands-on practical session repairing porcine anal sphincters and was logistically more complicated. A venue was needed that could accommodate work on biological tissue. Although a couple of the private laboratories in Cairns were willing to assist, their laboratory facilities proved to be too small for the 15–20 delegates that we envisaged would attend the workshop or they were unable to find staff members willing to work on the public holiday to supervise the laboratory. The James Cook University Department at the Cairns Hospital very kindly agreed to allow us to use one of their conference rooms for the workshop.

Appropriate waste disposal was a serious consideration, owing to the biological nature of the tissues used. A contaminated waste bin and sharps containers were provided by the waste disposal unit at the hospital and were removed by the unit's staff at the end of the day. The hospital infection control unit was consulted and appropriate antiseptic handwash was provided. Johnson & Johnson kindly supplied all the disposable instruments and suture material for the workshop. Cork boards, pins and plastic tablecloths were sourced from a local hardware store and Cairns Hospital theatre provided disposable gloves and aprons.

As Sam's brother-in-law conveniently owns a piggery, sourcing the

anal sphincters was done with minimal fuss and cost. As there was no appropriate refrigeration available near the conference room, the sphincters were delivered to Carol's house and stored in her husband's beer fridge. This was done without the prior consent of Carol's husband and caused some brief marital discord. Apparently, beer does not taste the same if removed from a fridge, allowed to warm up, then cooled down again.

Unfortunately, we had not been as specific as we should have been regarding the length of each piece of intestinal tissue required. As a result, at 7am on the morning of the workshop, a public holiday, we were standing on Carol's back lawn, scissors and hose in hand, merrily trimming intestinal tissue and washing off any residual porcine faecal matter. Carol's husband's large fishing esky was then temporarily appropriated (also without his prior consent) for the transportation of the sphincters to the Cairns Hospital.

We realised on our arrival at the hospital that the distance from the carpark to the conference room was quite significant, given we were also lugging a fully loaded, heavy fishing esky. Not game to call in manly assistance from our husbands (both of whom had been on full childcare duties over the weekend and one of whom was yet to realise that his beer was warm and his fishing esky missing), we struggled along the street to the amusement of passing joggers and cyclists, none of whom volunteered to assist us in our endeavours.

All this effort, however, proved to be worthwhile. The practical workshop went very smoothly. Attendees consisted primarily of GP obstetricians and O and G registrars. Feedback from the event was very positive, with 91 per cent of participants agreeing their learning objectives had been met and 100 per cent stating they would recommend the workshop to colleagues.

Our suggestions to anyone considering running their own perineal trauma workshop:

- ensure you have good facilitators who are able to explain the relevant anatomy and best repair techniques;
- be specific regarding your exact requirements for tissue samples;
- be aware of the need for a venue that can accommodate biological specimens, with enough room for people to work comfortably;
- ensure appropriate waste management and sharps removal;
- arrange appropriate storage facilities for the tissue;
- be aware that anal sphincters *en masse* weigh more than you would think; and
- obtain formal feedback so that you know how to do it better the next time around.

The 23rd National Conference on Incontinence (a joint meeting of the Continence Foundation of Australia, International Children's Continence Society and the Urogynaecological Society of Australasia) will be held in Cairns from 10–13 September 2014, at which a perineal trauma workshop will be run. Cairns in September is a lovely place to visit, and the conference should be well worth the journey!

# Diagnostic dilemma



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## Is it severe pre-eclampsia or acute fatty liver of pregnancy?

Liver dysfunction during pregnancy is a well-established complication of pre-eclampsia and its variant HELLP (haemolysis, elevated liver function, low platelets) syndrome. However, its clinical characteristics and laboratory findings bear similarities to acute fatty liver of pregnancy (AFLP), a rare metabolic disorder that is associated with high perinatal and maternal morbidity and mortality. As such, it poses a diagnostic challenge to the obstetrician and physician. In this article,

we describe our experience with a woman who recently came in with a clinical presentation of severe pre-eclampsia, with a strong differential diagnosis of AFLP (or vice versa).

### Case study

A 28-year-old Caucasian woman, gravidity 2 parity 0, presented at 34+5 weeks gestation with a three-day history of feeling unwell, with nausea, polydipsia and generalised abdominal pain not confined to the epigastrium. She complained of headaches with some blurred vision. The date of her confinement was based on an early dating scan and her antenatal care had been uncomplicated. She had a BMI of 29kg/m<sup>2</sup>, and she had previously undergone a dilation and curettage for a miscarriage.

On examination, she had drooping eyelids and appeared drowsy, but was orientated to time, place and person. She remained afebrile with a blood pressure of 130/90mmHg. She was not clinically jaundiced. Her uterus was soft and her reflexes were brisk with one beat of clonus bilaterally. There was no evidence of a rash

or bleeding. Urinalysis revealed 2+ protein, 2+ blood and 1+ leukocytes. Cardiotocography (CTG) remained reassuring, with no evidence of fetal compromise.

Her bloods on presentation showed an inflammatory response with deranged liver function (see Table 1). Her urine protein/creatinine ratio was 122mg/mmol (cut-off level of 30mg/mmol in pregnancy).

A diagnosis of severe pre-eclampsia with a differential of acute fatty liver was made and delivery was initiated. She was commenced on magnesium sulphate infusion. An emergency caesarean section was performed under spinal anaesthesia and a live male fetus weighing 2450g was delivered, with Apgar scores of four, eight and ten at one, five and ten minutes, respectively. The neonate was admitted to NICU, owing to prematurity and respiratory distress. The umbilical cord gases values are presented in Table 2.

Post-operatively our patient was admitted to intensive care for supportive management. She was discharged back to the labour ward after five hours for further monitoring. Her liver dysfunction, metabolic acidosis and renal impairment slowly improved. She was noted to have polyuria, a diuresis of >250ml urine per hour with total urine output >3600ml in 24 hours. Despite being on fluid restriction, her polydipsia persisted, which led to her increased oral intake without midwifery knowledge. She developed generalised oedema and hyponatraemia, likely secondary to her hypervolaemic and hypoalbuminaemic state. She recovered well without any further intervention and was discharged home on day seven postpartum. Her son made good progress and was discharged from the nursery at day 18 of life.

At her review in the postnatal clinic six weeks later, she was well, with her blood investigations completely normalised. Viral serologies and thrombophilia screening were negative. Placental histopathology showed mild increase of peri-villous fibrin and calcification, with no evidence of maternal vessel abnormalities.

Table 1. The patient's laboratory findings on presentation.

	Value	Normal range		Value	Normal range
Haemoglobin g/L	146	(120-160)	ALT U/L	1017	(5-34)
Platelets 10 <sup>9</sup> /L	143	(140-440)	AST U/L	712	(10-35)
White cell count 10 <sup>9</sup> /L	18.0	(4.0-11.0)	GGT U/L	92	(7-32)
Neutrophils 10 <sup>9</sup> /L	14.4	(2.0-7.5)	ALP U/L	403	(42-98)
Sodium mmol/L	132	(136-145)	Albumin g/L	25	(33-45)
Potassium mmol/L	4.5	(3.5-5.1)	Bilirubin umol/L	57	(0-21)
Chloride mmol/L	105	(98-108)	LDH u/L	1180	(125-243)
Bicarbonate mmol/L	14	(23-29)	Uric acid mmol/L	0.55	(0.15-0.36)
Glucose mmol/L	4.2	(3.5-7.9)	INR	1.1	(0.9-1.1)
Creatinine mmol/L	107	(50-107)	APTT seconds	36	(23-35)
Urea mmol/L	5.3	(2.5-6.4)	PT seconds	13	(11-13)

Table 2. Umbilical cord gases values.

	Arterial	Venous
pH	6.83	6.88
pCO <sub>2</sub> (mmHg)	105	92
pO <sub>2</sub> (mmHg)	6	7
Lactate (mmol/L)	11.4	10.3
Base excess (mmol/L)	-19.3	-18.6
HCO <sub>3</sub> <sup>-</sup> (mmol/L)	17.5	17.2

Table 3. Swansea diagnostic criteria for diagnosis of acute fatty liver of pregnancy.<sup>1</sup>

Six or more of the following features, in the absence of another explanation.
<ul style="list-style-type: none"> <li>• Vomiting</li> <li>• Abdominal pain</li> <li>• Polydipsia/polyuria</li> <li>• Encephalopathy</li> <li>• High bilirubin (&gt;14 µmol/L)</li> <li>• Hypoglycaemia (&lt;4 mmol/L)</li> <li>• High uric acid (&gt;340 µmol/L)</li> <li>• Leucocytosis (&gt;11 × 10<sup>6</sup>/L)</li> <li>• Ascites or bright liver on ultrasound scan</li> <li>• High AST/ALT (&gt;42 IU/L)</li> <li>• High ammonia (&gt;47 µmol/L)</li> <li>• Renal impairment (creatinine &gt;150 µmol/L)</li> <li>• Coagulopathy (PT &gt;14 s or APTT &gt;34 s)</li> <li>• Microvesicular steatosis on liver biopsy</li> </ul>

## Review

Both pre-eclampsia and AFLP are serious maternal illnesses occurring in the third trimester of pregnancy and remain a medical and obstetric emergency. While the former is relatively common, with an incidence of 1:900–2000 pregnancies, AFLP is rather rare, with an incidence value of 1:7000–19,000 pregnancies.<sup>1</sup> It was first described in 1934, by Stander and Cadden, as 'acute yellow atrophy of the liver' and defined as microvesicular fatty infiltration of hepatocytes during the latter half of pregnancy.<sup>2</sup> It is more common in first and multiple pregnancies and there is a higher incidence associated with male fetuses (3:1 ratio).<sup>3</sup> The pathogenesis of AFLP is not known, however, it has been reported to be associated with an inherited deficiency of long chain 3-hydroxyacetyl coenzyme-A dehydrogenase (LCHAD), a mitochondrial enzyme that catalyses a reaction in the β-oxidation of fatty acids.<sup>2,4</sup> A deficiency in this enzyme therefore allows the build-up of long chain fatty acids, leading to metabolic toxemia. Interestingly, this association has also been linked to HELLP syndrome in case studies.<sup>5</sup> Pre-eclampsia has also been reported to be present in half of all AFLP cases.<sup>6</sup> As such, some authors have argued that both AFLP and pre-eclampsia/HELLP syndrome may all be a spectrum of the same disease, given the difficult clinical and biochemical distinction between the two disorders.

The diagnosis of pre-eclampsia is well guided by the SOMANZ guidelines and will not be discussed here.<sup>7</sup> Diagnosis of AFLP, on the other hand, is assisted by the Swansea criteria (see Table 3), which were systematically assessed with positivity in the largest UK population-based cohort study for this liver disorder.<sup>8</sup> Clinical features may include malaise, nausea and vomiting, epigastric pain and jaundice. Hypertension and proteinuria may be present as well.<sup>9</sup> The relationship between diabetes insipidus and AFLP

is well established; however, this phenomenon has also been associated with HELLP syndrome in a case report, which is rare.<sup>10</sup> It is thought that liver dysfunction impairs degradation of placental vasopressinase activity.<sup>11</sup> Higher levels of this enzyme further inactivates antidiuretic hormone (ADH), leading to excretion of a large amount of diluted urine as well as excessive thirst. Biochemical studies are the hallmark of AFLP and the majority of women have raised liver transaminases, white cell count, uric acid and bilirubin levels.<sup>8,9,12</sup> Hypoglycemia is not always seen and its presence is a poor prognostic sign.<sup>2</sup> Viral serologies are mandatory to exclude acute infection. A liver biopsy may facilitate the definite distinction between AFLP and HELLP syndrome, but this is not always performed, owing to concerns regarding fulminating coagulopathy.<sup>9</sup> Imaging, such as computed tomography, may identify microvesicular fatty infiltration in AFLP, however, this is not always present. In the setting of severe pre-eclampsia, imaging may reveal hepatic rupture or subcapsular haematoma.<sup>2,9</sup> Our patient presented at midnight during a long weekend, her condition improved after delivery and therefore further imaging was deemed unnecessary for ongoing management.

Despite a diagnostic dilemma, the main principle of treatment for both AFLP and HELLP syndrome is expedited delivery, as well as supportive therapy. Maternal mortality rates for AFLP have dropped from 70 per cent to ten per cent, thanks to better recognition, intensive measures and prompt stabilisation.<sup>9</sup> Despite this, maternal morbidity remains high and the clinician should be watchful for complications, including disseminated intravascular coagulopathy, renal failure, pancreatitis and coma. Liver transplantation for liver failure has also been reported.<sup>13</sup> Women with a previous history of AFLP should be monitored in a maternal-fetal medicine unit as this liver disorder may re-present in subsequent pregnancies, even if they do not have the LCHAD mutation. A blood test for LCHAD genetic testing was requested for our patient, but was rejected as it was expensive (>\$250) and fell outside the Medicare rebate scheme. The exact risk of recurrence for AFLP is not known. Therefore, acquiring a positive (or negative) result may be a novelty finding, rather than of any predictive relevance.

## Conclusion

Severe liver disease in pregnancy encompasses a spectrum of different aetiologies and pathogenesis, with both severe pre-eclampsia/HELLP syndrome and AFLP recognised as fatal multi-organ dysfunctions that are unique to pregnancy. The clinical presentation of, and laboratory findings in, these disorders may overlap, allowing a potential delay in diagnosis and, subsequently, delaying prompt intervention for these women. Therefore, it is important that a multidisciplinary approach – with obstetricians, anaesthetists, physicians and intensivists – is part of the management of these women, preferably in a tertiary setting with access to blood bank and appropriate imaging. Owing to the uncommon nature of these conditions during pregnancy, the available evidence from the literature to guide any particular line of treatment includes case series and a handful of population cohort studies from around the world. Further studies such as the Australasian Maternity Outcomes Surveillance System (AMOSS), a national surveillance research system for serious and rare conditions in pregnancy, will be useful to understand the incidence and demographics of these disorders, especially in Australia.

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# Q&a

Q&a attempts to provide balanced answers to those curly-yet-common questions in obstetrics and gynaecology for the broader *O&G Magazine* readership, including Diplomates, Trainees, medical students and other health professionals.

**Q** *Deborah is 40 years of age and is delighted to be pregnant for the first time. Conception was by artificial insemination using donor sperm. Apart from an increased BMI, her general health is good. She is now ten weeks' gestation and is seeking information about noninvasive prenatal testing. What will you tell her?*

Dr Glenn Gardener  
FRANZCOG, CMFM

*a*

Noninvasive prenatal testing (NIPT) uses advanced molecular genomic technologies to detect fragments of cell-free DNA

(cfDNA) in maternal blood. cfDNA includes both maternal and fetal components; the primary source of fetal cfDNA is the placenta. NIPT has been shown to be highly sensitive and specific for the major autosomal trisomies (21, 18 and 13). NIPT can also accurately predict fetal gender and provide information about sex chromosome abnormalities such as Turner syndrome (XO), Klinefelter syndrome (XXY) and triple X syndrome (XXX).<sup>1</sup>

Traditional combined first trimester screening (cFSTS) detects approximately 90 per cent of pregnancies affected by trisomy 21, for a five per cent false-positive rate. In Deborah's case, her age would increase the likelihood of a high-risk result.<sup>2</sup> Several studies have now shown that NIPT has a very high (99 per cent) detection rate for Down syndrome, as well as a very low false-positive rate (less than one per cent). It has superior performance to cFSTS and will allow many women to avoid invasive testing (either chorionic villous sampling [CVS] or amniocentesis) and the associated risk of miscarriage.<sup>1</sup>

It is important that the limitations of NIPT are discussed. NIPT does not provide the same information as a normal prenatal cytogenetic test or microarray. While NIPT is an extremely effective screening test, it is not diagnostic. A positive result may be falsely positive and should be confirmed by amniocentesis (rather than by CVS, which is also a reflection of the trophoblast). A negative NIPT test does not completely rule out the chromosomal abnormalities being assessed.<sup>3</sup>

Standard NIPT tests are currently limited to assessments of chromosomes 21, 18, 13, X and Y and will not pick up other chromosomal abnormalities that would be seen using traditional genetic techniques. Similarly, NIPT does not pick up structural fetal abnormalities. Many of these can be detected by ultrasound at 12 weeks and NIPT should not be seen as a replacement for the 12-week scan.<sup>4</sup>

NIPT involves complex genomic and statistical techniques and, in a minority of cases, the laboratory cannot predict the

chromosomal nature of the fetus. Test failure appears more likely at earlier gestations (<12 weeks) and with a high maternal BMI as, in these circumstances, the fetal fraction of cfDNA is usually lower. A significant proportion of women will obtain a result if blood is redrawn at a later gestation.<sup>5</sup>

**'While NIPT is an extremely effective screening test, it is not diagnostic. A positive result...should be confirmed by amniocentesis...'**

There is an extremely small risk that a maternal chromosomal abnormality or tumour may be revealed through screening. Women who have had an organ transplant or stem cell therapy are not able to have NIPT. Pregnancies resulting from donor sperm can have NIPT while those resulting from donor eggs are excluded by some NIPT providers.

The final issue is one of cost. There are currently no onshore NIPT providers and all samples are sent overseas for analysis. The test does not have a Medicare rebate. Prices vary, currently ranging from AUD\$500 to \$1200. The turnaround time from blood sampling to providing a result is approximately 10–14 days.

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# Those who can, teach



**Dr Sarah Armstrong**  
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Applying educational theory in practical obstetrics and gynaecology settings.

Educating others is a central role of the clinician, in fact, the Hippocratic oath places teaching above all other duties of a doctor.<sup>1</sup> It's hard to imagine another specialty where the scope of teaching and learning is as varied or indeed as challenging as in obstetrics and gynaecology. Without teaching, being an

obstetrician and gynaecologist would just become another job.

The Medical Council of New Zealand and Medical Board of Australia emphasise within their Good Medical Practice documents, the importance of teaching and passing on knowledge as a professional responsibility. They state that the teaching should demonstrate the attitudes, awareness, knowledge, skills and practices of a competent and effective teacher.<sup>2,3</sup> Likewise, RANZCOG recognises that the ability to teach well is fundamental to the practice of O and G. The College expects its Trainees to develop teaching skills as a common professional objective, participating in hands-on teaching of peers and presenting at in-hospital education sessions. Trainees are required to list these presentations in their Training Record, which is checked by their Training Supervisor on a regular basis. The College expects its specialists to understand and apply the principles of apprenticeship learning for Trainees, students and other health professionals. Teaching attitudes and abilities are assessed through regular formative and summative appraisals.<sup>4,5</sup>

However, how many times have we, in our role as teachers, felt out of our depth when confronted with the prospect of planning and delivering teaching, let alone knowing whether it has been effective at facilitating learning?

Fortunately, there is a body of educational theory from which we can derive principles to help guide effective teaching. This article aims to

describe these central educational theories and demonstrate how they can be applied in three case studies relating to the obstetrician and gynaecologist teaching in the real world.

## Adult learning

Malcolm Knowles (1913–97) is famous for popularising the concept of andragogy, described as 'the art and science of helping adults learn'.<sup>6</sup> Andragogy is based on five crucial assumptions about adult learners that differ from the assumptions about child learning.<sup>7</sup> The assumptions are summarised as follows:<sup>8</sup>

1. adults are independent and self-directing;
2. they have accumulated a great deal of experience, which is a rich resource for learning;
3. they value learning that integrates with the demands of their everyday life;
4. they are more interested in immediate, problem-centred approaches than in subject-centred ones; and
5. they are more motivated to learn by internal drives than by external ones.

Knowles later derived seven principles of andragogy that can be summarised as follows:<sup>8</sup>

1. Establish an effective learning climate, where learners feel safe and comfortable expressing themselves.
2. Involve learners in mutual planning of relevant methods and curricular content.
3. Involve learners in diagnosing their own needs – this will help to trigger internal motivation.
4. Encourage learners to formulate their own learning objectives – this gives them more control of their learning.
5. Encourage learners to identify resources and devise strategies for using the resources to achieve their objectives.
6. Support learners in carrying out their learning plans.
7. Involve learners in evaluating their own learning – this can develop their skills of critical reflection.

## Case 1. Teaching medical students about subfertility

You have been asked to give a tutorial to a group of fifth-year medical students on their O and G placement on subfertility. It is to take place in a tutorial room off the gynaecology ward. You are told this is the only teaching they will receive on subfertility throughout their undergraduate training. You wonder how you can make the topic understandable to the class in a 60-minute tutorial.

### Solution

You could assign the students to small groups of four to six and ask each group to discuss the possible causes of subfertility and ask them to think of ways of classifying these causes into groups (principles 1 and 3). Provide each group with a large piece of paper and a marker pen, and ask them to annotate a diagram of the female and male reproductive tract with different causes of subfertility. Then bring the class together as a whole and ask each group to present their ideas to the class, while you keep a single record on the white board. This will tease out the gaps in the students' knowledge and engage the whole class in discussion. You could follow this with a brief interactive lecture and provide a handout covering the key points and a couple of short answer questions (principle 1). As a group, work through clinical examples of couples in clinic presenting with subfertility, encouraging participation by all members of the class (principle 2). Return to the short answer questions and ask students to discuss their ideas with their neighbour. A show of hands can be used to establish the class responses and then give the correct answers (principles 1, 2 and 5). Finally, opportunities to attend fertility clinic could be given to put learning into context (principles 6 and 7).



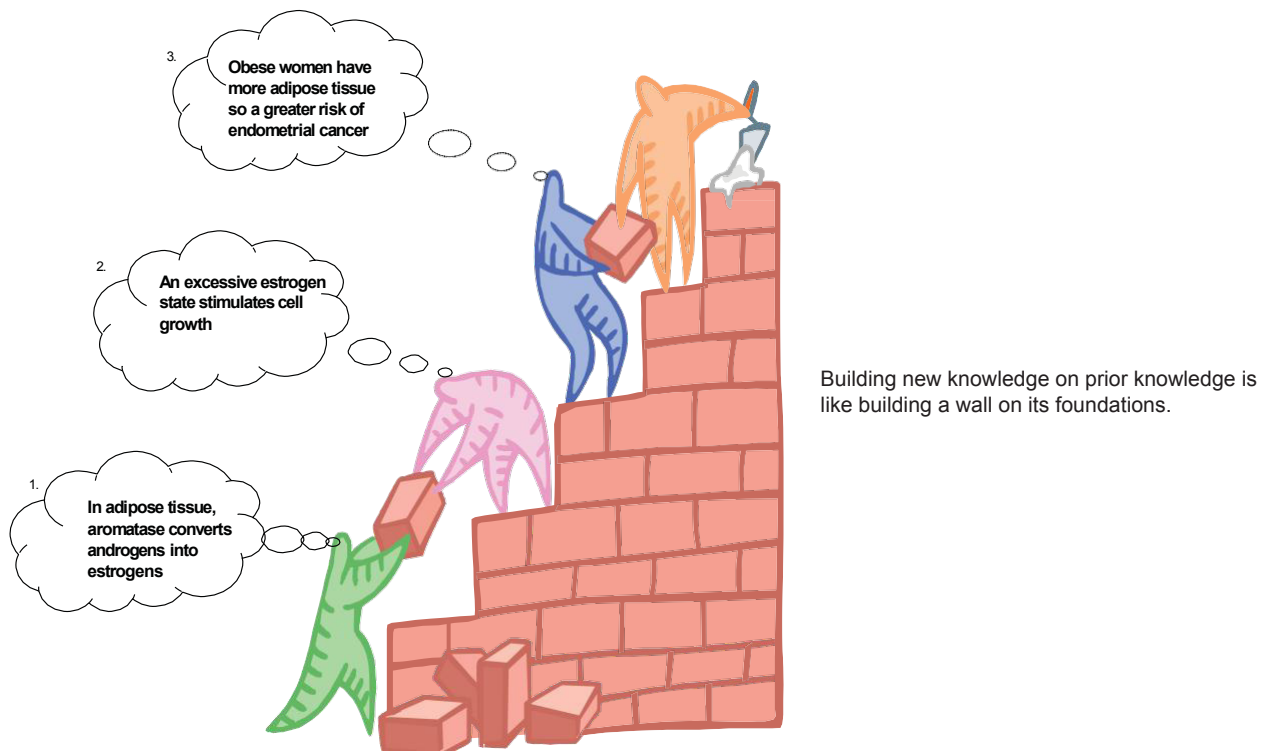


Figure 1. Constructivism in action in an O and G learning environment. Reproduced with permission.<sup>15</sup>

Knowles himself sums up his work on the topic as 'people learn best when treated as human beings and the ultimate purpose of all of education is to empower individuals through a process of lifelong learning.'<sup>9</sup> Despite the widespread adoption of andragogy throughout adult education, it is important to recognise that it has been criticised for not being an educational theory, but rather an educational ideology that can lack universal applicability as demonstrated by variations in self-directedness and learner autonomy within differing classes, cultures and levels of maturity.<sup>10</sup>

An example of an opportunity to utilise andragogy principles in O and G teaching is at a department's cardiotocography (CTG) meeting. All grades of O and G doctors and midwives are invited to attend a weekly CTG review meeting. The meeting should be advertised as a learning opportunity for all and members of staff should be encouraged to submit cases for presentation and discussion in a non-judgemental environment. Encourage an atmosphere where meeting attendees are able to voice their clinical

opinions on the CTG and ask them to back up their thinking by pointing out the various findings on the trace. Discuss management of the case as a group and identify learning objectives from the points raised. Cases should always be provided by the staff members, thus encouraging learners to identify their own learning needs and control their education.

### Constructivism

Constructivism views learning as an active, rather than a passive, process. The teacher, instead of merely imparting knowledge, is a guide who facilitates learning.<sup>11</sup> The teacher helps the student to activate their existing knowledge, or 'schema' on a topic and expose inconsistencies between their current understanding and their new experiences.<sup>8</sup> This allows the student to remodel their schema to form a more sophisticated understanding of the subject. This 'remodelling' is often most effective when it takes place in the environment or context where the learnt information will be used, for example, learning about obstetric emergencies on the delivery suite. Finally,

### Case 2. O and G RMO/SHO

You are the senior O and G registrar in antenatal clinic with a junior O and G doctor in her first year of specialist training. The clinic is so busy, you have little time to spend with her, besides briefly answering her questions between patients. You wonder how you can provide a valuable learning experience for your Trainee in such a busy working environment.

### Solution

You could initially ask if your Trainee would like to sit in on your consultations to watch how you conduct them. Be sure to reflect on your decision-making with her at the end of each consultation and 'unpack' your thinking. Why did you make that clinical decision? What was your clinical reasoning (principles 2, 6 and 7)? With your help, she could establish learning objectives based on her perceived areas of weakness (principles 1 and 4). Get your Trainee to see patients independently while keeping a record of challenging clinical problems – 'reflection on action' (principles 2 and 6). Encourage her to address these problems by undertaking some self-directed learning and then following up with a case-based discussion with you (principle 5). Finally, observe some of her consultations and provide feedback (principle 5).

adequate time must be provided for reflection on the new experience in order to construct understanding.<sup>8</sup> An example of constructivism in practice is outlined in Figure 1.

## Reflective practice

Donald Schön was perhaps the most influential thinker in developing the theory and practice of reflective learning among professionals in the 20th century. His work challenged practitioners, particularly focusing on health professionals, teachers and architects, to reconsider the role of technical knowledge versus artistry in developing professional excellence.<sup>12</sup> This artistry, Schön argues, is derived from practitioners reflecting on their actions when unexpected events arise both at the time of the incident and following the incident. The initial reflection, reflection in action, is the ability to learn and develop continually by applying previous experience and knowledge to the unfamiliar event as it is occurring. The reflection that occurs following the event, reflection on action, involves the practitioner analysing the decisions they made, and critically appraising whether their actions were appropriate and how this situation may affect their future practice.<sup>8</sup> Reflective learning can be aided with activities such as debriefing with peers or learners, seeking feedback from learners on a regular basis and keeping a journal.<sup>8</sup>

A common example of reflection in action would be when an O and G Trainee comes across a new situation or problem during a surgical procedure such as caesarean section. The Trainee is forced to reflect on prior experience and their knowledge of the procedure to deal with the new situation in hand. Subsequent reflection on the relative success of their actions during the caesarean then impacts on whether they would employ the same technique if they encountered that problem again (reflection on action).

## Self-efficacy

Self efficacy is a central concept of Albert Bandura's social cognitive theory and describes the idea that a learner's judgement of their personal ability to deal with a different or novel situation, affects their actions.<sup>13,14</sup> These actions include how much effort a learner invests in the given task or situation, how long they persist in the face of adversity and whether they approach the task with trepidation or assuredly.<sup>8</sup> Bandura identifies four factors affecting self-efficacy, as follows:<sup>13</sup>

1. Performance attainments. The experience of 'mastery' of a task is the most important factor in determining a person's self-efficacy. Failure of a task lowers self-efficacy, especially if it occurs early in the learning process and is not owing to lack of effort or adverse situations.
2. Modelling, or observation of other people. Observing other people similar to us succeeding at a task increases our self-

efficacy, whereas watching people failing decreases our self-efficacy.

3. Verbal persuasion. Direct verbal encouragement from a credible source can help increase our self-efficacy, particularly if the task in question is realistic.
4. Physiological factors. The physiological symptoms experienced when confronted with stressful situations such as butterflies in the stomach before public speaking, will be interpreted by some as an ominous sign of inability, thus decreasing their self-efficacy. It is a challenge for both teachers and learners to re-interpret their anxiety as excitement or anticipation.

An example of self-efficacy education theory in practice can be demonstrated with the junior O and G Trainee learning to perform a ventouse delivery. The self-efficacy of the Trainee can be elevated by having observed peers, such as the registrar, perform successful ventouse deliveries. That registrar could then offer to observe the Trainee perform ventouse deliveries. Experiencing a successful ventouse delivery is likely to increase the Trainee's feeling of mastery of the skill and therefore offering the Trainee appropriate ventouse deliveries that are likely to be easier and result in a successful delivery is pertinent. The registrar should provide reassurance that feeling nervous beforehand is a normal experience and is a sign of anticipation. Regular verbal feedback, direction and encouragement should be provided throughout the various steps of the delivery.

## Deriving principles from educational theory

With these educational theories in mind, principles can be derived that can be used as tools to help guide the obstetrician and gynaecologist in teaching situations. Kaufman has set out seven principles as follows:<sup>8</sup>

1. The learner should be an active contributor to the educational process.
2. Learning should closely relate to understanding and solving real-life problems.
3. Learners' current knowledge and experience are critical in new learning situations and need to be taken into account.
4. Learners should be given opportunities and support to use self-direction in their learning.
5. Learners should be given opportunities and support for practice, accompanied by self-assessment and constructive feedback from teachers and peers.
6. Learners should be given opportunities to reflect on their practice; this involves analysing and assessing their own performance and developing new perspectives and options.
7. The use of role models by medical educators has a major impact on learners. As people often teach the way they were taught, medical educators should model these educational principles

## Case 3. Teaching a new skill

You are the consultant to an O and G registrar who is keen to learn to ultrasound scan. You wonder how to go about teaching him this new skill.

## Solution

You could take some time to ask your registrar what aspects of scanning he hopes to learn, where his perceived weaknesses lie and what his time-scale is (principles 1, 2, 3 and 4). Together, draw up a plan of how to tackle these learning objectives and set aside time to meet to discuss progress. You might initially recommend he undertakes some reading on the basic physics and principles behind scanning and assess his understanding by asking some questions to gauge his understanding (principles 4 and 6). Set aside dedicated time together to teach the skill of scanning; arranging to scan appropriate patients who consent to an ultrasound scan as a teaching opportunity, is an excellent way to make the teaching relevant and useful (principles 1 and 2). Be sure to reflect on your techniques and verbalise your actions as well as giving appropriate feedback on your registrar's progress (principles 5, 6 and 7). Encourage him to take every opportunity to scan patients independently and ask him to keep a journal of his personal learning issues, which he could conduct self-directed learning on or discuss with you (principles 4 and 5).

with their students and junior doctors. This will help the next generation of teachers and learners to become more effective and should lead to better care for patients.

### How to apply these teaching principles

In real life, it is rare for a single teaching principle to be used on its own, therefore the solutions to various teaching problems encountered in everyday practice should include a combination of principles.

### Conclusions

Teaching others is a vital role of the obstetrician and gynaecologist and adds to the variety and satisfaction of the specialty. Therefore, we should utilise the educational principles derived from the best evidence and wisdom of educational theory to become more effective teachers and improve the learning experience of our juniors. With time, the use of effecting teaching and learning strategies should result in better trained doctors, who themselves become better educators for the next generation of obstetricians and gynaecologists.

As the well-known Chinese proverb has it: tell me and I forget; show me and I remember; involve me and I understand.

### Acknowledgements

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# Journal Club



Had time to read the latest journals? Catch up on some recent O and G research by reading these mini-reviews by Dr Brett Daniels.

## Treatment of VIN

In 2004, the International Society for the Study of Vulvovaginal disease classified vulvar intraepithelial neoplasia (VIN) as: a usual type more commonly occurring in younger women and associated with human papillomavirus (HPV); and a differentiated type more commonly associated with vulvar dermatoses such as lichen sclerosus. Treatment of high-grade VIN has previously been surgery, but this may lead to anatomical and sexual dysfunction. In recent years, less destructive treatments, such as laser ablation and topical treatment using the immune response modulator imiquimod, have been introduced. Frega et al<sup>1</sup> report on treatment outcomes for 80 women with high-grade usual type VIN. Half of the women were initially treated with surgery while the other half applied five per cent imiquimod cream twice a week for 16 weeks. Women in the imiquimod group received a second cycle of treatment if their disease persisted after one cycle and surgery if the disease persisted after two cycles. Women were followed up every six months for five years. In the surgery group, 45 per cent had a recurrence of disease following being disease free after initial treatment. The equivalent relapse rate was for the imiquimod group was 16 per cent, however, a further 53 per cent of that group required conversion to surgical treatment. Overall, 55 per cent of the women in the surgery group showed complete response to treatment, while 31 per cent of the imiquimod group showed complete response.

Wallbillich et al<sup>2</sup> report a retrospective chart review of 313 women with VIN 2-3 treated with excision, laser or imiquimod, or combinations of excision with laser or imiquimod. Significantly higher rates of recurrence were associated with laser (42 per cent), compared with imiquimod (14 per cent) or excision (26 per cent). Smoking, larger lesions and unclear margins were all significantly associated with disease recurrence. As a non-randomised chart review there may be reasons for these differences that may not be seen in a randomised design.

- 1 Frega A, Sesti F, Sopracordevole F, et al. Imiquimod 5 per cent cream versus cold knife excision of VIN 2/3: a five year follow-up. *European Review for Medical and Pharmacological Sciences*. 2013; 17: 936-940.
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## Timing of umbilical cord clamping

The timing of clamping and eventual cutting of the umbilical cord after delivery requires a number of considerations. Early cord clamping, generally within 60 seconds of delivery, has sometimes been promoted as part of active management of the third stage of labour, with the aim of reducing maternal blood loss and the risk of postpartum haemorrhage. Conversely, delayed cord clamping – waiting until the cord has stopped pulsating or for greater than one minute after delivery – has been associated with improved neonatal outcomes, including increased neonatal haemoglobin and iron stores. The WHO guidelines, most recently updated in January 2014<sup>1</sup>, recommend clamping one to three minutes after birth while simultaneously initiating neonatal care. They suggest the cord should not be clamped earlier unless the baby is asphyxiated and needs to be moved for resuscitation.

A recent Cochrane review by McDonald et al<sup>2</sup> on the timing of cord clamping is cited on the WHO statement. The review included 15 trials involving 3911 women. They found that while no studies reported the effect of cord clamping on maternal death or serious morbidity, there was no significant effect of early versus late cord clamping on postpartum haemorrhage, mean blood loss, use of uterotonic drugs or maternal postpartum haemoglobin. For the neonate, however, there was a significantly increased haemoglobin concentration in the first 24–48 hours in the late clamping group and better iron stores at three to six months. Fewer infants in the early clamping group experienced neonatal jaundice compared to the late clamping group, possibly owing to a lower risk of increased red blood cells being metabolised and resulting in higher jaundice levels. The authors conclude that a more liberal approach to cord clamping should be employed, particularly in resource-rich environments where access to treatment for neonatal jaundice is readily available.

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### Metformin for gestational diabetes

An increasing number of pregnant women are diagnosed with gestational diabetes mellitus (GDM). Corbauld et al<sup>1</sup> write approximately 16 per cent of women will be diagnosed with GDM under the new guidelines. While traditional treatment of GDM with diet and insulin are associated with better pregnancy outcomes, in recent years there has been research in the use of oral hypoglycaemic agents, such as metformin, in pregnant women.

The Metformin in Gestational Diabetes (MiG) trial by Rowan et al<sup>2</sup> randomly allocated 751 women with GDM to receive either insulin or metformin. Of the 363 women assigned to metformin, 92.6 per cent continued to receive metformin until delivery and 46.3 per cent received supplemental insulin. The outcome was a composite of neonatal hypoglycemia, respiratory distress, need for phototherapy, birth trauma, five-minute Apgar score less than 7, or prematurity. The rate of the composite outcome was 32.0 per cent in the metformin group and 32.2 per cent in the insulin group. Significantly more women in the metformin group indicated that they would choose to receive their allocated treatment again compared to the insulin group (77 per cent versus 27 per cent). There were no significant differences between the two groups in secondary measures, such as neonatal measurements, maternal glycaemic control and postpartum glucose tolerance, and no adverse effects associated with metformin. A 2008 paper by the same authors<sup>3</sup> followed up the offspring from the original study at two years of age. There were 318 children in the study. The metformin group had significantly larger upper circumferences and subscapular and bicep skin folds, but no greater total body fat. The authors postulate that if different body fat distribution is maintained into later life then it may result in a lower level of visceral fat and adult diabetes.

Corbauld et al<sup>1</sup> reported a small audit of 71 women with GDM in an attempt to determine which characteristics were associated with the need to add insulin to the treatment of women who were initially treated with metformin. Of the 25 women in the study who initially chose to receive metformin, seven required insulin to achieve adequate glycaemic control, while two changed to insulin owing to gastrointestinal side effects of metformin. The study found that there was a significant relationship between a fasting blood glucose of  $>5.2$  on the oral glucose tolerance test, and the need to change to insulin to achieve glycaemic control. The authors conclude that while metformin has a place in the treatment of GDM there may be some benefit to targeting it to appropriate patient populations.

- 1 Corbauld A, Swinton F, Radford A, et al. Fasting blood glucose predicts response to extended-release metformin in gestational diabetes mellitus. *ANZJOG*. 2013. 53: 125-129.
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## Letter to the editor

### A gravid issue: a case for the omission of a woman's gravidity from her antenatal record

Regarding the letter to the editor from Dr A M Owen and A/Prof C P McCusker (*O&G Magazine* Vol 15 No 4 66-67), any information about any woman may lead to prejudice by any other person. This is not an argument to omit information. Information about gravidity can have significant implications on a woman's psychological response to pregnancy, labour and postnatal bonding. It is definitely important information for care. Like anything in life, information

can be used for good or evil. A pregnant woman is a living feeling human being. She deserves to be treated as such, not pretending that gravidity didn't occur, but supporting her in her journey. Omitting gravidity from a woman's record denies the woman the respect and support she deserves for her journey.

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MBBS(Hons), DRANZCOG, FRANZCP, FRACGP

# College Statements Update

## November 2013

A/Prof Stephen Robson  
FRANZCOG  
Chair, Women's Health  
Committee

The Women's Health Committee (WHC) reviewed the following Statements in November 2013, which were subsequently endorsed by Council. College Statements can be viewed on the College website.

### New College Statements

The following new Statements were approved by RANZCOG Council and Board in November 2013:

- RANZCOG Position on Assisted Reproductive Treatment for Women of Advanced Maternal Age (C-Obs 52)
- Management of Gestational Trophoblastic Disease (C-Gyn 31)

### Revised College Statements

The following revised Statements were approved by RANZCOG Council and Board in November 2013 with significant amendments:

- Progesterone: Use in the Second and Third Trimester of Pregnancy for the Prevention of Preterm Birth (C-Obs 29b)
- Caesarean Delivery on Maternal Request (CDMR) (C-Obs 39)
- Female Genital Mutilation (C-Gyn 1)
- Guidelines for Visiting Surgeons Conducting Demonstration Sessions (C-Gen 6)

The following Statements were approved by RANZCOG Council and Board in November 2013 with minor or no amendments:

- Obstetricians and Childbirth: Responsibilities (C-Obs 1)
- Maternity Services in Remote and Rural Communities in Australia (C-Obs 34)
- Influenza vaccination during pregnancy (and in women planning pregnancy) (C-Obs 45)
- Position Statement on Robotic Assisted Surgery (C-Gyn 29)
- Antenatal Care in Australian Public Hospitals (WPI 10)

- RANZCOG Statement on Stand-Alone Primary Childbirth Units (WPI 15)
- Use of Lasers in Obstetrics and Gynaecology by RANZCOG Fellows and Trainees (C-Trg 4)

### Statements of other bodies

The following Statements of other bodies were endorsed by RANZCOG Council and Board in November 2013:

- ACOG Report: Neonatal Encephalopathy and Neurologic Outcome (2013)
- ACOG Report: Neonatal Brachial Plexus Palsy (2013)
- Screening to Prevent Cervical Cancer: Guidelines for the Management of Asymptomatic Women with Screen-Detected Abnormalities (2005)
- Guidelines for Cervical Screening in New Zealand (2008)
- Marcé International Society Position Statement on Psychosocial Assessment and Depression Screening in Perinatal Women (2013)

### New College Statements under development

- Screening and Diagnosis of Adverse Pregnancy Outcomes
- Pre-Pregnancy Genetic Testing
- Long-Acting Reversible Contraception (LARC)

A full list of College Statements can be viewed on the Statements and Guidelines page of the RANZCOG website.



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The Rural Obstetric and Anaesthetic Locum Scheme is funded by the Australian Government

### Notice of Deceased Fellows

The College was saddened to learn of the death of the following Fellows:

Miss Vivienne Alice Croxford, UK, on 2 February 2013  
Dr Peter Anthony Tynan, NSW, on 21 October 2013\*  
Dr John Croall, SA, on 11 December 2013  
Dr Robert Anthony Norelli, QLD, on 13 December  
Dr Keith Basil Layton, Vic, on 14 December 2013  
Dr Robert Charles Rundle, NSW, on 28 December 2013.  
Dr Serge Kunstler, Vic, on 12 January 2014  
Dr Annie Leong, Vic, on 20 January 2014\*

\* An obituary appears on pp74–5 of this issue of *O&G Magazine*.



# Honouring researchers

Delwyn Lawson  
Co-ordinator, RANZCOG  
Research Foundation

Recipients of the RANZCOG Research Foundation Awards 2014–15 were recently welcomed at College House.



*From left, Dr Cecelia O'Brien, Dr Jason Chow, Prof Michael Permezel (RANZCOG President), Dr Luke Larmour and Dr Fiona Brownfoot.*

The RANZCOG Research Foundation scholarship recipients for 2014–15 were well represented at an awards presentation held during the RANZCOG Annual General Meeting (AGM) at College House in November. RANZCOG President Prof Michael Permezel had high praise for the recipients: 'The College had the great pleasure of presenting awards to recipients of the RANZCOG Research Foundation Scholarships and Fellowships. Six of the seven recipients with awards commencing in 2014 are undertaking either the FRANZCOG or a subspecialty training program, with the seventh a RANZCOG Fellow and urogynaecology subspecialist; all have outstanding projects. Our thanks go to the RANZCOG Research Foundation Grants and Scholarships Committee, chaired by Prof Jonathan Morris.'

Dr Fiona Brownfoot was awarded the Arthur Wilson Memorial Scholarship for her project, 'Treating Severe Preterm Pre-eclampsia with Pravastatin: An Early Phase Clinical Trial'. She said: 'It was an honour to be able to discuss my project with colleagues and members from the research board. I also enjoyed meeting other scholarship recipients and learning more about their projects. It was a wonderful evening and a great way to promote research.'

Recipient of the Luke Proposch Perinatal Research Scholarship, Dr Cecelia O'Brien, spoke about her project: 'Metformin and Dietary Advice to Improve Insulin Sensitivity and Promote Gestational Restriction of Weight in Pregnant Women who are Obese (GRoW Trial) – Effects on Fetal Growth'. Of the AGM, she said: 'I gained insight into all the work and organisation that goes into our training program and College.' A highlight of the evening was meeting members of the Proposch family, who she thanked 'for their generosity and ongoing commitment to obstetric research.'

Dr Jason Chow was awarded the Robert Wrigley Pain Research Scholarship for his project, 'Quality of Life Outcomes Following Pudendal Nerve Release Surgery in Patients with Pudendal Neuralgia'. Dr Chow attended with his parents and expressed his thanks to those involved with this newly established award: 'I am very grateful to the Research Foundation, the Wrigley family and Prof Thierry Vancaillie for the opportunity to contribute to this fascinating area of medicine. It was greatly edifying to share lively and zealous conversations with my mentors and colleagues at the College and the Research Foundation. The evening was ebullient, friendly, collegial and tremendously encouraging.'

Dr Luke Larmour also attended and spoke about the project that earned him the Mary Elizabeth Courier Research Scholarship, titled, 'Factors Influencing the Progression of High-Grade Cervical Dysplasia to Invasive Carcinoma'.

Dr Ryan Hodges, recipient of the Fotheringham Research Fellowship for his project, 'Fetal Therapy for Congenital Diaphragmatic Hernia: A Global Partnership to Translate Surgical and Cellular Innovation', and Dr Ruchi Singh, recipient of the RANZCOG Fellows' Clinical Research Scholarship for her project, 'Vaginal Dimensions in Women with Pelvic Organ Prolapse using Vaginal Casts', were unable to attend, but their projects were acknowledged during the presentation. Also acknowledged was Dr Carin Black, recipient of the Brown Craig Travelling Fellowship, for her intended travel to the Maternal Fetal Medicine Unit of St Thomas' Hospital in London.

For more information on the RANZCOG Research Foundation please contact Delwyn Lawson ([dlawson@ranzco.org.au](mailto:dlawson@ranzco.org.au)) or visit the College website.



The Australian and  
New Zealand Journal  
of Obstetrics and  
Gynaecology

# ANZJOG

The official publication of the  
Royal Australian and New Zealand College of Obstetricians and  
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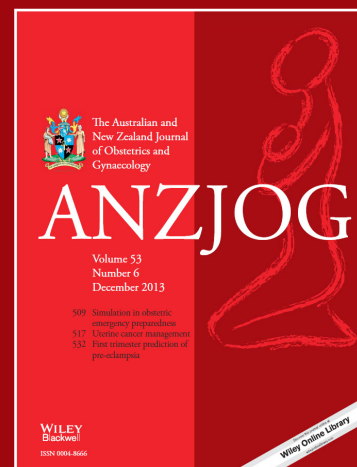
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WILEY

# New Zealand New Year and Australia Day Honours Awards

The College congratulates the following Fellows and Diplomates on their awards:

## Companion (CNZM) of the New Zealand Order of Merit

- Prof Cynthia Margaret Farquhar, Auckland, New Zealand (FRANZCOG). For services to women's health.

## Medal (OAM) in the General Division

- A/Prof James Forrester King, Parkville, Vic (FRANZCOG). For service to medicine, particularly in the field of perinatal epidemiology.
- Dr Jurriaan Jan Beek, Casino, NSW (DRANZCOG). For service to medicine, and to the community.
- Dr James Boyer Brown, Trafalgar, NSW (DRANZCOG). For service to medical education, and to the community.

# RANZCOG Women's Health Award 2013

Julia Serafin  
Media and Communications  
Senior Coordinator

Marking nine years, RANZCOG is proud to present the RANZCOG Women's Health Award 2013 to the following outstanding university students in obstetrics and gynaecology from medical schools across Australia, New Zealand and Papua New Guinea:

- Sarah Stone, University of Auckland
- Faseeha Peer, School of Clinical Medicine, Australian National University
- Amy Morrison, Bond University
- Courtney Speight, Faculty of Health Sciences, Flinders University
- Stephen Guy, Griffith University
- Belinda Stallard, School of Medicine, James Cook University
- Aditi Mahajan, University of NSW
- Justine Mackie, University of Notre Dame (WA)
- Carly Brazel, University of Notre Dame (Sydney)
- Presley Keith and Elizabeth Feeney, University of Papua New Guinea
- Samantha Sundercombe, University of Sydney
- Emily Jasper, School of Women's and Infants' Health, University of WA

# Staff news

**Bridget Anderson**, financial accountant, left the College at the end of December. We wish her all the best for her career.

**Kate Lording** left her role as the workforce and evaluation coordinator with the College at the end of January to take up a new position. We wish her every success in her new role.

**Latesha Houston** resigned from her position as examinations coordinator in January to move to Perth. We wish Latesha all the best for this adventure.

**Milly Davison** left the College at the end of February to return to full-time study. We thank her for her contribution to the CPD team

and wish her every success.

**Bree Morison** resigned from her role in the Victorian Regional Committee office in order to study full time. We wish her every success for her studies.

**Beverley Munro**, after 15 years at the College, left her role as business manager in early March. We thank her for her long-standing contribution to the College and wish her well for the future.



# Obituaries

## Dr Dorothy (Billie) Greening 1917 – 2012

Dorothy (Billie) Greening was born on 13 April 1917 in Sydney. Her father was a confectioner and she had one brother and three sisters. The family moved to Glen Innes, where she gained her leaving certificate and topped the class. Billie trained as a nurse at Prince Henry Hospital in Sydney and studied midwifery at Crown Street Women's Hospital. In 1943, she joined the Australian Army Nursing Service, serving in Tripoli, Crete, Borneo and Singapore.

After the war, Billie studied medicine at the University of Sydney. On graduating in 1956, she became a resident medical officer at Sydney Hospital and joined the Army Reserve. She then trained in obstetrics and gynaecology at Crown Street Women's Hospital, where she worked as a midwifery sister to fund her studies. Her fellow trainees were surprised to see her take a place at the senior sister's table during tea break.

In 1961, she moved to England, where she furthered her specialisation in obstetrics and gynaecology, worked as a registrar in Sutton-in-Ashfield and Grimsby, and served in the London General Hospital Territorial Army.

In 1964, Billie returned to Australia to set up a specialist practice at Wingham in New South Wales, which she continued until she retired in 1986.

In retirement, Billie lived at Hallidays Point and travelled extensively. She was a philanthropist, establishing the Dorothy Greening Scholarship for the Faculty of Medicine at the University of Sydney, and scholarships at Taree and Wingham high schools for students to attend university. She swam regularly at the Black Head ocean pool and was the oldest lap swimmer at the age of 88 years – when the pool was threatened with closure, she donated money to keep it open.

Billie fell and broke her hip while walking her dog. After a period of care in a nursing home at Tuncurry, she died on 10 June 2012.

## James B Roche FRANZCOG NSW

Roche JB. Dorothy (Billie) Grace Greening MB BS, DObstRCOG, FRACOG, FRCOG. *Med J Aust* 2013; 199(8): 559. © Copyright 2013 The Medical Journal of Australia – reproduced with permission.

## Dr Peter Tynan 1925 – 2013

Peter Anthony Tynan was born in Melbourne on 19 March 1925 at the Royal Women's Hospital, the second of three boys, and was educated at the Christian Brothers College. He first toyed with a career in mechanical engineering, before opting for medicine. Peter was a student at Melbourne University in the post-war years, and graduated in 1952. After initial posts as a hospital resident, including time at the Royal Women's Hospital, he was offered a position as a GP in Mount Isa, as the sole general practitioner.

He accepted and moved there, together with wife Marceline and young family. On top of his busy GP workload, he was also delivering around 200 babies a year.

After five years in Mount Isa, he had a visitor, Prof Lance Townsend. Prof Townsend offered Peter a job back at his unit at the Royal Women's Hospital, which he accepted.

After his time at the Royal Women's Hospital, his next move was to Belfast, Northern Ireland. Following his work there, and also at a hospital in County Armagh, Peter sat the MRCOG exam in London in 1964. He passed the exam and also won the Gold Medal, an achievement very few Australian doctors have achieved. After his exam success, he was offered a position at Queen Charlotte's Hospital in London, but declined and made the decision to return to Australia.

He arrived in Newcastle in 1966, and soon demonstrated an enormous appetite for work. He went on to build up a very busy practice, as well as being an active contributor to teaching and training. As his early years as a GP had showed – he could handle anything. He helped form the Newcastle Obstetric and Gynaecological Society and was also active in the planning for the medical school at the University of Newcastle, which took in medical students from 1979. Peter became Foundation Fellow of RACOG in 1978, and, in 1979, was elevated to the Fellowship of the RCOG.

Peter retired from practice in 1990, some 23 years ago, to spend his retirement years working on his beloved farm. During his quarter of a century working as an obstetrician and gynaecologist in Newcastle, he delivered thousands of babies and performed thousands of operations. To the Newcastle obstetric community, he will be remembered as a wonderful colleague and friend.

Peter passed away on 21 October 2013. He is survived by his wife Marceline, and children Lyndal, Judy and Matthew. One son, Anthony, pre-deceased him.

## Dr Gerald Lawson FRANZCOG NSW

**Dr Annie Leong**  
1972 –2014

Annie Leong was born in Malaysia on 24 June 1972, and emigrated to Australia with her family when she was three years old. Annie undertook her secondary schooling at Methodist Ladies College and completed her VCE at MacRobertson's Girls High School. She went on to study medicine at Melbourne University, graduating in 1995. Annie commenced her training in obstetrics and gynaecology at the Royal Women's Hospital, Melbourne in 1998, and achieved her Fellowship in 2005.

Annie had a strong interest in surgery and began training for the urogynaecology subspecialty in 2004. She successfully completed all requirements and became a certified urogynaecologist in 2007. Annie worked as a consultant urogynaecologist at the Royal Women's Hospital, Melbourne, where she enjoyed teaching and training future Fellows, registrars and medical students. She had a successful private practice first at Cotham Private Hospital and then at Knox Private Hospital.

Annie actively contributed to urogynaecology scientific meetings and was a College examiner for the subspecialty from 2009. She had a strong sense of social justice and was often fundraising, particularly for organisations supporting families with premature babies.

Annie was diagnosed with a brain tumour soon after the birth of her only child. She courageously fought her cancer and was able to return to work until a recurrence in 2013. Following this, Annie retired to spend more time with her family. She was a talented surgeon and a thoughtful and considerate doctor. She is survived by her husband Darren, son Tobie, her parents and sisters.

**Dr Alison De Souza**  
FRANZCOG, CU  
Vic

**save the date: 12-15 april 2015**



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# Applications invited for RANZCOG Board of Examiners

**Fellows and Diplomates of the College are invited to apply for membership of the RANZCOG Board of Examiners.**

Examinations are an integral part of the College's services and examiners are pivotal in ensuring that the College runs high-quality examinations that are transparent, reliable, valid and fair. RANZCOG has only one 'panel of examiners', the Board of Examiners, from which come the Diploma, Membership and Subspecialty examiners for each relevant Written and Oral examination. The aim of having a combined Board of Examiners is to allow an exchange of knowledge between Diploma, Membership and Subspecialist examiners.

Fellows and Diplomates who are appointed to the RANZCOG Board of Examiners provide a pivotal service in the ongoing development and assessment of trainees in specialist, subspecialist and general practice obstetrics and gynaecology.

## Duties

Examiners can utilise their expertise by being involved in the following activities:

- Developing questions for the Multiple Choice Question (MCQ) examinations and the Short Answer Question (SAQ) written examinations
- Developing cases for Oral Examinations
- Participating in standard setting activities
- Marking examination papers against established criteria
- Examining candidates at the Diploma, Membership or Subspecialty Oral Examinations
- Assessing Research Proposals and Research Projects in the ITP and Subspecialty Training Programs

## Additional information

### Availability

All examiners appointed to the Board are expected to make themselves available for at least one examination activity per year.

### Method of Application

To be considered for appointment, an application must be submitted to the Education & Assessment Committee. An application form is available on the College website <http://www.ranzcog.edu.au/education-a-training/board-of-examiners.html>. Applicants should read the factsheet Appointment, Roles and Responsibilities of Examiners and Examination Coordinators before submitting an application, available at: [http://www.ranzcog.edu.au/documents/doc\\_download/43-roles-and-responsibilities-for-examiners-examination-coordinators.html](http://www.ranzcog.edu.au/documents/doc_download/43-roles-and-responsibilities-for-examiners-examination-coordinators.html). The completed application form, together with a current curriculum vitae, should be emailed to [jwong@ranzcog.edu.au](mailto:jwong@ranzcog.edu.au) or, alternatively, sent by mail to College House, 254–260 Albert Street, East Melbourne, VIC 3002.

### Enquiries

Any questions regarding applications should be directed to Joan Wong, Education & Assessment Committee coordinator on +61 3 9412 2962 or [jwong@ranzcog.edu.au](mailto:jwong@ranzcog.edu.au).



# Author Index

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Articles A, In and The are ignored in filing entries

The following abbreviations have been used:

O and G = obstetrics and gynaecology

Series names and editorials have been placed in square brackets [ ]

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**ROALS** 

The Rural Obstetric and Anaesthetic Locum Scheme is funded by the Australian Government

## Subject Index

### Volume 15 2013

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Articles A, In and The are ignored in filing entries

The following abbreviations have been used:

O and G = obstetrics and gynaecology

\*Articles written about working in overseas countries, have been indexed under the place name  
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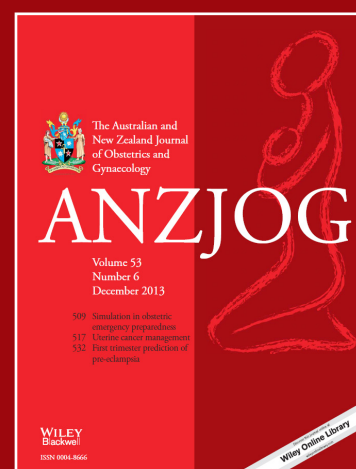
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