

Editorial Note

A number of experts have been invited to submit a commentary on this issue of the journal. Space permits us to publish only one commentary in conjunction with the papers of Petros et al., and this commentary was chosen because it was the first to be completed and returned. More commentaries will be printed in the next issue. Others are invited and will also be considered for publication.

The editors of *Pelvipерineology* see this as a wonderful opportunity to open up discussion of anorectal function to the general pelvic floor community. Please consider this opportunity to contribute to the discussion by submitting correspondence for publication.

Invited comment

Some years ago in an attempt to obtain the Holy Grail of every medic, the perfect golf swing, I found myself seduced into buying a set of instructional videos by a small town American golf instructor, Dalton McRary, who had by various observations of still images of golfers of yesteryear, where shutter speeds were not fast enough to prevent motion blur, come to the conclusion that much of the perceived and taught theory regarding the golf swing was in fact incorrect. He based his system for the golf swing on these observations.¹ More importantly in the introduction booklet to the videos he asks the reader to make a small mental leap of faith. He asked that although he did not necessarily expect the reader to automatically believe everything they were about to read and see, he asked them to open their minds to the possibility that it may be true. In other words to give the hypotheses a chance before closing ones mind to the fact that they went against the currently accepted wisdom. It was with this in mind that I read the work by Petros and Swash.

Our understanding of pelvic floor function, at least in colorectal circles is that the main cause of incontinence and other disorders is due to a lack of muscle power. Whether this is due to damaged muscles, damaged innervation or lack of muscle bulk, it is thought that it is an inherent lack of contractile strength that contributes to the dysfunction. This approach is confirmed by the current treatment rationales to help restore function, namely, muscle repair, sacral nerve stimulation and biofeedback. The decision as to which mode of treatment to use is based on the commonly performed investigations of anorectal physiology, pudendal nerve terminal motor latency recordings and anal ultrasound to gauge respectively, muscle power, nerve conduction and muscle damage.

It would appear that the initial observation made by the authors, that prompted much of this work was the finding that the vast majority of patients with concomitant urinary

and faecal incontinence treated with a mid-urethral sling-plasty were not only cured of their urinary symptoms but also their faecal symptoms. No attempt had been made to correct the muscles themselves. This observation clearly set the authors thinking about a possible mechanism for such an outcome and to rethink the current understanding of pelvic floor function.

The authors have therefore presented the reader with a new concept of anorectal function they have called "The Musculoelastic Theory". This concept is supported by the presentation of 12 papers which act to support the original concept, support each other and bring together observations made by other authors in previously published works. The various presented works involve individual case reports, which must obviously be taken on their individual merit only, along with small and large clinical series involving surgical repair, histological evaluations and radiological studies.

The basic tenet of The Musculo-Elastic Theory is that although faecal incontinence is in part contributed to by muscle damage or nerve conduction abnormalities, it can to a greater degree be explained by damage to, and weakening of the ligamentous attachments of the pelvic floor musculature, which if corrected surgically can produce a significant improvement in symptoms, without necessarily having to directly address the actual muscles or nerves themselves. It is not entirely unreasonable to assume that taut, appropriately directioned ligamentous attachments are fundamental to good muscle function. We have all heard the patient who is convinced her pelvic troubles all started after her hysterectomy.

Theoretically the theory has much to support it. The pelvic floor muscles are somewhat unique in that they represent a group of skeletal muscles, under voluntary as well as reflex control that although arising from bone insert directly into the soft tissues upon which they act. For the majority of muscles in the body which connect to bone at their origin as well as insertion, it is rare that they become stretched and lax to the point that they are unable to function as intended. With lack of use, or focal damage these bone oriented muscles may atrophy and weaken, but as they tend to maintain their original length can be re-strengthened with physiotherapy and exercise. How does a totally snapped hamstring in an Olympic athlete ever function normally again? When skeletal muscle inserts into soft tissue only, it is plausible that when overstretched or torn, especially if this involves ligamentous damage at the origin, that as normal length cannot easily be restored that power and function will be compromised. It is not hard to imagine how such stretching and damage can occur during pregnancy and childbirth. This may help to explain why the platysma, with no bony attachments is such a giveaway to our real age.

There is some evidence to support this. Krochmal et al studied muscle recovery following tenotomy and reinsertion of skeletal muscle in rats, by varying the length of the reinserted tendon.² In those muscles where the tendon was shortened, producing greater tension on the muscle fibres, greater muscle mass, greater muscle length, greater phys-

iological cross-sectional area, greater maximum isometric force, and greater maximum power relative to the control tendon length group was achieved. Admittedly the nerve was left intact but it is difficult to argue with the results. Furthermore, the other experimental group in this study, where the tendon was lengthened thereby inducing some laxity did not necessarily lose contractile power. It would however have reduced the degree of movement in the related joint. Our basic understanding of muscle physiology at undergraduate level should also allow us to accept this without too much difficulty.

We also know from the work by Malouf et al that external sphincter repair although producing good initial results has a significant rate of attrition.³ More interestingly, Malouf noted that other defaecatory disorders became apparent after such repair. Can we deduce a possible explanation for this from the work of Petros and Swash. Perhaps the initial overlap recreated tension in the muscle to allow an initial improvement, but as it does not address the main ligamentous bony attachments of the pelvic floor musculature, is only short lived. Perhaps the tension produced initially also has a distracting affect on other pelvic ligaments against their normal direction of activity thereby producing other defaecatory effects. Does sacral nerve stimulation work only by neuromodulation? Does it have some of its effect by increasing the resting tension of the muscle fibres. Maybe. I don't know, I'm only guessing. But the whole concept of a musculoelastic contribution to incontinence will produce many more questions.

Do we need to re-evaluate our pre-treatment investigations? Is sphincter physiology really valid? Is identification of muscle damage a good means for surgical selection? What does pudendal nerve conduction really tell us? Should all

patients with pelvic floor dysfunction of any kind undergo proctography? Should urodynamics be part of anorectal investigation? How can we quantify musculoelastic function? Which are the important ligaments for each disorder? How can we repair/strengthen them? Should we change our approach to rectal prolapse? The list is endless.

I am sure that the authors will agree that works such as this are rarely the final solution. There are aspects of the work that may need further consideration. The use of Poiseuille's formula only applies to laminar flow of an incompressible liquid through a circular tube of constant proportions. Its application in helping to explain continence in a narrowed rectum may not be relevant. That's not to say that retensioning the rectum doesn't help incontinence. It's just that it is unlikely to be explained by mere physics. The papers do however contain much to think about and will stimulate a huge amount of further study and research. As readers, if minds are kept open, the pelvic floor community has been thrown a fertile seed from which I am sure much will grow.

1. Dalton McCrary Straight Shootin' Golf. TVi productions.
2. Krochmal DJ, Kuzon WM Jr, Urbanchek MG. Muscle force and power following tendon repair at altered tendon length. *J Surg Res* 2008; 146: 81-9. Epub 2007 Oct 24.
3. Malouf AJ, Norton CS, Engel AF, Nicholls RJ, Kamm MA. Long-term results of overlapping anterior anal-sphincter repair for obstetric trauma. *Lancet* 2000; 355: 260-5.

Dr. DARREN M. GOLD

Senior Lecturer and Colorectal Surgeon
St Vincent's Hospital and Clinical School, UNSW
Darlinghurst, Sydney
Australia