

CAN LEVATOR AVULSION BE CORRECTED SURGICALLY?

Hypothesis / aims of study

Major morphological abnormalities of the puborectalis muscle, i.e., an avulsion of the puborectalis muscle from its insertion on the inferior pubic ramus, ('avulsion') are common in women after vaginal delivery (1). This form of trauma is likely to be an etiological factor in the development of female pelvic organ prolapse, especially cystocele and uterine prolapse(2). First attempts have been made to repair such trauma, so far without clear evidence of success, even in the short term. 'Proof of concept' would require not just a simple, safe and reproducible technique, but also the demonstration of a change in hiatal dimensions.

We have developed a simple vaginal technique for the reconstruction of an avulsed m. puborectalis. In order to demonstrate the feasibility of this technique and to estimate the likely improvement in hiatal dimensions to be expected from successful unilateral avulsion repair, we undertook a prospective surgical pilot trial.

Study design, materials and methods

We enrolled 15 patients on our waiting list for prolapse repair in a prospective surgical pilot study at two tertiary Urogynaecology units. Patients were aware that this was an IRB- approved Phase I trial and provided written consent. The entry criteria were 1) patient due for prolapse repair, 2) presence of unilateral or bilateral complete avulsion of the puborectalis muscle. Partial uni- or bilateral trauma was an exclusion criterion.

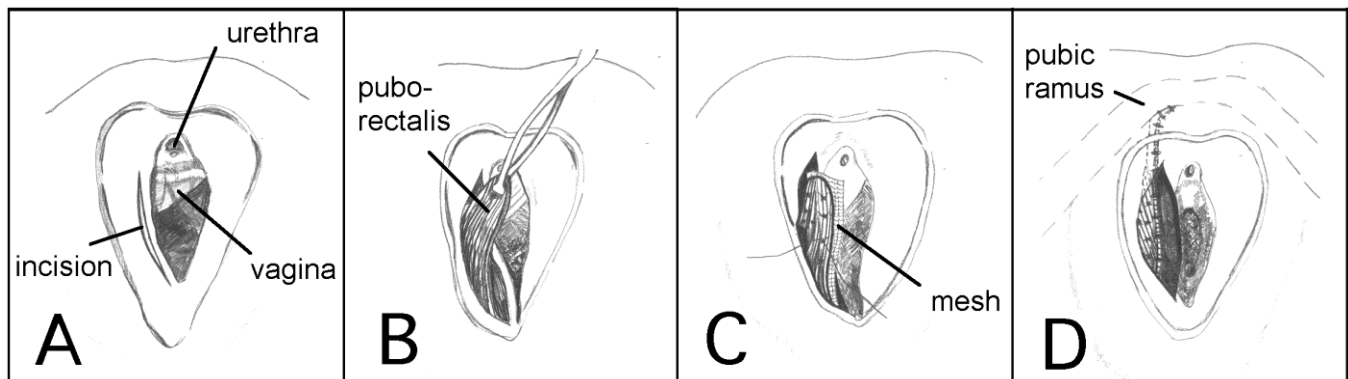


Figure 1: Surgical repair of an avulsion of the puborectalis muscle through a distal lateral colpotomy (A). The muscle is identified and freed from the vagina medially (B). A 2x4 cm patch of polypropylene mesh is attached to the muscle using multiple single sutures (C). The reinforced muscle is sutured to the medial surface of the inferior pubic ramus (D).

Patients were operated on between May 2010 and February 2011, by two subspecialist urogynaecologists. After completion of standard prolapse repair according to the surgeon's preferences, a low lateral colpotomy of 4 cm length was placed at the level of the hymenal remnant (see Fig. 1). This surgical method had been developed during dissection of over 20 female cadavers. The ischioanal space was entered. The puborectalis muscle was identified, separated from the vagina and mobilised to reach the inferior pubic ramus. It was then attached to a 2x4 cm piece of polypropylene mesh, and the reinforced muscle was sutured to the inferior pubic ramus, using two sutures of 0 PDS. Patients were followed up at 5-6 weeks, 3 months and 6 months after the procedure. Hiatal area on Valsalva was measured offline in cine volume datasets obtained using Voluson 730 expert or E8 systems with RAB 8-4 Mhz transducer (2). We did not perform formal power calculations due to an absence of pilot data in the literature.

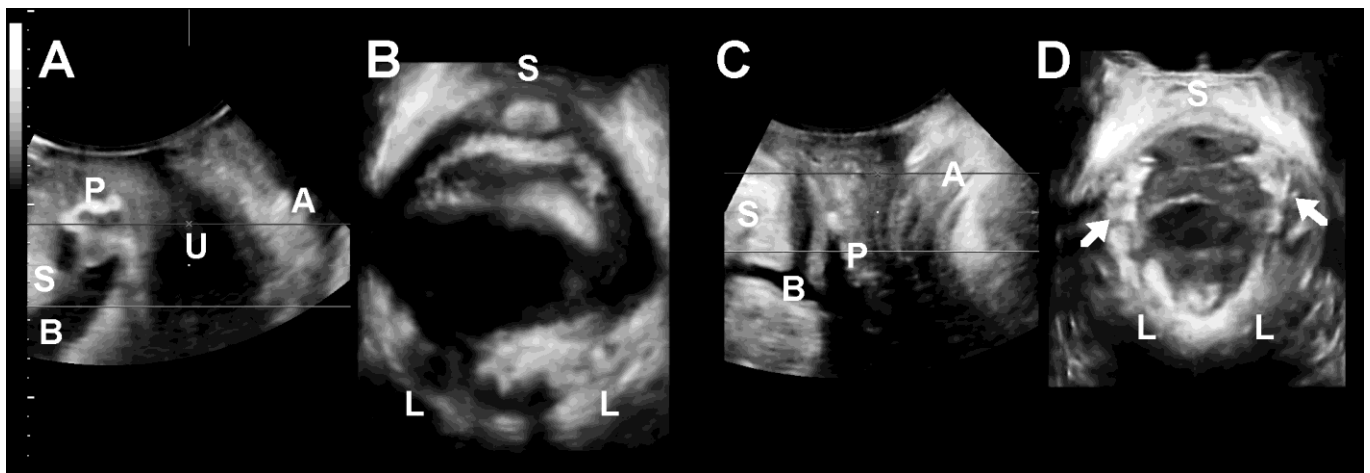


Figure 2: Hiatal reduction from 39 to 15 cm² 3 months after bilateral avulsion repair. Midsagittal (A) and axial (B) view on Valsalva before abdominal hysterectomy, sacrocolpopexy and bilateral avulsion repair; midsagittal (C) and axial (D) view on Valsalva 3 months after the procedure. S= symphysis pubis, P= Perigee mesh, B= bladder, U= uterus, L= levator ani, A= anal canal. Arrows show the location of the avulsion repair.

Results

At the time of writing, we have performed 18 levator repairs in 15 women (three bilateral). Mean age was 61 (47-79) years. Body mass index was 26 (18-32). All were vaginally parous, and 5/15 reported a previous vaginal operative delivery. 8/15 had previously undergone a hysterectomy, 5 an incontinence or prolapse procedure. Patients suffered from symptoms of prolapse (n=15), stress incontinence (n=9), urge incontinence (n=11), frequency (n=3), nocturia (n=3) and symptoms of voiding dysfunction (n= 4). All had a symptomatic prolapse ICS POP-Q stage 2 or higher (stage 3+, n=10) on clinical assessment (cystocele, (n=15), uterine prolapse (n=4) and rectocele or recto- enterocele (n=10). All had been diagnosed with an avulsion on tomographic ultrasound, of which 3 were bilateral. Mean hiatal area on Valsalva was 37.5 (27.5- 50) cm², with 5 showing severe ballooning over 40 cm².

There were no intraoperative complications. Concomitant procedures were suburethral tapes (n= 2), anterior colporrhaphy (n=13), transobturator mesh (n=1), posterior colporrhaphy (n=12), vaginal hysterectomy (n=6), sacrospinous colpopexy (n=7), abdominal hysterectomy (n=1) and abdominal sacrocolpopexy (n=1). Postoperative recovery was unremarkable in all cases. Patients were seen at 6 weeks, 3 and 6 months. Results are given for a mean follow-up of 5 months. Most (12/15) were satisfied with the outcome. Two patients complained of symptoms of recurrent prolapse, two of dyspareunia, and three more of pain related to the repair site. On clinical examination there was one mesh erosion. Mean Ba was -0.9, mean C -5.4 and mean Bp -1.8. Significant objective prolapse recurrence (exclusively ICS POP-Q stage 2) was observed in 11/15 patients. There was no evidence of implant dislodgment, and most meshes could be palpated; three were tender on palpation. On ultrasound, the mesh bridge was visualised as a hyperechogenic strip lateral to the fornix(see figure 2) in all cases. It usually was best seen 2.5-5 mm below the plane of minimal hiatal dimensions. The mean area on Valsalva was reduced from 37.5 cm² to 30.5 cm² (P= 0.008).

Interpretation of results

Reconnection of an avulsed puborectalis muscle to its insertion on the inferior pubic ramus is technically feasible through a lateral colpotomy at the level of the hymenal remnant. However, the effect on hiatal dimensions, while significant, is disappointing, and so is its effect on prolapse recurrence. An anatomically fully satisfactory result was obtained in only two patients, one of them a bilateral repair. In both cases the muscle seemed unusually thick and functional, even before the repair. It is likely that in many avulsions there is concomitant ipsi- or contralateral microtrauma (3), which will not be addressed by muscle reconnection. In addition, our technique may not be optimal in terms of avoiding implant- related pain and erosion. We are now placing the mesh reinforcement lateral to the muscle and perform avulsion repair only in selected patients with good muscle bulk without severe ballooning.

Concluding message

Direct surgical repair of a levator avulsion is feasible at the time of prolapse surgery. However, its effect on prolapse recurrence and hiatal dimensions is frequently disappointing, suggesting that there often is microscopic trauma and functional muscle impairment in addition to the avulsion.

References

1. Expert Rev Obstet Gynecol 2010; 5(4): 479–492
2. Br J Obstet Gynaecol 2008; 115: 979-984
3. Br J Obstet Gynaecol 2010; 117:1485–1492

Specify source of funding or grant	Nil
Is this a clinical trial?	Yes
Is this study registered in a public clinical trials registry?	No
Is this a Randomised Controlled Trial (RCT)?	No
What were the subjects in the study?	HUMAN
Was this study approved by an ethics committee?	Yes
Specify Name of Ethics Committee	SWAHS HREC (Nepean Campus)
Was the Declaration of Helsinki followed?	Yes
Was informed consent obtained from the patients?	Yes