

Bladder emptying difficulty in the female can be cured by uterosacral ligament repair, preferably using posterior slings

Abstract

Aim. To analyse bladder emptying difficulty with reference to the descriptions of 'Underactive Bladder' (UAB) syndrome, 'obstructive micturition' and Posterior Fornix Syndrome in the female. **Methods.** A comparative analysis of UAB and 'obstructive micturition' was performed against evidence from surgical correction of uterine/apical prolapse in patients with symptoms of 'posterior fornix syndrome' (PFS). PFS comprises 4 grouped symptoms, micturition difficulties/post-void residual, urge/frequency, nocturia, chronic pelvic pain. **Results.** Other than chronic pelvic pain, the expanded characteristics of UAB as recently defined are identical with those of PFS: micturition difficulties/ post-void residual, urge/frequency, nocturia. These were cured in up to 80% of cases by surgical repair of the cardinal/uterosacral ligament complex, using native or posterior sling techniques. Native tissue ligament repair worked well in younger women but not in older women, because of collagen leaching with age. Posterior ligament slings which create new collagen for ligament repair were required for older women. **Conclusions.** Surgical cure of UAB and renders definitions implying detrusor muscle pathogenesis invalid. Valid definitions are important, as they are the guidelines for treatment, diagnosis, research. Altering UAB to 'bladder emptying difficulties' allows compatibility with surgical treatment and removes the obstacles with detrusor pathogenesis presents for ongoing research.

Keywords: underactive bladder, uterosacral ligament, posterior fornix syndrome, obstructed micturition, nocturia

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Introduction

Inability to adequately evacuate the bladder was described as a major source of repeated urinary infection and pathology, with catheter-associated urinary tract infections (UTIs) as the most common nosocomial infection, accounting for >1 million cases in hospitals and nursing homes⁽¹⁾. Many such women require an indwelling catheter for the rest of their lives⁽¹⁾. The risk of UTI increases with the duration of catheterization. In elderly populations who are not institutionalized, UTIs are the second most common form of infection, accounting for nearly 25% of all infections with a cost of 1 billion dollars p.a.⁽¹⁾. In a previous work⁽²⁾, it was demonstrated that this condition, also known as 'obstructed micturition', 'underactive bladder' (UAB) could be cured or improved by repair of the uterosacral ligaments.

UAB is the symptom-based correlate of 'detrusor underactivity' (DU) which is characterized by prolonged evacuation time and raised post-void residual (PVR)⁽³⁾. The characteristic UAB symptoms are prolonged urination time, sensation of incomplete bladder emptying, hesitancy, reduced sensation on filling, slow stream, high post-void residuals, and history of retention episodes in over half the patients with DU⁽⁴⁾. UAB is not a well understood entity and its cause is unknown⁽³⁾. Overactive bladder (OAB) symptoms

were recently added to the syndrome characteristics of UAB by Uren et al's.⁽⁴⁾ findings of nocturia frequency, urge incontinence symptoms in over half the patients with DU. All recommended treatments for OAB (i.e. drugs, botox etc.) are based on the concept of overactivity in the detrusor muscle. Clearly such treatment is contraindicated with an "underactive" detrusor. Nor can bladder smooth muscle be "overactive" and "underactive" at the same time. There is said to be no treatment for UAB⁽³⁾. The emptying symptoms attributed to UAB are identical with those described for 'obstructed micturition' and the "emptying difficulty" component of the 'posterior fornix syndrome' (PFS)⁽⁵⁾.

The PFS is an anatomically-based paradigm associated with uterine/apical prolapse which does not have the internal conflicts of UAB. It was described in 1993⁽⁵⁾. As originally described, this syndrome has four grouped symptoms, urgency/frequency, nocturia, chronic pelvic pain, abnormal emptying (with raised PVR). The cause was attributed to loose uterosacral ligaments (USLs).

Not all four PFS symptoms necessarily occur simultaneously. Often, prolapse from the loose USLs is minimal, 1st degree^(5,6). Other than chronic pelvic pain, all PFS symptoms and signs such as prolonged emptying times, raised PVR urgency, nocturia⁽⁶⁻⁸⁾, are identical to those recently reported for UAB^(3,4).

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The aim of this short review is to critically examine the evidence from women who had PFS symptoms identical with those defined for UAB and DU, and who were cured or improved by reinforcement of the USLs either by native tissue repair or with posterior polypropylene slings.

Methods

We compared stated characteristics of 'obstructed micturition', 'underactive bladder', its urodynamic equivalent 'detrusor underactivity' against evidence from surgery performed for symptomatic uterine/apical prolapse in patients with PFS of surgeons who follow common principles of repair⁽⁹⁾. Of the four PFS symptoms, micturition difficulties/PVR, urge/frequency, nocturia, chronic pelvic pain, 3 are identical with UAB symptoms as reported by Uren et al.⁽⁴⁾ and defined by Osman et al.⁽³⁾.

Results

Native tissue USL repair results for PFS were published in 1993⁽⁵⁾. Not all patients had every PFS symptom. Cure rate at 12 months following native tissue USL approximation was >50% for all symptoms⁽⁵⁾. There was subsequent deterioration in symptom cure rate, attributed to insufficient collagen in the USLs. A posterior USL sling resulted in much higher cure rates at 21 month review⁽⁶⁾.

The inability of native tissue ligament repair to sustain symptom cure for PFS was recently clarified by Shkapura et al. (n=88) [personal communication]. They compared two cohorts both of which had native tissue cardinal ligament and USL repair for 1st and 2nd degree pelvic organ prolapse. At 12 months, the cure rate for the premenopausal group (n=40) was 80% but only 20% for the post-menopausal group (n=48). Corresponding deterioration in cure rates was noted for symptoms of frequency, urgency and nocturia.

Introduction of USL slings

Because of high failure rates subsequent to native tissue ligament repair, posterior slings were introduced to repair USLs^(6,7). The same surgical principle so successful for the midurethral sling was applied to repair USLs. The first posterior sling (posterior intravaginal sling (IVS)) was performed in 1997 concomitantly with a midurethral sling for urinary stress incontinence⁽⁶⁾. Surgery was controlled by pre and post-op. urodynamics. At (mean) 21-month follow-up, cure rates were: stress incontinence 88% (n=85), frequency 85% (n=42), nocturia 80% (n=30), urge incontinence 86% (n=74), emptying symptoms 50% (n=65). Urine loss (cough stress test) was reduced from 8.9 g preoperatively to 0.3 g postoperatively. The mean PVR urine decreased from 110 ml to 63 ml, $P < 0.02$. Urodynamically diagnosed detrusor instability (now detrusor overactivity) was present in 36/85 patients preoperatively (42%) and in 13/61 postoperatively (21%). Of these 13 patients 12 had no incontinence symptoms. Of the 5 operative failures who were tested postoperatively, 4 had a stable detrusor.

Goeschen⁽⁷⁾ also performed USL tape repair with posterior IVS slings in 198 patients. Their mean age was 62 years. Results were: 80% cure for frequency (127/198); 80% for nocturia (63/198); 54% for emptying (68/198). PVR improved in 44 patients who had residual urine > 50 ml to 26 patients who had PVR < 10 ml.

Petros et al.⁽⁸⁾ performed cardinal/USL ligament reinforcement with a 'tissue fixation tissue' tensioned mini sling in 67 patients in a pre and post-op urodynamically controlled study. Their mean age was 65 years. 36/67 had emptying symptoms, with 76% cured; mean emptying time improved from 52 to 26 sec; mean PVR improved from 201 ml to 39 ml. Two patients who were self-catheterizing pre-operatively were able to pass urine immediately postoperatively, with PVRs of 50 ml and 32 ml. In total, 149 episodes of nocturia pre-operatively reduced to 53 episodes post-op. Daytime frequency reduced from 11.8/day pre-op to 8.4 post-op; urge incontinence reduced from a total of 68 wet episodes/day to 16/day.

Other surgeons reported cure rates of 80% or greater for prolapse and PFS symptoms following uterosacral ligament repair shortening and reinforcing damaged ligaments with tapes with preservation of vaginal elasticity; they reported early discharge from hospital, minimal intra-operative complications, low erosion rates, between 0-1.5%; follow-up was between 12 months and 4 years⁽⁹⁻²⁰⁾.

Discussion

Our review indicates that what is defined as 'obstructed micturition' or UAB as described by Osman⁽³⁾ and Uren⁽⁴⁾ in women can reasonably be considered as being part of the PFS and these symptoms may be cured or improved along with other PFS symptoms by shortening and reinforcing USLs, preferably with a posterior sling⁽⁶⁻²⁰⁾. Though the emphasis of this work is on surgical restoration, it has been demonstrated that squatting-based pelvic floor exercises which work by strengthening the 3 directional pelvic floor muscles 'S' (Figure 1) and the ligaments against which they contract, will improve 50% of UAB and OAB symptoms in 50% of younger women⁽²¹⁾.

Our findings go beyond questioning definitions of UAB. They impact on what definitions stand for: they are the guidelines for treatment, diagnosis, research⁽²²⁾. The present definition of UAB by learned bodies is misleading, in that the definition implies the cause lies in the detrusor muscle itself, which is not curable. How a posterior sling causes emptying problems and how these can be improved by a posterior sling is explained by the Integral Theory System (Figure 1)⁽²³⁾.

Because the patient feels there is something which is 'blocking' evacuation of urine, some physicians use the term "obstructive micturition". Others attribute the cause to 'underactive bladder', inability of the detrusor to expel urine⁽³⁾. The Integral Theory view⁽²³⁾ is the problem is mechanical: inability of the muscles to open the posterior urethral wall because of loose USLs (Figure 1).

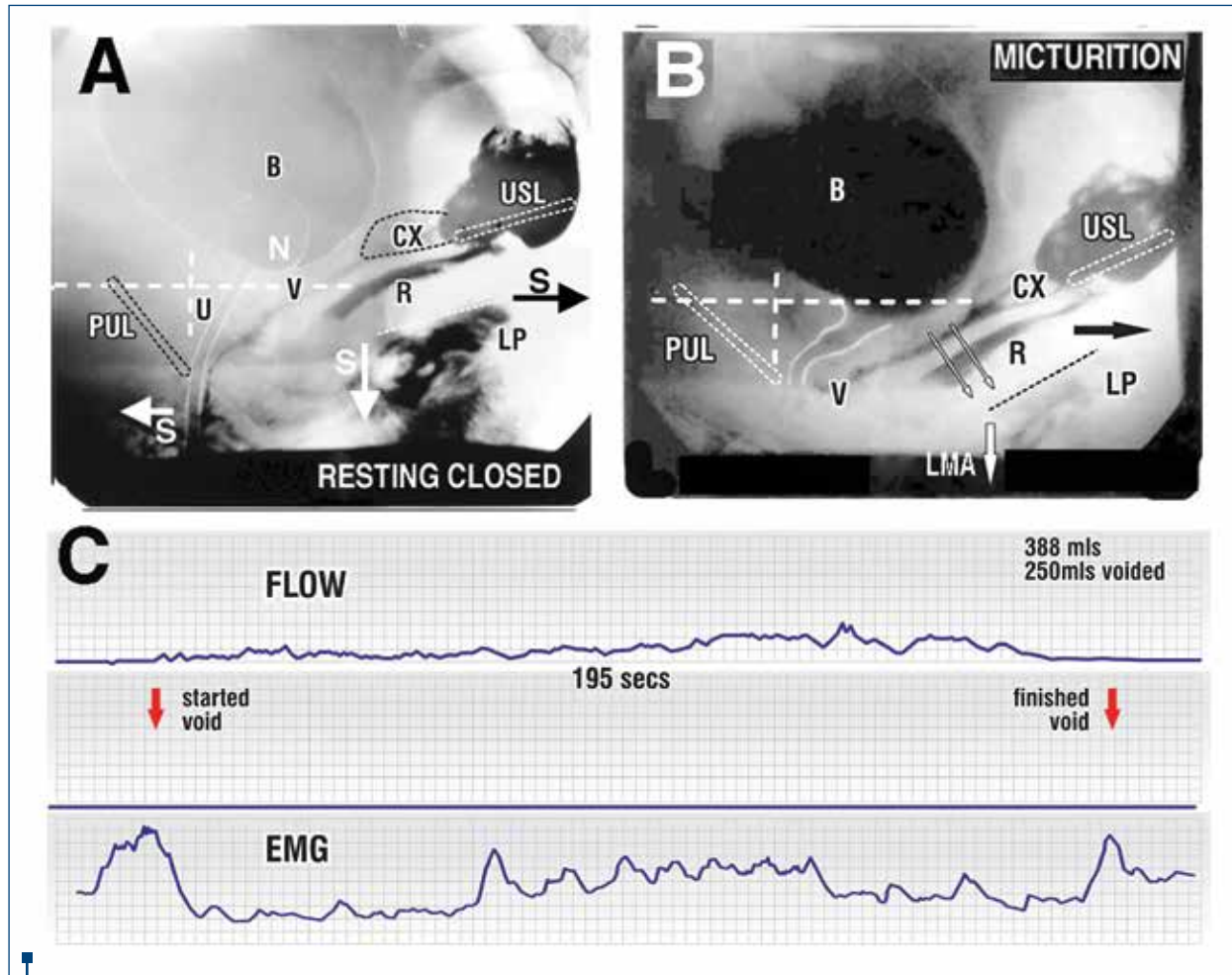


Figure 1. Mechanics of micturition – normal and UAB. X-ray video myogram. Normal patient sagittal view, sitting position; Vertical and horizontal lines are bony co-ordinates; **A.** At rest: 3 directional slow twitch vectors ‘S’ stretch the vagina and urethra ‘U’ forwards and backwards around the pubourethral ligament ‘PUL’; bladder ‘B’, vagina ‘V’, levator plate ‘LP’, conjoint longitudinal muscle of the anus ‘LMA’; R=rectum; USL= uterosacral ligaments; **B.** Micturition: the forward vector ‘S’ relaxes. Fast twitch vectors LP/LMA stretch open the posterior urethral wall acting against the insertion of USL in the cervix (CX); **C.** Detrusor underactivity graph. An EMG cylindrical electrode inserted into the posterior fornix of vagina records posterior muscle activity (LP/LMA). Note LP/LMA muscle activity preceding flow and repeated activity throughout flow

In essence, the urethra is an emptying tube, which, simplistically, is opened and closed by selective contraction and relaxation of 3 directional muscle forces⁽²³⁾. These contracts against suspensory ligaments, Figure 1⁽²⁴⁾. If USL is loose, the posterior muscles effectively lengthen and lose contractile force⁽²⁵⁾; the posterior urethral wall cannot be adequately opened out and the detrusor must contract against a smaller diameter tube. Because flow through a tube is exponentially determined, inversely by the 4th power of the radius (Poiseuille’s Law), even minor inability to open out the diameter of the urethra may increase the resistance to flow sufficiently to cause bladder emptying difficulties or UAB.

Pathogenesis of chronic pelvic pain cure of the 4th pillar of PFS, chronic pelvic pain of unknown origin is explained by the inability of loose USLs to support the

Frankenhauser and Sacral nerve plexuses. This concept was originally proposed by Heinrich Martius in the German literature in 1938⁽²⁶⁾.

Conclusions

We have shown that UAB and ‘obstructive micturition’ symptoms are identical with the emptying symptom component of the 4 PFS symptoms which are surgically curable by USL repair. Changing UAB definition to ‘bladder emptying difficulties’ is compatible with a ligament based management system. It will help relieve any confusion caused by the previous definition and provide hope for cure to women afflicted by this problem. ■

Conflict of interests: The authors declare no conflict of interests.

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