
Uterosacral injuries: a clinical classification.

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Some basic anatomy of the uterosacral ligaments and the reinterpretation of some common laparoscopic views are presented as an explanation for some forms of chronic pelvic pain.

Their role in the aetiology of post-hysterectomy urinary stress incontinence is also discussed in a short appendix.

Uterosacral ligaments:

1. In the standing position, the usual plane of the uterosacral ligaments is a few degrees behind vertical (Fig 1). They form the proximal link in the posterior axis of vaginal support consisting of the uterosacral ligaments-rectovaginal septum- perineal body. In association with the cardinal ligaments they suspend the lower genital tract. (Fig 2, Richardson, 1993)
2. Uterosacral ligaments contain a central neurovascular bundle with a nerve bundle that contains mixed nerve bundles from the hypogastric plexi (Fig 3, Campbell, 1950). Disruption of the uterosacral nerves leads to regenerative uterosacral reinnervation (Fig 4, Quinn, 2002, 2004)
3. Normal, nulliparous uterosacral ligaments form a smooth, symmetrical arch at the vaginal vault. They take origin from the middle three pieces of the sacrum and have variable insertions into the vagina and cervix (Fig 2, Umek, 2004)
4. The shape and form of uterosacral ligaments changes with vaginal delivery (asymmetrical scarring, atrophy, attenuation, avulsion) and with persistent straining (hyperplasia and hypertrophy); both are associated with chronic pelvic pain (Allen, 1955, 1971; Chatman, 1981; Chapron 2001).
5. Injuries to the uterosacral ligaments offer an anatomical spectrum of injuries (“defects”) that may be of clinical value in the evaluation of women with chronic pelvic pain and their response to treatment (MacDonald, 1999):

Grade 0	symmetrical, uterosacral arch	(Fig 2)
Grade 1	asymmetry of US ligaments	(a) with neovascularisation (b) with scarring (c) with atrophy
Grade 2	attenuation of US ligaments	(Fig 6)
Grade 3	avulsion of US ligaments	(a) left uterosacral (b) right uterosacral (c) bilateral uterosacral avulsion

6. Variations in associated anatomy of the round ligaments and pouch of Douglas are frequent in women with chronic pelvic pain:

- * Varices of the round ligament are a feature of persistent straining. (Fig 8)
- * Straw coloured fluid in the pouch of Douglas is a frequent accompaniment of uterosacral injury (Allen, 1955)
- * Neovascularisation of peritoneal and uterine surfaces is a frequent observation in women with prior difficult episodes and subsequent chronic pelvic pain.

References

- Allen WM, Masters WH.** Traumatic laceration of uterine support. *Am J Obstet Gynecol* 1955; 70:500-513.
- Allen WM.** Chronic pelvic congestion and pelvic pain. *Am J Obstet Gynecol* 1971;109:198-202.
- Campbell RM.**
The anatomy and histology of the sacrouterine ligaments. *Am J Obstet Gynecol* 1950; 59:1-12
- Chapron C, Fauconnier A, Dubuisson JB, Vieira M, Bonte H, Vacher-Lavenu M.**
Does deep endometriosis infiltrating the uterosacral ligaments present an asymmetric distribution ? *Brit J Obstet Gynaecol* 2001; 108: 1021-4
- Chatman DL.** Pelvic peritoneal defects and endometriosis: Allen-Masters syndrome revisited. *Fertil Steril* 1981; 36:751-6.
- MacDonald SR, Klock SC, Milad MP.** Long-term outcome of nonconservative surgery (hysterectomy) for endometriosis-associated pain in women <30 years old. *Am J Obstet Gynecol* 1999;180:1360-3.
- Quinn M, Kirk N.** Differences in uterine innervation at hysterectomy. *Am J Obstet Gynecol* 2002; 187:1515-20.
- Quinn M, Armstrong GR.** Cervical nerve fibre proliferation and genital prolapse. *J Obstet Gynaecol* 2004;24:714-5.
- Quinn M, Kirk N.** Uterosacral nerve fibre proliferation in parous endometriosis. *J Obstet Gynaecol* 2004; 24:189-90.
- Richardson AC.** The rectovaginal septum revisited: its relationship to rectocele and its importance in rectocele repair. *Clin Obstet Gynecol* 1993; 36:976-83.
- Umek WH, Morgan DM, Ashton-Miller JA, DeLancey JO.** Quantitative analysis of uterosacral ligament origin and insertion points by magnetic resonance imaging. *Obstet Gynecol.* 2004;103:447-51.



Fig 1 Normal pattern of uterosacral ligaments in an erect cadaver (Dr AC Richardson)

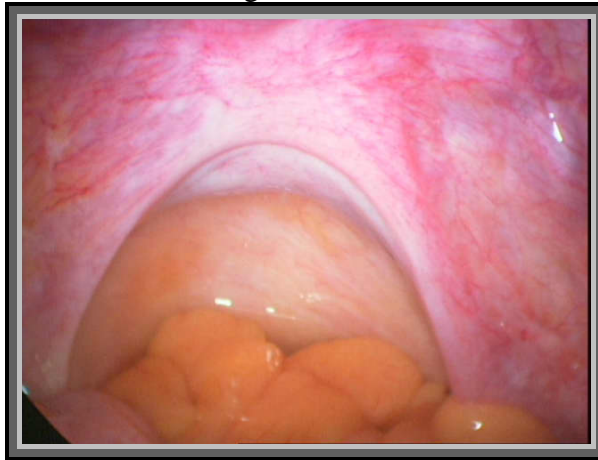


Fig 2 Normal, smooth, nulliparous uterosacral arch inserting into the vaginal vault

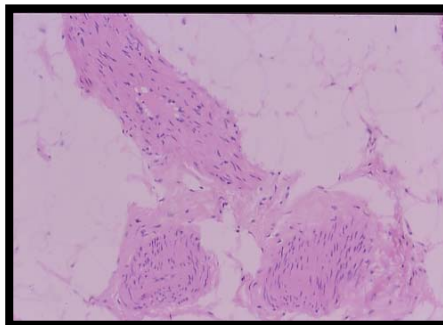


Fig 3 Normal uterosacral nerves in the central neurovascular bundle of the uterosacral ligaments

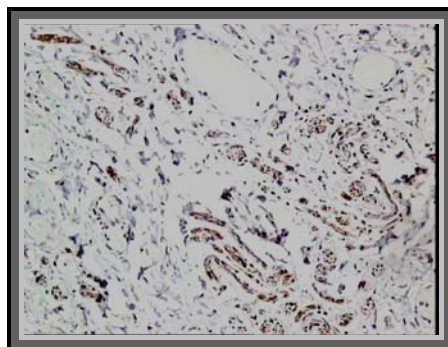


Fig 4 Regenerative uterosacral reinnervation in the central neurovascular bundle in CPP

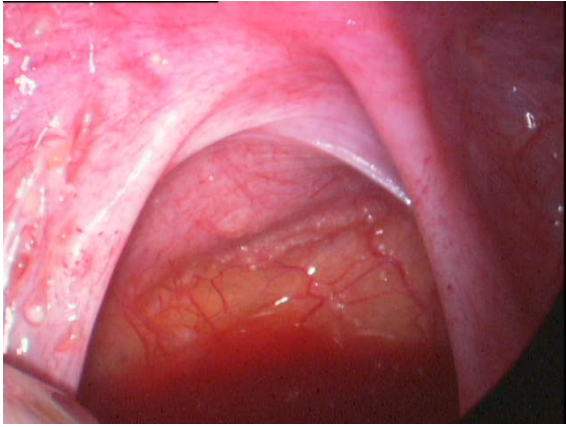


Fig 5a Injury to left uterosacral with scarring.

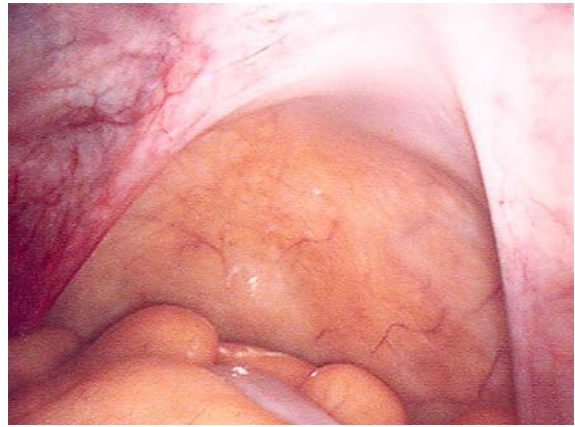


Fig 5b Injury to both uterosacral insertions with extensive scarring.



Fig 5c Injury to left uterosacral ligament with reattachment of scar tissue across the pouch of Douglas.

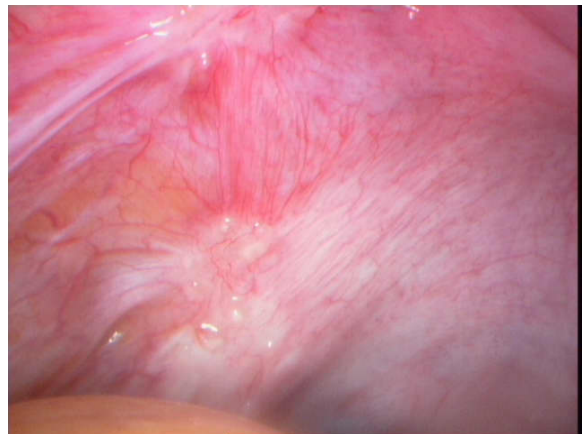


Fig 5d Detachment with scarring of the insertion of the left uterosacral ligament.

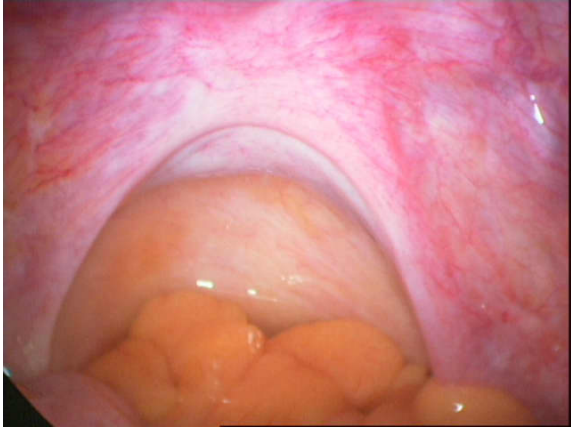


Fig 6a Normal uterosacral arch

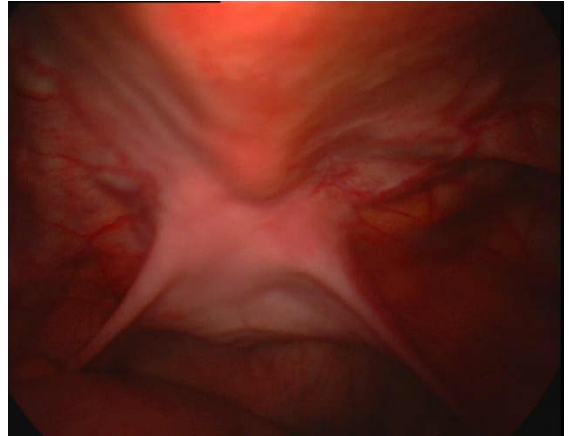


Fig 6b Symmetrical attenuation of uterosacral ligaments

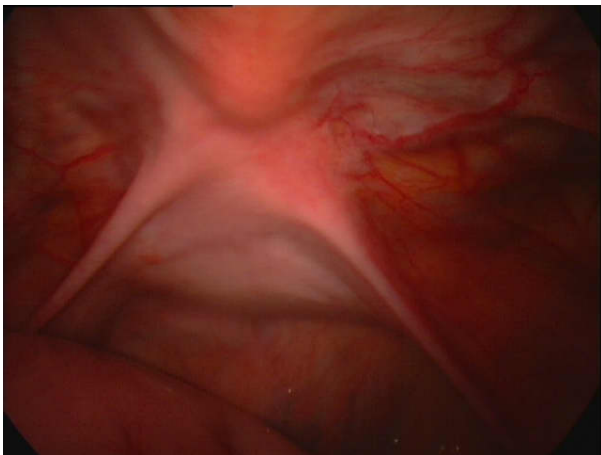


Fig 6c Asymmetrical attenuation of the uterosacral ligaments (?).

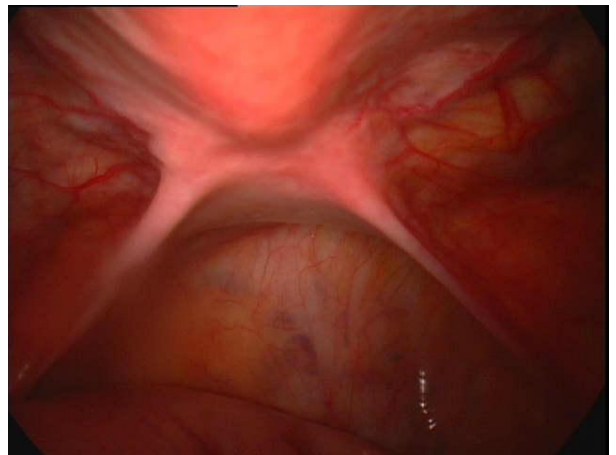


Fig 6d As 6b with minor "endometriosis" in the pouch of Douglas.

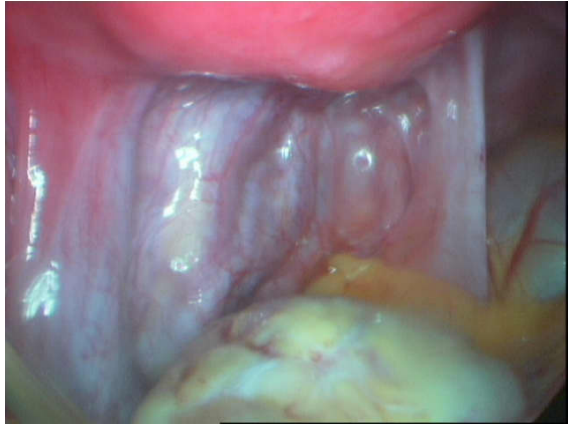


Fig 7a Avulsion of the left uterosacral ligament with varices.

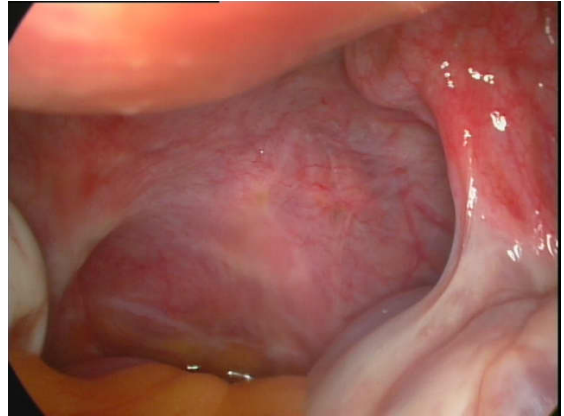


Fig 7b Avulsion of right uterosacral ligament with extensive scarring.

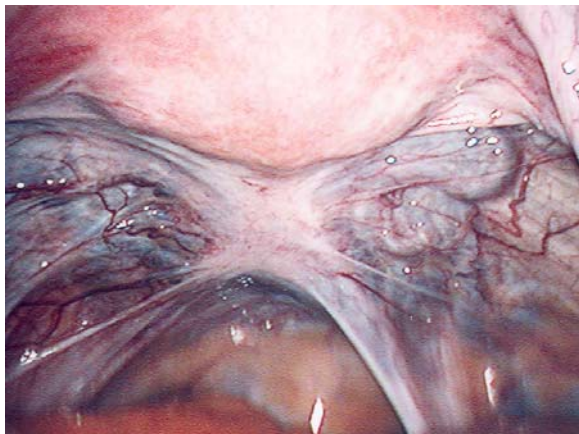


Fig 7c Avulsion of the left uterosacral ligament with:

- perforation of posterior uterine wall
- enlarge uterus
- extensive neovascularisation with pelvic varices
- attenuation of uterosacral ligaments
- marked uterine mobility

Fig 7d Bilateral avulsion of uterosacral ligaments

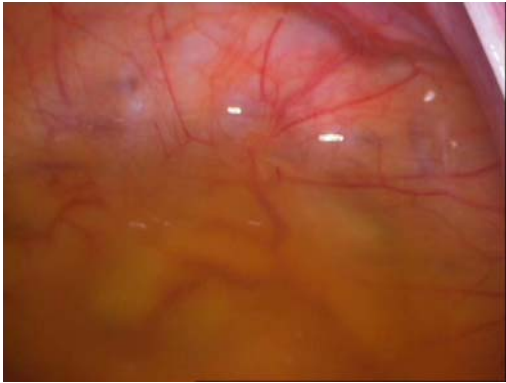


Fig 8a Straw coloured fluid in the pouch of Douglas (Allen, 1955)

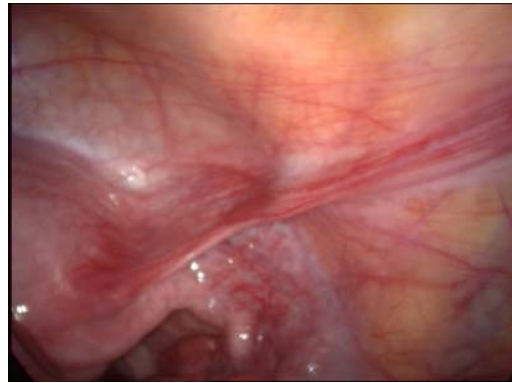


Fig 8b Round ligament varices in patients with persistent straining.



Fig 8c Uterine neovascularisation which also affects peritoneal surfaces.



Fig 8d Hypertrophy of uterosacral ligaments from persistent straining.



Fig 8e Obliteration of the pouch of Douglas in advanced endometriosis with hypertrophy of US ligaments in a young woman with sustained constipation through her teenage years.

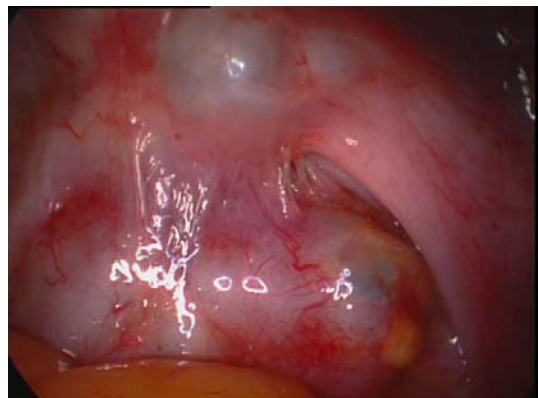


Fig 8f Nodular changes in the pouch of Douglas in association with hypertrophy of US ligaments. It is often said to be associated with “deep” endometriosis.

Post hysterectomy urinary incontinence

Hysterectomy is associated with an increased risk of subsequent incontinence (Brown, 2000). Both urinary stress incontinence and urinary urge incontinence contribute to the increased incidence of incontinence though their aetiology in this setting remains speculative.

Hysterectomy is frequently performed for menorrhagia, dysmenorrhoea and chronic pelvic pain – all of which may be associated with isthmic reinnervation (Quinn, 2002, Atwal, 2005). Concomitant neural injuries to the bladder have been reported in the bladder (Christmas, 1998) and sensory pelvic problems frequently coexist (Zondervan, 2000). Some proportion of cases of urinary urge incontinence may be associated with intramural nerve fibre proliferation from a “field effect” of vaginal delivery; others may arise from the process of hysterectomy itself e.g. where the bladder is reflected from the lower genital tract, causing injury to vesical nerves.

Urinary stress incontinence may also arise for a number of reasons – some of which are due to division of the uterosacral ligaments during the operation and impaired support of the vaginal vault as a consequence. In the panel below, Fig 1a demonstrates normal nulliparous support of the lower genital tract via the fascial supports underpinned by the levator ani. Vaginal delivery may create a range of injuries to the support of the lower genital tract including a central or paravaginal defects of the endopelvic supports (Fig 1b). Hysterectomy further undermines the support of the lower genital tract and changes the axis of support such that point A may be the pivot of support (Fig 1c). Further “wear and tear” from daily activities may progressively impair support to include the urethrovesical junction (Fig 1d). Dynamic ultrasound imaging conveys an unsupported bladder base, open vesical neck and severe incontinence on minor provocation.

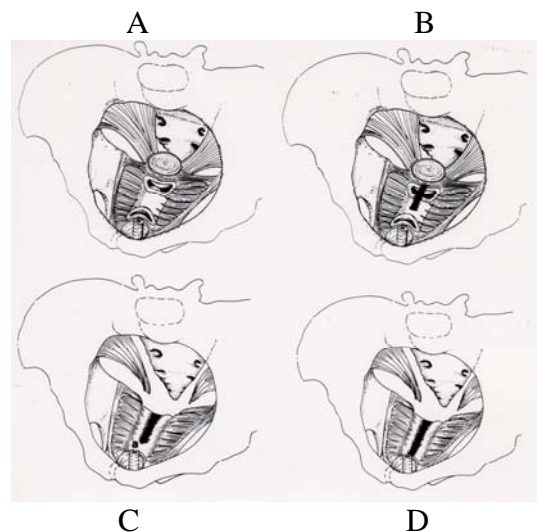


Fig 1

Progressive loss of support of the lower genital tract resulting in urinary stress incontinence following hysterectomy. These effects may be immediate or delayed by several years depending on the pre-existing support defects created by vaginal delivery (1b)

References

Brown JS, Sawaya G, Thom DH, Grady D

Hysterectomy and urinary incontinence: a systematic review. *Lancet*, 2000; 356:535-9.

Quinn M, Kirk N. Differences in uterine innervation at hysterectomy. *Am J Obstet Gynecol* 2002; 187:1515-20.

Atwal GSS, Duplessis D, Armstrong GR, Slade RJ, Quinn MJ. Uterine innervation after hysterectomy for chronic pelvic pain with, or without, endometriosis. *Am J Obstet Gynecol* 2005; 193:1658-1663.

Christmas TJ, Rode J, Chapple CR, Milroy EJG, Turner-Warwick RT. Nerve fibre proliferation in interstitial cystitis. *Virchows Archiv A Pathol Anat* 1990;416:447-451.

Zondervan KT, Yudkin PL, Vessey MP, Dawes MG, Barlow DH, Kennedy SH. Prevalence and incidence of chronic pelvic pain in primary care: evidence from a national general practice database. *Brit J Obstet Gynaecol* 1999; 106:1149-55.

Zondervan KT, Yudkin PL, Vessey MP, Dawes MG, Barlow DH, Kennedy SH. Patterns of diagnosis and referral in women consulting for chronic pelvic pain in UK primary care. *Brit J Obstet Gynaecol* 1999; 106:1156-61.