How is the lower urinary tract affected by gynaecological surgery?

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INTRODUCTION

Pelvic surgery is common in urology, gynaecology and colorectal surgery; inevitably, procedures by one discipline may give rise to symptoms or consultations in others. The anatomy of the pelvis dictates that the removal of one organ will have an effect on the neurological and vascular supply of another (Fig. 1) [1,2]. There is an increased awareness by patients that surgical procedures can result in an adverse outcome and patients are increasingly interested in the long-term effects of any intervention. A valid informed consent for anyone undergoing such a procedure requires a knowledge of the potential complications [3]. In this review we outline the evidence for urological manifestations after gynaecological procedures. Gynaecological surgery can be divided into hysterectomy for benign or malignant disease, ovarian surgery, repair of vaginal prolapse and incontinence surgery.

SIMPLE Hysterectomy

Since 1969, when Hanley first proposed that hysterectomy may have an effect on bladder function, there have been many anecdotal reports of a change in LUTS after the procedure. Large epidemiological studies addressed the relationship between hysterectomy, urinary incontinence and LUTS.

The estimated prevalence of incontinence in a Danish population of 3114 women who were sent a validated questionnaire was 17%. However, 63% had undergone a previous abdominal or pelvic procedure and incontinence was only mildly increased afterward. In another postal questionnaire study of 8622 women, loss of urine was reported in 17.1% of respondents who had undergone a previous hysterectomy, compared to only 7.9% of women who had not. However, in a random population of 1299 women questioned about LUTS there was no clear association between hysterectomy and incontinence, but a relationship between incontinence and menopausal status was suggested [4].

Although retrospective epidemiological studies include many patients they are open to several biases. It is difficult to draw firm conclusions from these studies, as they suggest that LUTS and incontinence may be related as much to age and menopausal status as to the intervention of hysterectomy.

Prospective longitudinal studies where LUTS are evaluated before and after hysterectomy with a questionnaire should help to eliminate bias. In 209 patients undergoing abdominal hysterectomy and supravaginal amputation, 10% had preoperative nocturia and dysuria, which was unchanged when assessed a year after surgery, suggesting little effect of surgery. In a separate study, 57% of women complained of LUTS before the procedure, which was significantly reduced by the intervention of hysterectomy [5,6], whereas an increase from 58% to 75% of patients with troublesome LUTS after hysterectomy was reported in another study [7]. Analysis of symptom questionnaires can be criticised because they are subjective; they depend on the reliability and validity of the questionnaire. There are many potential reasons to explain the discrepancy between different studies. Hysterectomy is a common operation and LUTS increase with age. The prevalence of both these conditions is high and may explain their apparent association. Common findings in patients after undergoing hysterectomy are haematoma, oedema and minor trauma to the bladder or urethra, possibly explaining the short duration of symptoms. Patients may often associate the onset of LUTS with the hysterectomy, as they remember a specific event such as an operation.

Urodynamics have been used to evaluate LUTS before and after hysterectomy. From a cohort of 387 women, 67 with a history of hysterectomy and 67 who had not had an operation had video-urodynamics, and their abdominal leak-point pressures were measured. Intrinsic sphincter deficiency was twice as common in those who had had a hysterectomy than in the controls; the authors suggested that disruption of autonomic pathways could affect urethrovaginal function and contribute to these findings [8]. In contrast, there were no changes in bladder compliance or urethral pressure in a study of 26 women undergoing hysterectomy and video-urodynamics at 6 weeks and 6 months after surgery [9].

In essence, it is difficult to make firm conclusions about the effect of a simple hysterectomy on LUTS with so much conflicting data. The case remains to be effectively confirmed that any deterioration in lower urinary tract function can be attributed to hysterectomy. Similarly, there is no evidence of a positive benefit on LUTS after hysterectomy.

RADICAL Hysterectomy

Radical hysterectomy for cervical cancer involves more extensive dissection within the pelvis, which could lead to greater neurovascular disruption. One large case series suggested that 21% of patients who had had a radical hysterectomy had some degree of bladder dysfunction 3 months afterward [10]. Long-term data were assessed with a questionnaire 10 years after women had undergone their primary surgery, where seven of nine patients complained of obstructive voiding symptoms [11]. Again, case series lack validity in terms of determining the true effect of an intervention. In another study using urodynamics it was...
shown that after radical hysterectomy there was a significant reduction in detrusor contractility and an increase in abdominal straining to empty the bladder. The same authors assessed patients after simple hysterectomy and these abnormalities were absent. They concluded that surgical injury during radical surgery partly damages the neural innervation of the bladder [12]. The autonomic nerves leading to the bladder can be identified during surgery in the vesicouterine ligament, using electrical stimulation. By adopting this new technique and protecting the nerves during operative dissection, the authors were able to improve bladder emptying characteristics and improve bladder function afterward [13]. Patients undergoing radical hysterectomy should be warned of a probable alteration in LUTS, but further improvements in surgical technique may alter outcome.

OVARIAN SURGERY

Oophorectomy, whether for benign or malignant disease, is unlikely to interfere directly with the neurological and vascular supply to the bladder, but removing ovarian tissue with the subsequent lack of oestrogen in postmenopausal women has been identified as a potential cause of incontinence in a large epidemiological study [5].

A meta-analysis of the effects of oestrogen on incontinence revealed that oestrogen supplementation subjectively improved incontinence in postmenopausal women, but there was no evidence of an objective improvement [14].

Several laboratory studies have identified potential mechanisms where a change in hormonal status could affect urethrovessical function. Oestrogen receptors are not found on the transitional epithelium of the bladder. However, oestrogens have been shown to have a direct effect on detrusor function through modifications in the muscarinic receptor. The density of muscarinic receptors was increased in rat detrusor muscle when treated with oestrogens. Urethral pressure profilometry studies clearly documented an interaction between oestrogens and α-adrenergic receptors in the urethral sphincter that help to maintain its muscular tone. The sensory threshold of the bladder may be raised by oestrogen supplementation. Animal studies show that oophorectomy alters the pressure-flow characteristics of micturition in the female rat. Whether a similar response is seen in humans has not been proven [15].

PROLAPSE

The interaction between prolapse and bladder dysfunction is complicated because some women only complain of incontinence after surgery to correct prolapse, or conversely only have symptomatic prolapse after continence surgery. It is well documented that occult stress urinary incontinence can occur in up to 65% of women with prolapse beyond the introitus. It is imperative in evaluating stress incontinence that methods to reduce prolapse are used. When this policy is adopted a good
incontinence outcome can be predicted in patients having prolapse surgery [16]. In a study of 80 women with genital prolapse, pressure-flow video-urodynamics were used to assess voiding dysfunction. Voiding difficulty, BOD, detrusor instability and urethral hypermobility are associated with prolapse, but impaired detrusor contractility and intrinsic sphincter deficiency are not [17]. Urinary urgency and urge incontinence are common in patients with ureterovaginal prolapse, with up to 40–50% of patients having detrusor instability before repair. After sacrocervopexy there was a decrease in urinary frequency but no change in urge incontinence or detrusor instability. The resolution of urge incontinence after prolapse repair has been quantified; uninhibited detrusor contractions of <25 cmH₂O during cystometry, and bladder trabeculation, were each independent predictors of the improvement in urge incontinence after prolapse repair [18].

An accurate preoperative evaluation and an awareness that the repair of prolapse may only improve detrusor instability in about half of patients are important considerations in this surgery. The accurate prediction of how prolapse surgery will alter voiding function is difficult, as most studies have included few patients and been largely retrospective.

INCONTINENCE SURGERY

In a large systematic review [19] assessing outcomes from incontinence procedures from a wide selection of published reports, the outcome from all procedures was similar for urgency. If urgency and detrusor instability were present before surgery there was a significant risk of them persisting afterward. If either is absent the risk of urgency after surgery is less. The authors were unable to give accurate statistical statements about these tendencies because of the small total sample sizes reported [19]. In a study of 88 women who underwent colposuspension (44 with urodynamically stable bladders and 44 with detrusor overactivity) the success rate after 2 years using subjective dryness and a negative stress test as outcome measures was 95% and 75% for the stable bladder and detrusor overactivity, respectively. This suggests that although a preoperative diagnosis of bladder instability is associated with a poorer outcome it should not exclude the patient from surgery [20]. When pubovaginal sling surgery is assessed it is clearly of great benefit in stress incontinence, but in a series of 42 patients where 74% reported an improvement in continence, postoperative urge incontinence was the single most important factor affecting patient satisfaction. In another study of 85 patients, symptomatic control was achieved in 97% but only 66 were satisfied with the surgical result, mainly because of persistent urge syndrome in 27. This effect of de novo urgency is thought to be related to an incompetent bladder neck mechanism. Bladder neck denervation results in the inability to close the bladder neck, causing urine pooling in the urethra and giving rise to these troublesome symptoms [21].

The tension-free vaginal tape (TVT) procedure has been popularized for surgically managing stress incontinence, and is used frequently by gynaecologists and urologists. In terms of outcome it is estimated that de novo detrusor instability arises in 18% of patients after TVT, compared with 8–16% of those undergoing Burch colposuspension and 3–11% of those with a pubovaginal sling. However, in a study which specifically assessed the improvement in urge incontinence after TVT, it was determined that at 1 year there was a 30% subjective improvement in this variable after surgery [22]. The effect of incontinence surgery is of great benefit in stress incontinence and in some patients can improve urge incontinence, but the occurrence of de-novo urge can severely limit satisfaction and the patient must be counselled about this before surgery.

SUMMARY

Many subjective reports have suggested that gynaecological surgery can produce LUTS. Soon after simple hysterectomy changes in voiding are common, but there is no firm evidence that long-term bladder dysfunction is the rule. Radical hysterectomy is more likely to cause prolonged symptoms. The changes after ovarian surgery are related to a change in the hormonal status and its effect on bladder function rather than a neural or vascular phenomenon. Prolapse and incontinence surgery by their very nature will cause a change in voiding function which is well recognized but unpredictable in its pattern. Patients should be warned of a possible change in voiding function at the time of consent, but a change in LUTS should not be deemed as a surgical failure after gynaecological surgery.

CONFLICT OF INTEREST

None declared.

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Abbreviations: TVT, tension-free vaginal tape.