Evidence-based practice in urogynaecology

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Urogynaecology practice is rapidly progressing, with a trend towards minimally invasive techniques. This article attempts to cover the evidence behind the assessment and treatment of urinary and anal incontinence, and vaginal prolapse.

Urinary incontinence and genital prolapse are common conditions; urinary incontinence affects up to 35% of women and genital prolapse affects approximately 50% of parous women, although only 10–20% of women seek treatment for their symptoms (Beck, 1983; MacLennan et al, 2000). Both urinary and faecal incontinence occur more commonly in women, even in the nulliparous, than in men (MacLennan et al, 2000). Overall, the prevalence of urinary incontinence is higher in women than in men by 2:1, and the prevalence of anal incontinence in women compared with in men is 3:2 (Hunskaar et al, 2002; Norton et al, 2002a).

RISK FACTORS

There has been much debate about the relationship between the type of delivery and the development of incontinence and pelvic floor prolapse. A large, cross-sectional, representative survey of a non-institutionalized community found that there was an increased risk of pelvic floor dysfunction (defined as incontinence, symptoms of prolapse or previous pelvic floor surgery) after any pregnancy of more than 20 weeks' gestation, despite the mode of delivery (MacLennan et al, 2000). The difference in the relative risk between caesarean section and spontaneous vaginal delivery was not significant, but there was an increased relative risk with an instrumental delivery compared with a caesarean section. Further clarification is required before caesarean section delivery can be offered to protect the pelvic floor.

Studies of women presenting for surgical management of pelvic floor dysfunction have found that these women tend to be older, postmenopausal, parous, overweight, current or ex-smokers and have a history of chronic lung disease. However, there are large numbers of women who do not seek treatment for prolapse, and the true incidence of pelvic floor dysfunction is unknown (Olsen et al, 1997).

ASSESSMENT

The history from a patient with urinary symptoms often correlates poorly with urodynamic results, probably because our understanding of the aetiology of symptoms such as urgency is unclear. However, greater emphasis is placed on the impact of a treatment on a patient's quality of life, rather than considering the cure of a single symptom, such as stress incontinence.

There is little standardization in examination in urogynaecology. The Pelvic Organ Prolapse-Quantification (POP-Q) (Bump et al, 1996) is a standardized examination using specific measures of the anterior and posterior vaginal walls, vault or cervical descent. This seems to produce consistent examination findings (Hall et al, 1996) but it is mainly a research tool at present. Further research is needed to determine whether examination position, time of day or menstrual cycle influence the examination findings.

INVESTIGATIONS

A century ago urogynaecology was largely a surgical specialty. The recognition of the importance of function as well as form has led to the investigation of lower urinary and gastrointestinal tract function with urodynamics and anorectal studies in order to differentiate patients whose symptoms are caused by anatomical derangement from those whose bladder and bowel function are abnormal. The value of these investigations is a source of much debate.

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Urodynamics gives information on:

- Bladder function, including the presence of detrusor overactivity
- Voiding function
- Urethral occlusive forces.

As preoperative detrusor overactivity is associated with a poorer outcome from bladder neck surgery, it is widely believed that urodynamics should be performed in these patients before surgery for stress incontinence is considered (Colombo et al, 1996).

Poor detrusor contractility during voiding preoperatively has been shown to be associated with a higher risk of postoperative voiding problems. Therefore, voiding studies may provide useful information for preoperative counselling of patients about the risks of surgery (Lose et al, 1987). However, other studies have not supported the role of pressure flow studies for predicting postoperative voiding difficulties (Kobak et al, 2001).

There is conflicting evidence about the value of measuring urethral occlusive forces. It is suggested that in women <50 years of age, a maximum urethral closure pressure of <20 cm of water is associated with a three times higher risk of surgical failure (Sand et al, 1987).

Anorectal studies are discussed later in this article.

URINARY INCONTINENCE

The International Continence Society defines urinary incontinence as:

> **'the complaint of any involuntary leakage of urine'.**

It can also be further described by the:

> **'type, frequency, severity, precipitating factors, social impact, effect on hygiene and quality of life, the measures used to contain the leakage, and whether or not the individual seeks or desires help because of the urinary incontinence' (Abrams et al, 2002).**

The most common type of urinary incontinence in women is stress incontinence. The term stress incontinence is both a symptom and a sign. In urodynamics, stress incontinence is seen as an involuntary loss of urine during increased abdominal pressure in the absence of a detrusor contraction. This is now termed 'urodynamic stress incontinence', which was previously known as 'genuine stress incontinence' (Abrams et al, 2002).

Detrusor overactivity incontinence is defined as incontinence resulting from an involuntary detrusor contraction during the filling phase. The cause of detrusor overactivity may be secondary to a neurological condition, such as multiple sclerosis, and is then termed 'neurogenic detrusor overactivity'. When there is no clear cause for the overactivity, it is termed 'idiopathic detrusor overactivity', which was previously referred to as 'detrusor instability' (Abrams et al, 2002). Mixed incontinence is a mixed picture of urodynamic stress incontinence and detrusor overactivity.

Other causes of incontinence include the chronic retention of urine, the presence of a fistula secondary to delivery, surgery or radiotherapy, congenital abnormalities of the urinary tract and urethral diverticulum.

Conservative management of urinary incontinence

The management of urinary incontinence should begin with lifestyle interventions, such as weight loss in the obese, treatment of constipation and straining, and smoking cessation. Also, the treatment of respiratory conditions that cause chronic coughing, caffeine reduction and appropriate fluid intake (normal water intake should be encouraged) may be helpful. Some medications such as alpha-adrenoreceptor antagonists (e.g. prazosin) can cause incontinence, and these need to be changed to another family of drug (Wilson, 2002).

Pelvic floor muscle training has been shown to be an effective treatment in women with stress incontinence and mixed incontinence (Nygaard et al, 1996; Bo et al, 1999). There have been few adverse events reported, and all of these were reversible. Biofeedback consists of any process where an external sensor is used to give an indication on bodily processes (Schwartz and Beatty, 1977). For the treatment of urinary incontinence this may consist of devices which measure urethral or vaginal squeeze pressure, vaginal and anal surface electromyography or weighted vaginal cones (Bo, 2002). Biofeedback should be considered as part of the physiotherapists' armamentarium and should not be used in isolation. There is little good evidence to support the use of biofeedback, however, the use of electrical stimulation may offer benefit for those women who are unable to voluntarily contract their pelvic floor muscles (Hay-Smith et al, 2002).

Bladder retraining comes in a variety of protocols. It has been used in the treatment of stress, mixed and urge incontinence. Bladder retraining has been shown to be more effective than no treatment, although there is insufficient evidence on whether it is more effective than drug treatment alone, or if it is more effective

when used in combination with medication (Roe et al, 2002). Generally, bladder retraining involves an initial voiding interval of 1 hour (or less depending on the woman's previous voiding pattern) during the day, which is then gradually increased by 15–30 minutes each week. The aim is to achieve a voiding pattern of 2–3-hourly voids. Pelvic floor muscle training may also be taught to help extend the voiding periods (Wilson, 2002).

There is no evidence that urodynamic studies should be performed before these conservative managements are introduced. The conservative treatment of urinary incontinence should be used in conjunction with other measures, such as incontinence pants and pads, devices that support the bladder neck, devices that occlude the bladder neck and intraurethral devices (Anders, 2002).

Medical management of urinary incontinence

There are numerous drugs used in the treatment of the overactive bladder, although most have not been evaluated in randomized, controlled trials and much of our information is based on initial open trials. In many of the trials of medications for detrusor overactivity there is a high placebo response, and there have been difficulties demonstrating the differences between the drug and the placebo (Andersson et al, 2002).

The most common drugs used in the treatment of the overactive bladder are oxybutynin and tolterodine. They both have antimuscarinic effects that increase the volume at which the first detrusor contraction occurs and decrease the amplitude of the contraction. Oxybutynin also has a direct muscle-relaxant effect (Andersson et al, 1999).

Oxybutynin has been shown to be effective in controlling detrusor hyperactivity compared with placebo for patients with an overactive bladder (Moisey et al, 1980). However, the high incidence of side effects in up to 76% of users, of which dry mouth is the most common, results in a low level of compliance (Baigrie et al, 1988).

Tolterodine appears to show selectivity for bladder receptors over the salivary glands, resulting in a lower incidence of dry mouth. It has been shown to result in a reduction in urinary frequency and a reduction in the number of incontinence episodes. Compared with oxybutynin, tolterodine seems to have a better tolerability profile (Abrams et al, 1998).

Alpha-adrenergic agonists have been used for the treatment of stress incontinence because they cause an increase in urethral tone. However, side effects include hypertension, headache, dizziness, insomnia and confusion (Andersson et al, 1999).

Oestrogen therapy alone has not been shown to be of benefit to clinical or quality-of-life variables for women with incontinence (Fantl et al, 1996).

Duloxotine is being developed for the treatment of stress incontinence. It has been shown to increase the neural activity of the urethral sphincter and increase bladder capacity in animal studies, and is currently undergoing clinical trials. So far, it seems to improve objective measures of incontinence and quality of life (Andersson et al, 1999).

Nocturnal enuresis is the complaint of loss of urine occurring during sleep (Abrams et al, 2002). It is not usually considered a problem until after the age of 5 years. Treatment involves behavioural therapy, which may include an enuresis alarm, in combination with antidiuretic agents (e.g. desmopressin). Serum sodium levels must be monitored initially with these agents (Andersson et al, 2002).

Surgical management of urinary incontinence

Anterior vaginal repair is no longer considered to be an appropriate treatment for stress incontinence. Anterior repair has been shown to be less effective than open abdominal retropubic suspension, with higher failure rates and an increased need for repeat operations (Glazener and Cooper, 2002a).

Since the second half of the last century, there has been a move to a suprapubic approach to stress incontinence surgery. The Burch colposuspension is considered to be the gold standard for the treatment of stress incontinence, with a long-term success rate of 70–80% over 5–10 years (Alaclay et al, 1995). However, postoperative complications of de novo detrusor overactivity, voiding dysfunction and prolapse are not uncommon, and <50% of women will have no complication after the procedure (Galloway et al, 1987).

Minimally invasive techniques have been developed such as the Stamey or Pereya bladder-neck needle-suspension procedures. However, these procedures have been found not to be as effective as the open abdominal retropubic suspension, and probably have a failure rate similar to that of anterior repair (Glazener and Cooper, 2002b).

Laparoscopic colposuspension and tension-free vaginal tape were developed as minimally invasive forms of the Burch colposuspension and

the sling procedure. Laparoscopic colposuspension was first described by Vancaillie and Schuessler in 1991. It was initially reported to have a lower success rate than the open procedure, although there has been a lack of standardization in some of the randomized studies. In other trials, where both the open and laparoscopic procedures used the same type and number of sutures, the short-term follow-up success rates were similar (Carey et al, 2000; Fatthy et al, 2001). There is still conflicting evidence for the long-term effectiveness of laparoscopic colposuspension; however, a large, multicentre, randomized clinical trial is currently in progress in the UK (Reid and Smith, 2002).

Tension-free vaginal tape is a suburethral sling of Prolene (Gynecare, Ethicon, Somerville, USA) mesh supporting the mid-urethra. Two-year follow-up data show a cure rate of 80%, and a randomized trial comparing tension-free vaginal tape with colposuspension suggests that the two procedures have similar success rates (Moran et al, 2000; Ward et al, 2000).

Transurethral injection of bulking agents, such as collagen, Teflon (DuPont, Wilmington, USA), fat and Macroplastique (Uroplasty, Geleen, The Netherlands), have been used for the treatment of stress incontinence. The objective cure rates are initially 61% after 3 months, although rates decline to approximately 48% after 2 years. The advantage of the procedure is that it can be performed on an outpatient basis under local anaesthesia. It has been suggested that the use of bulking agents is more successful in women with intrinsic sphincter deficiency; however, the evidence is flawed by selection bias and lack of numbers (Smith et al, 2002).

Surgical interventions for urgency and urge incontinence may be considered for refractory cases. Hydrodistension has not been shown to have any long-term benefit. Enterocystoplasty or bladder augmentation, using bowel segments, and detrusor myomectomy or autoaugmentation both aim to decrease filling pressures and increase filling capacity. Urinary diversion may also be considered as a last resort (Smith et al, 2002). None of these procedures have been assessed by controlled trials.

PELVIC FLOOR PROLAPSE

Over the last century there has been considerable debate about the relative importance of the muscular and fascial support components in the pelvis. This question has not been resolved, but in all likelihood both components are important for normal anatomy and function.

Conservative management

Pessaries have been used for many years for the treatment of pelvic floor prolapse. They tend to be used in women who are unfit for surgery, decline surgery or are considering future childbearing. Pessaries come in a variety of types, although the most commonly used are the ring pessary and shelf pessary. They are easy to insert and are safe as long as they are changed regularly (Thakar and Stanton, 2002). Optimal change routines and adjuvant hormone replacement have not been studied. No prospective studies have been performed to evaluate the role of pessaries in women presenting with a primary symptom of prolapse.

Surgical management of prolapse

Overall, there is an 11.1% cumulative incidence of surgery for prolapse and incontinence by the age of 80 years. Reoperation for recurrent prolapse and incontinence is common (29.2%) (Olsen et al, 1997). Surgery should aim to restore the normal anatomy and relieve symptoms. Surgery for prolapse has undergone little rigorous scrutiny over the past 100 years.

UTEROVAGINAL AND VAULT PROLAPSE

The current conventional surgical treatment of uterovaginal prolapse is a vaginal hysterectomy with pelvic floor repair. The Manchester repair (Shaw, 1954) developed 80 years ago to enable the uterus to be preserved is now less popular. There are no trials comparing uterine conservation with hysterectomy for the treatment of prolapse.

The most common procedure for prolapse at present is a vaginal hysterectomy with anterior and/or posterior vaginal repair. Long-term studies indicate a high rate of recurrent vault prolapse (95.7%) in women for whom this procedure is performed for severe genital prolapse (Marana et al, 1999). There are a number of different procedures that have been described to suspend the vaginal vault following hysterectomy for prolapse (e.g. McCall culdeplasty, prophylactic sacrospinous fixation), but there are no robust studies comparing the procedures.

Procedures for upper genital tract (uterovaginal) prolapse or vault prolapse can be performed via the vaginal or abdominal route. A randomized trial comparing these techniques concluded that surgical effectiveness was more likely with the abdominal approach compared with the vaginal approach (58% *vs* 29%) (Benson et al, 1996). The vaginal length tends

to be better maintained with an abdominal approach when compared with posterior culdeplasty or sacrospinous fixation (Given et al, 1993).

The McCall culdeplasty procedure tends to shorten the vagina and can result in difficulties with intercourse. Iliococcygeal fixation has been compared with sacrospinous ligament fixation in a case-control study, and the procedures were comparable in terms of patient satisfaction and recurrence rates after <2 years' follow-up (Maher et al, 2001). Sacrospinous fixation has been extensively reported in case series, with success rates ranging from 63–97% (Brubaker et al, 2002).

ANTERIOR VAGINAL PROLAPSE

Loss of anterior vaginal wall support can be addressed either by reattachment of pubocervical fascia to the pelvic side wall on either side, which is the paravaginal repair, first described by White in 1909, or by central plication of fascia as described by Kelly in 1913. The vaginal approach is most commonly used. There is a wide variation in the techniques used, and failure rates are reported at 0–20% (Weber and Walters, 1997). There are no controlled studies comparing the central plication technique with paravaginal repair (Weber and Walters, 1997). The effect on urinary function has not been fully evaluated. However, anterior vaginal repair is not an appropriate procedure for urinary stress incontinence.

POSTERIOR VAGINAL PROLAPSE

Posterior vaginal defects are usually repaired vaginally. However, there is little evidence to support using the vaginal passage for the correction of bowel dysfunction. Conventional techniques for the correction of the vaginal defect may not improve and may actually worsen bowel and sexual function (Kahn and Stanton, 1997). Techniques that aim to repair discrete fascial defects have been reported in case series and may achieve anatomical correction with less incidence of postoperative dyspareunia (Cundiff et al, 1998).

FAECAL AND ANAL INCONTINENCE

Faecal incontinence has been defined as:

> **'the involuntary passage of faeces'**

and anal incontinence as the:

> **'involuntary loss of flatus, liquid or solid stool that is a social or hygienic problem' (Royal College of Physicians, 1995; Norton et al, 2002b).**

The prevalence of faecal and anal incontinence is difficult to assess, as many women will not volunteer this symptom and are more likely to admit to incontinence if asked on an impersonal questionnaire than if asked directly (Khullar et al, 1998). In the general population of women, it is estimated that 10.9% will have incontinence of flatus and 3.5% will have incontinence of faeces (MacLennan et al, 2000).

Obstetric trauma, especially third-degree tears and instrumental delivery, are risk factors for faecal incontinence, at least in the short term (MacArthur et al, 2001). However, it must be remembered that sphincter damage is not the only factor in faecal incontinence. Bowel function must also be considered, and factors such as stool consistency, gut motility, the mucosal seal of the anal canal, rectal compliance, and psychological and lifestyle issues are important. Neurological causes and functional factors (such as immobility) may also need to be considered (Norton et al, 2002a).

Investigations can include symptom diaries and digital examination to assess resting and squeeze pressures. Endoanal ultrasound assesses structural damage to the internal and external anal sphincters. Anorectal manometry defines functional weakness of the sphincters, and when used in conjunction with endoanal ultrasound may be useful to predict the response to biofeedback training. Rectal and anal sensory testing may identify patients with afferent nerve injury as a cause of incontinence. A defaecating proctogram may be helpful if rectal prolapse is suspected as contributing to the incontinence. Most of these studies have only been evaluated using an uncontrolled protocol, and there is little conclusive evidence that these studies improve the outcome from treatment.

Measurement of the pudendal nerve latency has a poor correlation with clinical symptoms, and cannot be recommended for the evaluation of faecal incontinence. If there is a recent change in bowel habit, a colonoscopy may be considered (American Gastroenterological Association, 1999).

Conservative treatment can involve behavioural and muscle retraining with biofeedback or medication. Biofeedback is used to describe many different therapies, including improving the voluntary response of the external anal sphincter to progressively smaller volumes of a rectal balloon, strength training of the external sphincter and electrical stimulation via anal or vaginal routes. For those women who mainly have incontinence with a loose stool, loperamide may be helpful to firm the stool and improve incontinence (Cook and Mortensen, 1998).

There is little strong evidence of the effectiveness of conservative treatments because of the lack of randomized trials. However, there is some evidence that anal biofeedback is superior to vaginal biofeedback, and electrical stimulation may improve the effectiveness of exercises. There is also some evidence that training to enhance rectal discrimination of sensation may be helpful in reducing faecal incontinence, at least in the short term (Norton et al, 2002b).

Surgical management can include sphincter repair for those with a disruption of the anal sphincter. Results have shown a 50% symptom improvement rate at 5 years; however, no patient was completely continent, many have residual symptoms and some develop new evacuation disorders (Malouf et al, 2000). More recent approaches have included the creation of a neosphincter from the gracilis muscle of the inner thigh, or the use of an artificial sphincter. Stimulation of the sacral nerves with an implantable pacemaker has also shown some success. Colostomy may also be considered for women with refractory incontinence (Norton et al, 2002a).

There are no studies comparing the effectiveness of conservative and surgical treatments, nor any convincing evidence that one surgical procedure is superior to another (Bachoo et al, 2002). However, conservative therapies are unlikely to do any irreversible harm (Norton et al, 2002b).

CONCLUSION

Incontinence and vaginal prolapse are common conditions, although the true incidence is unknown. The relationship between anatomy and function is not fully understood and restoration of normal anatomy will not necessarily result in normal function, including continence.

Urodynamic and anorectal investigations have limitations, but should be preformed before surgical interventions are considered. Conservative management, lifestyle alterations and physiotherapy are unlikely to do any harm and should be trialled initially. Surgical interventions have variable success rates and may produce high rates of complications. Further research is required into all these aspects of care. **HM**

KEY POINTS

- Our knowledge of pelvic floor function is still evolving, although it is evident that attempting to repair the anatomy alone does not provide a good functional result.
- The bladder is an 'unreliable witness', and although urodynamic studies have their limitations, they should be performed before any surgery for incontinence.
- The Burch colposuspension remains the gold standard surgical procedure for stress incontinence; however, there is growing evidence that the tension-free vaginal tape can be as effective, with lower morbidity rates.
- Surgical procedures for prolapse come with a high risk of recurrence, and further evaluation of these techniques is required.

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Abrams P, Freeman R, Anderstrom C, Mattiasson A (1998) Tolterodine, a new antimuscarinic agent: as effective but better tolerated than oxybutynin in patients with an overactive bladder. *Br J Urol* **81**: 801–10

Abrams P, Cardozo L, Fall M et al (2002) The standardization of terminology of lower urinary tract function: report from the Standardization Subcommittee of the International Continence Society. *Am J Obstet Gynecol* **187**: 116–26

Alaclay M, Monga A, Stanton SL (1995) Burch colposuspension: a 10–20-year follow-up. *Br J Obstet Gynaecol* **102**: 740–5

American Gastroenterological Association (1999) American Gastroenterological Association medical position statement on anorectal testing techniques. *Gastroenterology* **116**: 732–60

Anders K (2002) Non-medical management of incontinence. In: MacLean AB, Cardozo L, eds. *Incontinence in Women*. RCOG Press, London: 224–48

Andersson K-E, Appell R, Cardozo LD et al (1999) The pharmacological treatment of urinary incontinence. *Br J Urol Int* **84**: 923–47

Andersson K-E, Appell R, Awad S et al (2002) Pharmacological treatment of urinary incontinence. In: Abrahams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*. Health Publication Ltd, Plymouth: 479–511

Bachoo P, Brazzelli M, Grant A (2002) Surgery for faecal incontinence in adults (Cochrane review). In: *The Cochrane Library*. Issue 2. Update Software, Oxford

Baigrie RJ, Kelleher JP, Fawcett DP, Pengelly AW (1988) Oxybutynin: is it safe? *Br J Urol* **62**: 319–22

Beck RP (1983) Pelvic relaxational prolapse. In: Kase NG, Weingold AB, eds. *Principles and Practice of Clinical Gynecology.* John Wiley and Sons, New York: 677–85

Benson JT, Lucente MD, McClellan E (1996) Vaginal versus abdominal reconstructive surgery for the treatment of pelvic support defects: a prospective randomized study with long-term outcome evaluation. *Am J Obstet Gynecol* **175**: 1418–22

Bo K (2002) Physiotherapeutic techniques. In: Maclean AB, Cardozo L, eds. *Incontinence in Women.* RCOG Press, London: 256–71

Bo K, Talseth T, Holme I (1999) Single, blind, randomized controlled trial of pelvic floor exercises, electrical stimulation, vaginal cones, and no treatment in the management of genuine stress incontinence in women. *Br Med J* **318**: 487–93

Brubaker L, Bump R, Jacquetin B et al (2002) Pelvic organ prolapse. In: Abrahams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*. Health Publication Ltd, Plymouth: 243–65

Bump RC, Mattiasson A, Bo K et al (1996) The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am J Obstet Gynecol* **175**: 10–17

Carey M, Rosamilia A, Maher C et al (2000) Laparoscopic versus open colposuspension: a prospective, multicentre, randomized, single-blind trial. *Neurourol Urodynam* **19**: 389–90

Colombo M, Zanetta G, Vitobello D, Milani R (1996) The Burch colposuspension for women with and without detrusor overactivity. *Br J Obstet Gynaecol* **103**: 255–60

Cook TA, Mortensen NJMcC (1998) Management of faecal incontinence following obstetric injury. *Br J Surg* **85**: 293–9

Cundiff GW, Weidner AC, Visco AG, Addison WA, Bump

RC (1998) An anatomic and functional assessment of the discrete defect rectocele repair. *Am J Obstet Gynecol* **179**: 1451–7
Fantl JA, Bump RC, Robinson D, McClish DK, Wyman JF (1996) Efficacy of estrogen supplementation in the treatment of urinary incontinence. The Continence Program for Women Research Group. *Obstet Gynecol* **88**: 745–9
Fatthy H, El Hao M, Samaha I, Abdallah K (2001) Modified Burch colposuspension: laparoscopy versus laparotomy. *J Am Assoc Gynaecol Laparosc* **8**: 99–106
Galloway NT, Davies N, Stephenson TP (1987) The complications of colposuspension. *Br J Urol* **60**: 122–4
Given FT Jr, Muhlendorf IK, Browning GM (1993) Vaginal length and sexual function after colpopexy for complete uterovaginal eversion. *Am J Obstet Gynecol* **169**: 284–7
Glazener CMA, Cooper K (2002a) Anterior vaginal repair for urinary incontinence in women. (Cochrane review). In: *The Cochrane Library*. Issue 2. Update Software, Oxford
Glazener CMA, Cooper K (2002b) Bladder neck needle suspension for urinary incontinence in women (Cochrane review). In: *The Cochrane Library*. Issue 2. Update Software, Oxford
Hall AF, Theofrastous JP, Cundiff GW, Harris RL, Hamilton LF, Swift SE, Bump RC (1996) Interobserver and intraobserver reliability of the proposed International Continence Society, Society of Gynecologic Surgeons, and American Urogynecologic Society pelvic organ prolapse classification system. *Am J Obstet Gynecol* **175**(6): 1467–70
Hay-Smith EJC, Bo K, Berghmans LCM, Hendriks HJM, de Bie RA, van Waalwijk van Doorn ESC (2002) Pelvic floor muscle training for urinary incontinence in women (Cochrane review). In: *The Cochrane Library*. Issue 2. Update Software, Oxford
Hunskaar S, Burgio K, Diokno AC, Herzog AR, Hjalmas K, Lapitan MC (2002) Epidemiology and natural history of urinary incontinence. In: Abrahams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence.* Health Publication Ltd, Plymouth: 165–201
Kahn MA, Stanton SL (1997) Posterior colporrhaphy: its effects on bowel and sexual function. *Br J Obstet Gynaecol* **104**: 82–6
Khullar V, Damiano R, Toozs-Hobson P, Cardozo L (1998) Prevalence of faecal incontinence among women with urinary incontinence. *Br J Obstet Gynaecol* **105**: 1211–3
Kobak WH, Walters MD, Piedmonte MR (2001) Determinants of voiding after three types of incontinence surgery: a multivariable analysis. *Obstet Gynecol* **97**: 86–91
Lose G, Jorgensen L, Mortensen SO, Molsted-Pedersen L, Kristensen JK (1987) Voiding difficulties after colposuspension. *Obstet Gynecol* **69**: 33–7
MacArthur C, Glazener CM, Wilson PD et al (2001) Obstetric practice and faecal incontinence three months after delivery. *Br J Obstet Gynaecol* **108**: 678–83
MacLennan AH, Taylor AW, Wilson DH, Wilson D (2000) The prevalence of pelvic floor disorders and their relationship to gender, age, parity and mode of delivery. *Br J Obstet Gynaecol* **107**: 1460–70
Maher CF, Murray CJ, Carey MP, Dwyer PL, Ugoni AM (2001) Iliococcygeus or sacrospinous fixation for vaginal vault prolapse. *Obstet Gynecol* **98**: 40–4
Malouf AJ, Norton CS, Engel AF, Nicholls RJ, Kamm MA (2000) Long-term results of overlapping anterior anal-sphincter repair for obstetric trauma. *Lancet* **355**: 260–5
Marana HR, Andrade JM, Marana RR, Matheus de Sala M, Philbert PM, Rodrigues R (1999) Vaginal hysterectomy for correcting genital prolapse: long-term evaluation. *J Reprod Med* **44**: 529–34
Moisey CU, Stephenson TP, Brendler CB (1980) The urodynamic and subjective results of treatment of detrusor instability with oxybutynin chloride. *Br J Urol* **52**: 472–5
Moran PA, Ward KL, Johnson D, Smirni WE, Hilton P, Bibby J (2000) Tension-free vaginal tape for primary genuine stress incontinence: a two-centre follow-up study. *Br J Urol Int* **86**: 39–42
Norton C, Christiansen J, Butler U et al (2002a) Anal incontinence. In: Abrahams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence.* Health Publication Ltd, Plymouth: 987–1043
Norton C, Hosker G, Brazzelli M (2002b) Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults (Cochrane review). In: *The Cochrane Library*. Issue 2. Update Software, Oxford
Nygaard IE, Kreder KJ, Lepic MM, Fountain KA, Rhomberg AT (1996) Efficacy of pelvic floor muscle exercises in women with stress, urge and mixed urinary incontinence. *Am J Obstet Gynecol* **174**: 120–5
Olsen AL, Smith VJ, Bergstrom JO, Colling JC, Clark AL (1997) Epidemiology of surgically managed pelvic organ prolapse and urinary incontinence. *Obstet Gynecol* **89**: 501–6
Reid FM, Smith ARB (2002) Laparoscopic surgery for incontinence. In: MacLean AB, Cardozo L, eds. *Incontinence in Women*. RCOG Press, London: 292–301
Roe B, Williams K, Palmer M (2002) Bladder training for urinary incontinence in adults (Cochrane review). In: *The Cochrane Library*. Issue 2. Update Software, Oxford
Royal College of Physicians (1995) Incontinence. Causes, management and provision of services. A Working Party of the Royal College of Physicians. *J Roy Coll Phys Lond* **29**: 272–4
Sand PK, Bowen LW, Panganiban R, Ostergard DR (1987) The low-pressure urethra as a factor in failed retropubic urethropexy. *Obstet Gynecol* **69**: 399–402
Schwartz G, Beatty J (1977) *Biofeedback: Theory and Research.* Academic Press, New York
Shaw WF (1954) Plastic vaginal surgery. In: Munro Kerr JM, Johnson RW, Phillips MH, eds. *Historical Review of British Obstetrics and Gynaecology.* E&S Livingstone, Edinburgh: 370–9
Smith A, Daneshgari F, Dmochowski R et al (2002) Surgical treatment of incontinence in women. In: MacLean AB, Cardozo L, eds. *Incontinence in Women*. RCOG Press, London: 825–63
Thakar R, Stanton S (2002) Management of genital prolapse. *Br Med J* **324**: 1258–62
Vancaillie TG, Schuessler W (1991) Laparoscopic bladder-neck suspension. *J Laparoendosc Surg* **1**: 169–73
Ward KL, Hilton F, Browning J (2000) A randomized, control trial of colposuspension and tension-free vaginal tape for primary stress urinary incontinence. *Neurourol Urodyn* **19**: 386–7
Weber AM, Walters MD (1997) Anterior vaginal prolapse: review of anatomy and techniques of surgical repair. *Obstet Gynecol* **89**: 311–18
Wilson D (2002) Nonsurgical management of incontinence. In: MacLean AB, Cardozo L, eds. *Incontinence in Women*. RCOG Press, London: 211–24