Weakness of the pelvic floor: urological consequences

Ranee Thakar, Stuart L Stanton

The pelvic floor comprises three compartments: anterior, posterior and middle. Weakness of the pelvic floor can lead to prolapse, urinary or faecal incontinence. This article deals with the defects in the anterior compartment which lead to urological consequences. The anatomy and management of stress incontinence are discussed.

The pelvic floor is the collective term applied to the muscle, fascia and ligaments which span the outlet within the bony pelvis. Physiologically the muscles of the pelvic floor differ from most other skeletal muscles by exhibiting constant activity (as shown by electromyography; EMG) except during voiding and defaecation (Brubaker and Saclarides, 1996). The near constant activity of these muscles is necessary to act with the endopelvic fascia as a support for the pelvic viscera. Weakness of the pelvic floor can occur by mechanical or neurological damage and/or change in integrity of the pelvic floor tissue itself. This can lead to prolapse of the pelvic organs, or urinary and faecal incontinence, depending on which compartment is affected. The impact of pelvic floor dysfunction on a woman's quality of life may be devastating.

This article deals with the urological consequences of pelvic floor weakness. Incontinence of urine may be a consequence of anterior pelvic floor failure as a result of either defective bladder neck support by the anterior vaginal wall or failure of the intrinsic urethral sphincter or both. To get a better understanding of this problem a comprehensive review of the pelvic floor anatomy and function is necessary and is discussed below.

STRUCTURE AND FUNCTION OF THE NORMAL PELVIC FLOOR

The pelvic floor includes the levator ani muscles, the urethral and anal sphincter muscles and the endopelvic fascia. The levator ani muscle is the largest component of the pelvic floor which consists of the ileococcygeus muscle and the pubovisceral muscle. The ileococcygeus muscle arises laterally from the arcus tendineus, a thickened band of obturator internus fascia extending from the pubic bone to the ischial spine. Each muscle then travels medially and posteriorly, meeting the contralateral muscle behind the rectum in the midline raphe that fuses with the coccyx. The pubovisceral muscle includes the puborectalis and the pubococcygeus muscles. These muscles form a U-shaped sling, encircling the urogenital hiatus, the midline potential space through which the pelvic viscera pass (*Figure 1*).

The levator ani has two important functions. First, this muscle maintains a constant basal tone, thus keeping the urogenital hiatus closed (DeLancey, 1993; Wall, 1993). If this basal tone is lost or diminished, the urogenital hiatus can widen, causing the descent of the pelvic viscera. The second function is to contract reflexly in reaction to increases in intra-abdominal pressure such as coughing (Wall, 1993), which may play a role in maintaining continence during effort.

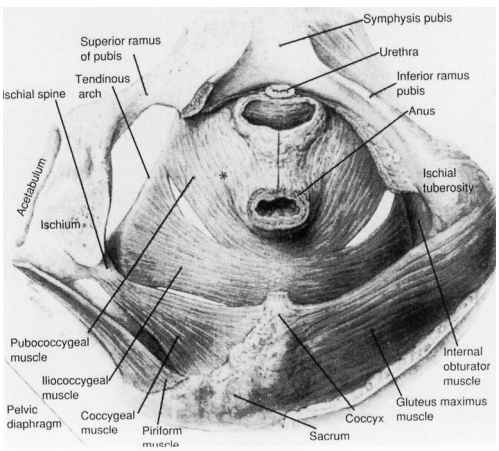

Figure 1. Levator ani muscles seen from below. The portion of the pubococcygeus which inserts into the rectum and forms a 'U' behind it is called the puborectalis. From DeLancey (1997).

Dr Ranee Thakar is Subspecialty Trainee in Urogynaecology and **Professor Stuart L Stanton** is Professor of Pelvic Reconstruction and Urogynaecology in the Department of Obstetrics and Gynaecology, St George's Hospital, London SW17 0QT

Correspondence to: Dr R Thakar

The levator ani complex is associated intimately with the anal and urethral sphincter mechanisms. The anal sphincter comprises two separate muscles, the external and the internal anal sphincters. The striated external anal sphincter is made up of three parts (subcutaneous, superficial and deep) and is inseparable from the puborectalis posteriorly. The external anal sphincter maintains a constant basal tone but can be contracted voluntarily. The internal anal sphincter is a thickened continuation of the circular muscle of the bowel. It is separated from the external anal sphincter by the conjoint longitudinal muscle which is a continuation of the longitudinal smooth muscle of the bowel. The internal anal sphincter is responsible for most of the resting tone of the anal canal.

The urethral sphincter mechanism is complex and includes both intrinsic and extrinsic sphincters. The intrinsic sphincter consists of two layers: an inner longitudinal muscle and an outer circular muscle, the sphincter urethrae. The extrinsic urethral mechanism consists of a proximal and a distal component. In its proximal portion, the urethra rests on a sling formed by the vaginal wall. This sling is suspended laterally from the levator ani and the arcus tendinous fascia. Thus a contraction of the levator ani elevates and compresses the proximal urethra. In the distal urethra, two bands of skeletal muscle (the compressor urethrae and the urethrovaginal sphincter muscle) arch over the ventral surface of the urethra. These muscles contract as a reflex response to sudden increases in the abdominal pressure, or voluntarily which will constrict the urethra (DeLancey, 1999) (*Figure 2*).

The levator ani and the sphincter muscles of the pelvic floor are innervated by the anterior sacral nerve roots S2–S4. The external anal sphincter and the striated urethral sphincter are innervated by branches of the pudendal nerve, which arises from sacral roots S2–S4 (Handa et al, 1996).

The other component of the pelvic floor is the fascia which envelopes the pelvic organs and attaches them to the pelvic side wall. The fascial components are parietal and visceral (endopelvic). Parietal fascia covers the pelvic skeletal muscles and provides attachment of the muscles to the bony pelvis; it is characterized histologically by regular arrangements of collagen. Visceral fascia is less discrete and exists throughout the pelvis as a meshwork of loosely arranged collagen, elastin, adipose tissue through which the blood vessels, lymphatics and nerves travel to reach the pelvic organs. Condensations of the endopelvic fascia have been given various names such as uterosacral ligaments, cardinal or broad ligaments, parametrium, paracolpos, pubocervical fascia and rectovaginal fascia.

FACTORS THAT 'WEAKEN' THE PELVIC FLOOR

Childbirth

During childbirth the pelvic floor is exposed to direct trauma from the fetal presenting part as well as downward pressure from maternal expulsive efforts. These forces stretch and distend the pelvic floor, resulting in functional and anatomical alterations in the muscles, nerves and connective tissue. Lacerations and incisions of the perineum during childbirth (Klein et al, 1994) and damage to the peripheral nerves that innervate the levator ani and the sphincter muscles (Handa et al, 1996) are associated with postpartum weakening of the pelvic floor.

Using neurophysiological techniques to study the pelvic floor, denervation injuries of the pubococcygeus and the external anal sphincter musces have been demonstrated after 42–80% of vaginal deliveries (Snooks et al, 1986; Allen et al, 1990). Denervation has not been demonstrated after elective caesarean section (Snooks et al, 1984, 1986) although it has been associated with caesarean deliveries performed during labour (Allen et al, 1990). Chaliha et al (1998) conducted a large prospective study on 286 primigravida and reported a high incidence of stress incontinence during pregnancy (45.8%) and after delivery (19.2%), in contrast to the incidence in the prepregnancy period (4.2%), although this was not always confirmed on urodynamic studies.

Menopause and oestrogen deficiency

The majority of studies on the epidemiology of urinary incontinence indicate that the prevalence increases with age (Teasdale et al, 1988;

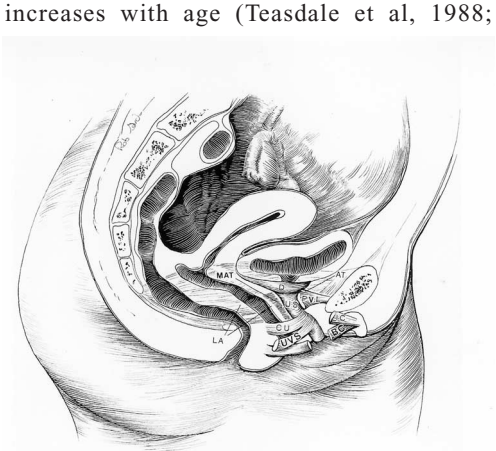

Figure 2. The lower urinary tract, including the striated urogenital sphincter muscle. From DeLancey (1986).

Molander et al, 1990; Milsom et al, 1993). Several factors may be responsible for this increase including the decrease in oestrogen occuring after menopause. However, hypo-oestrogenism as an independent factor within the ageing process has not been scientifically proven to induce urinary incontinence by itself (Fantl et al, 1996; Jackson et al, 1999). There is evidence to suggest that skin collagen reduces in women after menopause (Brincat et al, 1985).

Collagen tissue abnormalities

The reduction of collagen tissue integrity, be it congenital or acquired, may lead to stress urinary incontinence. Factors that can affect the connective tissue are childbirth, oestrogen deficiency and underlying diseases such as Ehlers–Danlos syndrome and Marfan's syndrome. A 40% decrease in collagen content is reported in women with genuine stress incontinence compared to continent controls (Ulmsten et al, 1987). It has been shown that women with Ehlers–Danlos and Marfan's syndrome have increased complaints of incontinence and prolapse (McIntosh et al, 1993; Jabs et al, 1999).

Mechanical trauma

Mechanical trauma is a major factor in the development of pelvic floor weakness, as is the upright posture. In animals, the pelvic floor is largely weight bearing and is composed of muscle and a little fascial tissue (Smout and Jocby, 1953). In primates the amount and strength of the fascial tissue is greatly increased. In a normal woman when standing the levator plate is nearly horizontal, thus providing support to the pelvic organs. The supportive function of the normal pelvic floor relieves pressure on the ligaments of the pelvic organs. If this function is impaired, the daily tension on these ligaments is increased, leading to a continuous deterioration in pelvic floor function.

Neurological damage

There is increasing evidence that denervation injury to the striated muscles of the pelvic floor is an important factor in the development of genuine stress incontinence (Wall et al, 1993). Smith et al (1989a,b) found electromyographic evidence of partial denervation in women with stress incontinence or uterovaginal prolapse or both. Deindle et al (1994) examined eight women with stress incontinence and nulliparous controls using EMG recordings of the right and left pubococcygeus muscles and found that childbirth induced both qualitative and quantitative changes in the pelvic floor, contributing to the development of stress incontinence. Their findings suggested sphincter weakness resulted not only from loss of individual motor units but also from altered behaviour of the remaining units, such that there was asynchronous activity between two sides of the pubococcygeus muscle. In other words, during straining, when the levator muscles should be relaxed, inappropriate muscle activity was detected on one side; during a voluntary contraction there was a contribution of inappropriate firing units on the other side.

MANAGEMENT

History

The initial assessment of patients with urinary incontinence should include a thorough history and physical examination. Caution needs to be exercised as these methods alone cannot give an accurate diagnosis of many disorders of the lower urinary tract (Cardozo and Stanton, 1980). The patient is usually multiparous. The classic symptom of a weak pelvic floor are stress incontinence, prolapse and sometimes faecal incontinence. Occasionally the patient may complain of frequency and urge incontinence.

Examination

General examination will allow assessment of mobility and general health. Pelvic examination should be performed to detect any abnormality, such as prolapse, which may require treatment at the same time. Anterior vaginal wall descent will be present in 50% of cases with genuine stress incontinence. Vaginal capacity and mobility which are indicators of vaginal scarring should be assessed as they may be relevant in determining subsequent continence procedures. Neurological assessment with particular reference to S2–4 dermatomes should also be performed.

INVESTIGATIONS

Many clinicians have demonstrated the discrepancy between clinical findings and urodynamic studies (Haylen and Frazer, 1987; Ng and Murray, 1989). In a consecutive clinic of 800 women attending the urodynamic clinic, approximately 50% were diagnosed by urodynamic studies as having urethral sphincter incompetence. Of these only 3% had the symptoms and signs of stress incontinence and 1.5% had the sole symptoms of stress incontinence. Of the total group, 85% had urgency, urge incontinence and stress incontinence but only 25% had detrusor instability on testing (Haylen and Frazer, 1987). Thus during clinical evaluation one must take into consideration clinical findings and the urodynamic assessment.

A negative midstream urine specimen should precede all urodynamic studies to avoid the risk of invasive procedures aggravating any urinary tract infection which may make the subsequent results unreliable.

Pad test
A pad test is a simple, inexpensive and non-invasive method of demonstrating urinary loss when this is not proven on cystometry or videocystourethrography. The 1-hour pad test as recommended by the International Continence Society (Abrams et al, 1988) is probably the most reliable (Mayne and Hilton, 1989). The pad test does not indicate the cause of the leakage but gives a guide to the severity of involuntary urinary loss (Sutherst et al, 1981).

Uroflowmetry
Measurement of urine flow provides objective evidence of voiding ability. Uroflowmetry measures maximum flow rate, volume voided, average flow rate, flow time and time to maximum flow. It is useful in women with voiding difficulties and before surgery for stress incontinence, as a low preoperative flow rate increases the likelihood of prolonged postoperative catheterization.

Cystometry
The cystometric diagnosis of urinary leakage will indicate the presence of detrusor instability or voiding difficulty; only when detrusor instability is absent is the diagnosis of urethral sphincter incompetence made by exclusion.

Videocystourethrography
Videocystourethrography is a combination of cystometry and radiological screening recorded with a sound commentary on a video tape and is used for more complicated cases, e.g. neuropathic bladder disorders and voiding difficulties.

Urethral pressure profilometry
The role of urethral pressure profilometry in the diagnosis of stress incontinence is controversial and undecided as the overlap between normal and stress incontinence may make the accurate diagnosis impossible (Versi et al, 1986). A maximum urethral pressure of 20 cmH_20 indicates likely intrinsic sphincter deficiency (Sand et al, 1987).

Radiology of the urinary tract
A plain film of the abdomen can be used to screen for urinary calculi and symphysial diastasis which can be secondary to a pelvic fracture.

Ultrasound and magnetic resonance imaging
Ultrasound is becoming a popular mode of investigation in urogynaecology although at present it is mainly used as a research tool. Ultrasound allows measurements of the bladder neck position and of the vesicourethral angle. Magnetic resonance imaging has been shown to be of limited value in the management of urinary incontinence (Klutke et al, 1990).

Electrophysiological studies
In complex cases of sphincter incompetence, especially where multiple bladder neck surgeries are being performed and further surgery is contemplated, it may be worthwhile measuring the electromyographic activity of these structures using single fibre electrode (Krieger et al, 1988) and terminal motor latencies in the perineal branch of the pudendal nerve.

TREATMENT

Conservative and surgical treatments are used depending on the patient's condition and urodynamic diagnosis. Conservative treatment is indicated when:

- The patient refuses or is undecided about surgery
- The patient is physically or mentally unfit for surgery
- Childbearing is incomplete
- There is uncontrolled detrusor instability or voiding disorder.

Treatment for urethral sphincter incompetence can be broadly divided into:

- Devices: electronic, elevating, occlusive
- Exercises: self, supervised by physiotherapist
- Surgery.

Devices
Electronic devices: Electrical stimulation for incontinence has been applied with some success through various mechanisms and at different frequencies. The electrical stimulation can be applied by vaginal or anal electrodes. A higher frequency of 50 Hz causes the pelvic floor muscles to contract, building strength through exercise (Amuzu, 1998).
Elevating devices: For mild sphincter incompetence, wearing a tampon, reusable foam pessary, or bladder neck support prosthesis may temporarily cure incontinence by elevating the bladder neck. This is recommended for patients who are incontinent at known times.
Occlusive devices: Urethral occlusive devices include urethral plugs and more recently, expandable urethral devices. The safety and efficacy of an expandable urethral insert has been

evaluated over a 4-month period in a multicentre study of 33 women, the majority of whom had genuine stress incontinence (Staskin et al, 1994). After 4 months of use, the urethral device appeared to be a highly effective way of preventing stress incontinence on the basis of pad testing. However, symptomatic urinary tract infections were reported in 21% of patients and two devices migrated proximally. Compliance would appear to be a major problem and patients need to have manual dexterity to insert or manipulate devices.

Pelvic floor exercises

Various regimens of pelvic floor exercise have been tried but the most commonly advocated one is by Kegel who reported a 80% cure rate and 100% improved results for patients with uncomplicated urinary stress incontinence (Kegel, 1956). More recently Bo and Talseth (1994) recorded a 61% objective improvement in 23 women doing pelvic floor exercises 5 years after treatment. There is a fair correlation between success and intensity of training (Amuzu, 1998). Success depends on the patient's ability to distinguish the proper muscles and to comply with an intensive rehabilitation regimen.

Adjuncts to pelvic floor exercises: Biofeedback detects pressure directly or senses the EMG activity of muscles. Most units are designed for home use on an ongoing basis, or for office use with intermittent, most often weekly, sessions. They can be used in conjunction with Kegel exercises and success rates of at least 50% improvement has been reported for genuine stress incontinence (Burgio et al, 1986) and 80% for mixed incontinence (Shepherd et al, 1983).

Vaginal cones are used as a method in strengthening the pelvic floor muscles by actively and passively contracting the pelvic floor. It is a form of biofeedback as the patient knows the weight of the cones she is able to retain with pelvic floor muscles and therefore can monitor her progress.

Surgery

Surgical treatment: Continence surgery is indicated when conservative treatment fails or the patient wants definitive treatment. The patient should be counselled that it is wise to avoid unnecessary heavy lifting or abnormal straining after any urethrovesical suspension operation. The aim of the surgery to correct sphincter incompetence is either to elevate the bladder neck or increase urethral resistance or both.

The choice of operation is influenced by clinical features, urodynamic data and operation characteristics (*Table 1*) and the success rates vary (*Table 2*).

Clinical features: Clinical features include health of the patient, position of the bladder neck, the amount of vaginal scarring and the presence of other pelvic pathology. A physically frail or older patient with impaired physical health may be treated with a urethral bulking agent or tension-free vaginal tape (TVT), whereas a fitter or younger patient may need open retropubic surgery such as a colposuspension or a TVT. Bladder neck position, vaginal capacity and mobility on vaginal examination are important in

TABLE 1.
Clinical and urodynamic features

Access	Operation	Mechanism	Clinical indications	Complications
Vaginal	Anterior colporrhaphy	Elevates bladder neck from below	Elderly, physically frail	Minimal recurrence of stress incontinence
	Peri/transurethral bulking agents	Prevents premature bladder neck opening	Mild urethral sphincter incompetence, primary and failed surgery, physically frail	Transient urinary retention, UTI
Vaginal and suprapubic	Endoscopic bladder neck suspension (Raz and Stamey procedure)	Elevates from above, enhances pressure transmission in proximal urethra	Elderly and physically frail	Suture can pull through causing recurrence. High recurrence of stress incontinence
	Tension-free vaginal tape	Support and elevates the mid-urethra	Primary sphincter incompetence	No significant complications
Suprapubic	Marshall Marchetti Krantz	Elevates bladder neck from above	Urethral sphincter incompetence without cystourethrocele	Osteitis pubis
	Colposuspension	Elevates bladder neck	Primary or secondary urethral sphincter incompetence with or without cystocele	Voiding difficulty, detrusor instability, rectocele formation
	Sling	Elevates bladder neck from above, supports proximal urethra	Proximal urethra needs support; contracted vagina	Voiding difficulty and UTI; sling erosion; detrusor instability
	Artificial urinary sphincter	Increases urethral resistance	Neurogenic,reconstructive surgery; failed conventional bladder neck surgery	Erosion, mechanical failure

UTI = urinary tract infection

TABLE 2.
Meta-analysis of continence surgery

Procedure	Cure (%)	Complication (%)	Detrusor instability (%)	Void difficulty (%)
Anterior colporrhaphy	37–84	1	8	0
Endoscopic bladder neck suspension	6–43	12	6	6
Marshall–Marchetti–Krantz	75	2.5	11	11
Colposuspension Open	69–90	14*	17	10
Laparoscopic	60–80	4	–	–
Paravaginal	72–97	–	–	–
Sling	67	–	17	10
Bulking agents	31–48†	–	–	–
Artificial sphincter	92‡	17	–	–

When possible, the long term (> 5 years) follow up results have been used. *prolapse. † objective. ‡ subjective. From G Jarvis, unpublished data, WHO conference on incontinence, 1998

determining whether a colposuspension can be performed. If the patient has not completed her family continence surgery can be performed but if she subsequently conceives and is dry, a caesarean should be performed to avoid disruption of the operation and further pelvic floor trauma.

Urodynamic data: Urodynamic studies are carried out to detect voiding difficulty and detrusor instability. If detrusor instability or voiding disorder is present these should be controlled before proceeding to surgery and the patient should be warned that surgery may make either worse.

Operation characteristics: In general, vaginal operations are quicker and less painful, but may not be as durable as the urethrovesical suspension operations. Most clinicians try for moderate elevation at colposuspension and use minimal tension for the sling to prevent voiding difficulty.

The benefit of knowing urodynamic characteristics of each operation is that one can match each operation with the clinical requirements, i.e. low pressure urethra needs an operation that will enhance urethral resistance and a patient with voiding difficulty needs an operation that does not greatly increase urethral resistance.

Anterior colporrhaphy: The advantage of an anterior colporrhaphy is that it will correct coexistent anterior vaginal wall prolapse and is unlikely to cause either voiding difficulties or detrusor instabilty. However, the cure rate is low and narrowing and scarring of the vaginal tissues may result, which may render further surgery more difficult. It is only indicated when the patient complains of a lump and stress incontinence is either absent or a very rare event.

Urethral bulking agents: Various bulking agents are available, e.g. GAX collagen (glutaraldehyde cross-linked bovine collagen), Macroplastique, and fat. The procedure can be done as a day case under local anaesthetic or a light general anaesthetic and acts by preventing premature bladder neck opening. Reinjection is often required and does not preclude further bladder neck surgery. These are indicated for mild stress incontinence and when the patient wants to defer or is unfit for surgery.

Endoscopic bladder neck suspension operation: Using a special long needle a suture is inserted on either side of the bladder neck and tied on top of the rectus sheath at a tension sufficient to support the bladder neck. A cystoscopy is essential after all needle passes have been completed to ensure that no suture has passed through the bladder and that the sutures are at level with the bladder neck. The long-term results are so poor that these procedures can no longer be recommended.

Marshall–Marchetti–Krantz operation: In this procedure the sutures are inserted between the paraurethral tissues along the proximal half of the urethra and the periosteum or perichondrium of the symphysis pubis. The main complication is osteitis pubis (0.5–5% of cases). The procedure will not correct a cystocele.

Colposuspension: This procedure was initially described by Burch in 1961 (*Figure 3*). Two to three Ethibond sutures are placed between the paravaginal fascia on either side of the bladder neck and the base of the bladder and attached to the ipsilateral ileopectineal ligament. The most distal suture is placed at the bladder neck and the most proximal suture is placed as far cephalad as possible to support the bladder base. Detrusor instability, voiding difficulties and rectocele are the main complications. It is indicated for urethral sphincter incontinence associated with a cystourethrocele.

Laparascopic colposuspension: Laparoscopic colposuspension is a less invasive technique with

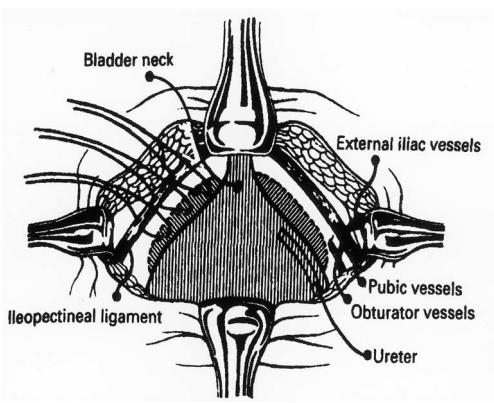

Figure 3. Diagram of colposuspension as seen through a Pfannenstiel incision.

minimal disruption to normal lifestyle. However, two published randomized controlled trials showed it to be about 20% less successful than an open procedure (Burton, 1999; Su et al, 1997). Present disadvantages include insufficient long-term follow-up data, 1–10% rate of bladder injury during surgery, cost of disposable equipment, long operating time and the long learning curve.

Sling operation: Various types of material have been used for sling operations which can be natural, e.g. rectus sheath, vaginal wall graft or synthetic, e.g. Silastic. When synthetic material is used there is a high incidence of erosion. Other complications include voiding difficulties and detrusor instability.

Tension-free vaginal tape: Recently TVT has gained popularity for the treatment of urethral sphincter incompetence (*Figure 4*). So far it has proved to be a safe and effective treatment (Ulmsten, 1999). The procedure is carried out under local anaesthetic or a regional block and involves a vaginal and two small suprapubic incisions. After minimal paraurethral dissections of the vaginal wall a special prolene tape covered with a plastic sheath is introduced using a two-component needle instrument. The tip of this needle first perforates the urogenital diaphragm, and within the retropubic space the needle tip just internal to the pubic bone is brought up to the abdominal incision. The procedure is repeated on the other side and the tape is placed in a U-formed shape around the mid-urethra.

After cystoscopy to make sure that the bladder is undamaged, the tape is adjusted without tension under the urethra. After adjustment of the tape by asking the woman to cough the plastic sheath covering the tape is removed and the vaginal and abdominal incisions are closed. A 3-year follow-up study has shown a 86% cure rate and 11% improvement (Ulmsten et al, 1999). A large randomized study is currently underway comparing it to colposuspension, which is considered the current gold standard operation for urethral sphincter incontinence.

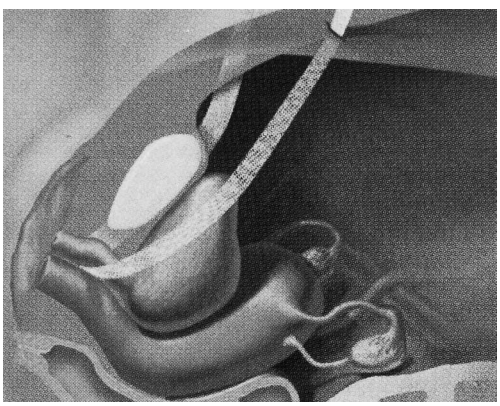

Figure 4. Tension-free vaginal tape (Ethicon Ltd, Johnson & Johnson) placed directly under the mid-urethra.

Paravaginal repair: The paravaginal repair works on the principle that the endopelvic fascia becomes detached from the arcus tendineus. This results in a paravaginal defect, but midline defects can also occur. The latter are repaired vaginally whereas the former can be repaired vaginally or abdominally. The main advantage of this procedure is that it restores normal or near normal anatomy, i.e. the bladder neck is returned to its normal or near normal position without over elevation. This prevents voiding disorders. This procedure is popular in the United States.

Artificial urinary sphincter: Artificial urinary sphincter is used only in the most complex cases of sphincter incompetence, where there is a total loss of urethral resistance and where conventional surgery has failed or for reconstructive procedures. Complications include erosion, malfunction, and infection. Revision surgery may be needed in up to 32% of patients, and the 5-year reliability rate of the device is more than 90% (Stanton, 1997).

CONCLUSION

It has become clear that the effect of gravity, childbirth, neurological trauma, oestrogen and collagen deficiency associated with ageing all lead to pelvic floor weakness. Depending on the compartment affected urinary incontinence, pelvic organ prolapse and faecal incontinence may occur in isolation or more often in combination. Surgical repair of one compartment may lead to deterioration in other compartments. There is growing evidence that a multidisciplinary approach to the whole pelvis is indicated to improve patient care, advance science and train clinicians in new skills and knowledge for pelvic floor problems that cross disciplines. A pelvic floor service model where a patient can be seen at the multidisciplinary clinic (Nager et al, 1997) by a surgeon trained in benign gynaecology, urology and colorectal surgery should be the goal for the third millennium. **HM**

Figure 1 *is reproduced by kind permission from DeLancey (1997) and* Figure 2 *is reproduced by kind permission from DeLancey (1986).*
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KEY POINTS

- Weakness of the pelvic floor can occur by mechanical or neurological damage and/or change in integrity of the pelvic floor tissue itself.
- Weakness of the pelvic floor can lead to prolapse of the pelvic organs or urinary and faecal incontinence depending on which compartment is affected.
- Incontinence of urine may be a consequence of anterior pelvic floor failure as a result of either defective bladder neck support by the anterior vaginal wall or failure of the intrinsic urethral sphincter or both.
- Fcators that weaken the pelvic floor are childbirth, menopause, collagen tissue abnormalities, mechanical trauma and neurological damage.
- Treatment may be conservative or surgical.
- At present colposuspension is considered the gold standard operation for treatment of urethral sphincter incompetence.
- Recently the tension-free vaginal tape has gained popularity for the treatment of urethral sphincter incompetence. Long-term results from a multicentre trial are awaited.