

# Female stress incontinence

## Treatment options and indications

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### Relative Harninkontinenz der Frau

**Zusammenfassung.** Die Diagnose eines inkompetenten Harnröhrensphinkters wird durch urodynamische Untersuchungen bestätigt, die im wesentlichen auf Zweikanal-Zystometrie basieren. Detrusor-Instabilität und Miktionsstörungen müssen nachgewiesen werden. Die Indikation zur konservativen Behandlung sowie die verschiedenen Operationen und ihre jeweiligen Wirkungsweisen werden besprochen und die Behandlung von rezidivierender Inkontinenz wird beschrieben.

**Summary.** The diagnosis of urethral sphincter incompetence is confirmed by urodynamic studies which essentially involved twin channel subtracted cystometry. Detrusor instability and voiding difficulty must be detected. The indications for and an outline of conservative treatment are reviewed. The indications for surgery and a brief review of the operations and how they work and the management of recurrent incontinence are reviewed.

**Key words:** Female urinary incontinence – Investigations – Conservative treatment – Surgical treatment

Stress incontinence due to urethral sphincter incompetence can be managed surgically or conservatively, largely dependent on the patient's wishes. The broad aims of either mode of treatment are to strengthen the pelvic floor, elevate the bladder neck, and allow independence for the patient.

### Investigations to diagnose incontinence

Investigations are necessary to detect (1) detrusor instability, (2) voiding difficulty, (3) urinary fistulae, (4) urethral sphincter incompetence. For the last, it is important to discover whether failure of bladder neck elevation and/or low urethral resistance are relevant factors.

I find history adds little to the diagnosis beyond description of the symptoms and their severity. The clinical examination will detect residual urine, the position of the bladder neck, and the degree of bladder neck excursion, the amount of scarring around the bladder neck and urethra and whether or not there is adequate mobility and capacity within the vagina to allow bladder neck elevation. Other pathology, such as associated prolapse, can also be detected.

The following urodynamic studies are important:

1. Either cystometry and uroflowmetry, alone or combined with videocystourethrography, to exclude detrusor instability or voiding disorder and to confirm urethral sphincter incompetence. Whether it is necessary to combine videocystourethrography with cystometry for non-neuropathic causes of incontinence in the female is uncertain; Barnick et al. [3] found it essential in the diagnosis of 7.5% of patients, whilst Stanton et al. [36] found it necessary in only 2.5%. The advantages over cystometry are the diagnosis of urethral and bladder diverticulae, incontinence on standing due to detrusor instability rather than to urethral sphincter incompetence, and the detection of reflux.

2. Ultrasonography to determine residual urine and the position and excursion of the bladder neck.

3. The role of the urethral pressure profile remains controversial. MacGuire [17] and Sand et al. [25] believe that a pre-operative maximum urethral closure pressure lower than 20 cmH<sub>2</sub>O is more likely to lead to failure of continence surgery. Hilton [14], although believing that a low urethral pressure is more likely to lead to failure, found the case for a 20 cmH<sub>2</sub>O cut-off was unproven.

4. Distal urethral electric conductance is a useful adjunctive test to cystometry to detect sphincter incompetence. Peattie et al. [21] found it increased the accuracy of cystometry for urethral sphincter incompetence by some 83%.

5. There is sufficient evidence now to indicate that denervation of the pelvic floor caused by pregnancy and delivery leads to both urinary and faecal incontinence [29, 30]. Detection of this is achieved by histological and histochemical studies of pelvic floor biopsies and, more practically, by the use of terminal motor latencies and electromyographic studies of the nerves and muscles of the pelvic floor.

6. In cases of incontinence where both cystometry or videocystourethrography and DUEC have failed to demonstrate urine leakage, various forms of pad tests may be used, from the 2-h extended test to the 24-h ambulant test.

### Indications for conservative treatment

Conservative treatment is indicated where (1) incontinence is mild, i.e. less than 5 g daily, (2) where child bearing is incomplete, (3) the patient is physically frail and her medical fitness precludes surgery, (4) the patient



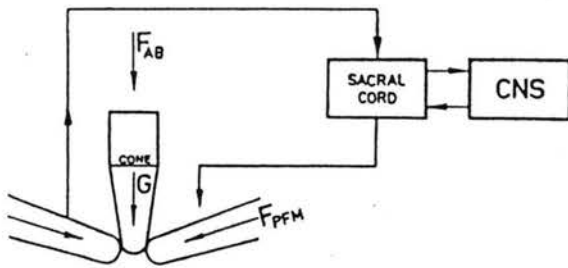


Fig. 1. Diagrammatic representation of the effect of a cone vaginal weight on the pelvic floor, and its relationship to the sacral cord and central nervous system ( $G$ , weight of the cone;  $F_{AB}$ , force due to abdominal pressure;  $F_{PFM}$ , force developed by PFM)

refuses or defers surgery, (5) there is a long waiting list for surgery.

The advantages of conservative treatment are that its effects are reversible and it can be administered as an outpatient procedure and practised at home. The disadvantage is that improvement usually depends on continued treatment or support.

### Conservative therapy

*Femcon*

Pelvic floor exercises and faradism have been taught by physiotherapists for many years, but lately there has been greater interest in this area and correspondingly greater objectivity in assessing outcome. Bo et al. [6] used outcome measures of pad tests, urethral closure pressure, and visual analogue scores in addition to subject assessment of improvement. They compared and contrasted intensive and home pelvic floor exercises over 6 months and found that intensive exercise cured or improved over 60% of patients, whilst home exercises only cured or improved 17%, which is tantamount to saying that the degree of success achieved with exercises was highly dependent on the degree and duration of treatment and frequent supervision by the therapist.

Tapp et al. [38] showed that, whilst physiotherapy was simple and safe, it had a low cure rate. They studied 45 women with sphincter incompetence and found that 12 improved. Those likely to succeed were premenopausal, had a shorter duration of symptoms, a lower visual analogue score, or urinary tract symptoms, and better urethral function, as judged by urethral pressure profilometry.

An alternative approach to conventional treatment has been the use of vaginal cones, which were developed by Plevnik [23]. These are a series of graduated cone-shaped vaginal weights varying from 20–100 g, which when individually introduced into the vagina, can be retained by passive and active contraction of the pelvic floor muscles (Fig. 1). Peattie and Plevnik [19], and Bridges et al. [7] compared cones with physiotherapy and interferential therapy and found cones to be time-saving and effective.

Various means of electrical stimulation have been available over the last 20 years and have seen various fashions. Stimulation is believed to act by increasing the local blood supply, breaking down painful adhesions formed

by healing damaged muscles, increasing the resting tone of muscles, and restoring cortical awareness of particular muscle groups, thus enabling training of these muscles [27]. The current used may be alternating low frequency (faradism) or interrupted and direct. With the latter, the intensity, pulse duration and frequency can be varied. Electrodes can be positioned externally or, more popularly, vaginally, with an indifferent electrode on the abdomen or under the sacrum. Recently, interferential therapy has become popular, although conceptually it is difficult to explain how it works.

### Indications for surgical therapy

Surgery is indicated when (1) the patient refuses conservative treatment and asks for an operation, (2) the patient wants an "instant cure" and does not want conservative treatment, (3) conservative treatment has been tried and has failed, (4) other surgically correctable pathology is present, e.g. genital prolapse or menorrhagia requiring an hysterectomy.

### Surgery

Surgical operations either elevate the bladder neck or increase outflow resistance or both (Table 1).

#### 1. Operations to elevate the bladder neck

• **Anterior colporrhaphy.** This is a classical operation with the dual aims of curing sphincter incompetence and correcting anterior vaginal wall prolapse. However, cure rates vary, with many below 60% [34], although some clinicians will achieve an 80% cure by careful selection [39].

• **Endoscopic bladder neck suspension (EBNS).** This procedure was first described by Pereyra [22] and subsequently modified by Stamey [31] and Raz [24]. Results vary between 41% for the physically frail and elderly [20] to over 90% [32]. A review of some twenty papers over the last 10 years

[13, 14] shows an average cure rate of 73%. The main advantage of this type of procedure is the short operating time and minimal postoperative discomfort for the patient. The disadvantages are the likelihood of sutures either breaking or tearing out and the relatively low cure over 5 years for patients undergoing primary surgery. The Raz procedure may have a higher long-term rates because a helical suture is passed into the periurethral fascia and more fibrosis is created at the time of operation.

• **Colposuspension.** Burch originally described this in 1961 and this operation has gradually become one of the most favoured of the suprapubic suspension operations. The objective cure rates are higher than those for the anterior colporrhaphy and vary from 70% to 100% [35]. The main postoperative complications include voiding difficulty and detrusor instability. The advantages of this operation over others is its ability to correct sphincter incompetence and anterior vaginal wall prolapse.

• **Marshall-Marchetti-Krantz (MMK).** The MMK has been overtaken in popularity by colposuspension, partly because it cannot correct a cystourethrocele and involves a risk of osteitis pubis. Objective studies by Behr et al. [4] and Briel [8] indicate a cure rate of only 57%.

• **Sling procedures.** A variety of tissues are used for slings. Organic materials include antigenic tissue, such as rectus fascia and fascia lata, and allogenic tissue, such as lyophilized dura and porcine dermis. Inorganic tissues include Mersilene, nylon and Silastic. Whilst inorganic tissues are readily available, they do not have the consistent strength of organic tissues. However, the latter may become inextricably bound to body tissues and prove difficult to remove and have a risk of

Table 1. Classification of surgery for urethral sphincter incompetence, according to the route of access and whether the operation acts by elevation of the bladder neck or outflow obstruction

	BN elevation	Obstruction
Vaginal	Ant. repair	Periurethral inj.
Mixed	EBNS	
Suprapubic MMK		AUS
	Colposuspension	
	Sling	

In Deutschland sind die Vaginalkone unter dem Namen  
"Femcon" im Handel



erosion. Because of the uncertain mechanism of sling tension, all slings carry a risk of voiding difficulty and subsequently urinary tract infection and have a less consistent cure rate than other suprapubic procedures. Cure rates may vary between 82% and 85% [14].

As well as elevation, both the colposuspension and the sling can be obstructive, leading to a decrease in peak flow rate and an increase in maximum voiding pressure.

## 2. Operations that increase outflow resistance

- *Periurethral injection.* Injection of a bulking substance under the mucosa of the bladder neck wall, producing an increase in outflow resistance has been used to correct mild incontinence. Schulman et al. [26] used Teflon and achieved an overall improvement rate of 70%. The substance was found to migrate to brain and lungs, which was thought disadvantageous. Appell et al. [2] used a biodegradable and biocompatible glutaraldehyde cross-linked collagen (which is replaced by host collagen within 6 months) and achieved a preliminary cure rate at 6 months of 81%. Multicentre studies are now in progress to validate this.

- *Artificial urinary sphincter (AUS).* The AUS was devised by Scott et al. [28] in 1973 and has been extensively modified since. Its principle indication in the female is for neuropathic disorders in conjunction with reconstructive procedures, and for recurrent urethral sphincter incompetence. The patient should be mentally alert and manually dextrous and have a sterile urine. In addition, the bladder capacity should be at least 250 ml, any detrusor instability should be controlled, and there should be no voiding difficulty or upper tract dilatation.

Donovan et al. [10] cured or markedly improved 21 out of 30 women. Nurse and Mundy [18] implanted a sphincter in 100 patients, of whom 36 were female; overall, 93% were cured, although 3 continued to require clean instrumental self-catheterization. My own series of 27 sphincters implanted in women for sphincter incompetence has a 66% cure rate [37]. Appell [1] and Hadley [12] have both used the vaginal

route for implantation of the cuff and achieved 100% and 90% success rates, respectively. Hadley had one case of infection in his series.

Whilst the artificial urinary sphincter is the end-stage operation for patients with sphincter incompetence. It is subject to complications and many authors record upwards to 30% of further operations for revisions. It means that the clinician has to have that patient under life-time review and must be prepared to replace parts from time to time if mechanical failures occur. Nonetheless, the benefits to the patient are significant when implantation is successful.

## Combined stress and urge incontinence

It is important to determine whether urge incontinence or stress incontinence is the more major symptom for the patient. If it is urge incontinence, then it is wiser to treat this prior to surgery. If detrusor instability is present, bladder neck surgery frequently makes urgency and frequency worse, while also leading to a decreased cure rate for stress incontinence.

Stable urgency and frequency may respond to bladder retraining, electronic stimulation, vaginal cones, or biofeedback using urethral electric conductance. If detrusor instability is present, anticholinergic or calcium antagonist drugs should be used. Functional electric stimulation with a vaginal electrode over a period of 6 weeks has been used by Bent et al. [5] for combined sphincter incompetence and detrusor instability with a 50% subjective and objective improvement.

## Role of hysterectomy

Hysterectomy at the same time as continence surgery has been advised [11], but there is little objective evidence to support that [16, 33]. I think an hysterectomy should only be performed if the uterus is causing symptoms (e.g. prolapse or menorrhagia), or is pathologically enlarged.

## Recurrent incontinence

It is important to appreciate that before any further surgery is attempted, the present cause of incontinence has

to be accurately defined. Whilst there is discussion as to whether every patient who has incontinence needs urodynamic studies, it should be mandatory for any patient who requires further surgery following unsuccessful surgery to correct incontinence should undergo urodynamic investigations beforehand.

The investigation has to determine whether there is failure of bladder neck elevation or whether urethral pressure needs to be augmented. In addition, it is important to exclude detrusor instability and voiding difficulty. The urodynamic studies to do this have been outlined previously. The choice of surgery, as for primary surgery, is governed by a variety of factors.

## 1. Medical health

A patient in frail medical health, who is often old, is not going to subject her pelvic floor and sphincter mechanism to the same physical stresses as a younger patient. Nor will she withstand major suprapubic surgery as well as a younger patient. For this group, one of the endoscopic bladder neck suspension procedures is quicker to carry out and has less postoperative morbidity, resulting in speedier convalescence. My choice would be the Raz procedure.

## 2. Vaginal capacity and mobility

Previous pelvic surgery has often left scarring within the vagina, leading to reduced vaginal capacity and mobility. The colposuspension requires adequate capacity and mobility, so that the lateral fornices can be elevated close to the ileopectineal ligaments, and this has to be assessed as part of the clinical examination. Where capacity and mobility are reduced, procedures other than colposuspension may have to be used.

## 3. Urethral position

Hilton and Stanton [15], using intra-urethral pressure measurements, have shown that alignment of the proximal urethra and bladder neck to the posterior-superior surface of the symphysis is probably responsible for transmission ratios of intra-abdominal pressure to intra-urethral pressure ex-



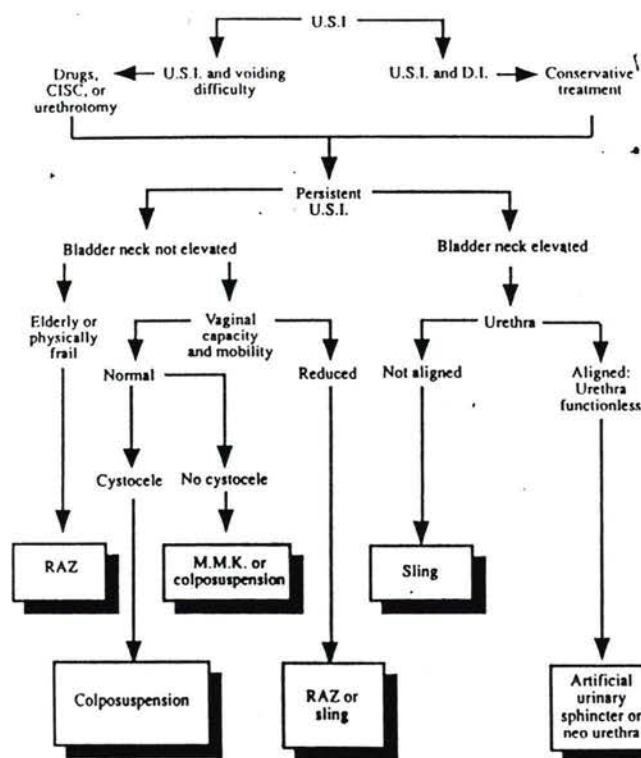


Fig. 2. Algorithm for the choice of surgery for urethral sphincter incompetence

ceeding 100%. Alignment can be demonstrated using either lateral bead chain urethrocystography or preferably perineal ultrasonography [9]. If the proximal urethra is not aligned to the posterior-superior surface of the symphysis, it is unlikely to be compressed during physical effort. The sling procedure works, I think, by providing posterior support against which the proximal urethra can be compressed by intra-abdominal forces during straining.

The choice therefore, of primary or secondary surgery will depend on these factors and (Fig. 2) shows a suggested algorithm for this choice.

## Conclusions

The last 10 years have shown an increased emphasis on the need for urodynamic studies, and this has led to a greater availability of centres where these can be performed. It is reasonable that every major urological or

gynaecological department should have access to these investigations. There has been a resurgence of interest in conservative approaches to the correction of incontinence and these should be encouraged, partly because many patients may find their incontinence sufficiently corrected to avoid surgery, or following surgery residual incontinence may often be further improved by conservative treatment.

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