Intrinsic sphincter deficiency (ISD)

What is ISD?

Intrinsic sphincter deficiency (ISD) is a form of stress urinary incontinence (SUI) that occurs due to poor urethral closure function as a result of defective urethral mucosal coaptation. Clinically, it is typically associated with severe leakage of urine with minimal exertion, where increased abdominal pressure, not bladder pressure, is the expulsive force.

ISD is a diagnosis that was described as early as the beginning of the 1900s. With the advent of the widespread use of urodynamic testing, the condition is more readily diagnosed, though, as we shall discuss, there is some controversy regarding a precise technique for diagnosis of ISD. It is defined by the Agency for Health Care Policy and research in the USA as a condition in which “the urethral sphincter is unable to coapt and generate enough resistance to retain urine in the bladder”.

ISD is synonymous with Type III SUI. This classification, first developed by Green, was refined by McGuire (Table 1). Types I and II urethral hypermobility are due to impaired urethral support, whereas initially Type III or ISD is associated with a fixed urethra. As demonstrated in Table 1, there is an increasing degree of urethral hypermobility from Type I to Type II SUI, minimal rotational descent of less than 45° is seen fluoroscopically in Type I SUI, and Type II SUI is associated with more gross hypermobility.

The concept of ISD (or Type III) has evolved, as it was recognised that urethral closure function is independent of urethral support and the two problems, ISD and urethral hypermobility, will frequently coexist.

The key features of ISD that were initially recognised were an open bladder neck at rest, a fixed immobile urethra and poor proximal urethral closing pressures. Many of the patients with SUI also had poor maximum urethral closing pressures (MUCP) leading to a tendency to include low MUCP as part of the diagnosis. It was subsequently realised in the spina bifida group and other sub-groups of people with ISD that MUCP could be quite high and still the patient was severely incapacitated with SUI if the proximal urethra was open. A relatively simple technique then evolved for quantifying ISD. That technique, more easily performed than direct proximal urethral pressure measurement, is the abdominal leak point pressure or ALPP.

Aetiology

ISD is more frequently diagnosed in women than men. Risk factors for the development of ISD can be divided into structural and neurological, although there is overlap between these two categories. Structural causes relate to tissue changes in the urethral wall and its vasculature which can be altered by previous urethral surgery (including anterior vaginal repair, surgery for urethral diverticulum, incontinence surgery, bladder neck incision and prolonged catheterisation), ageing, pelvic irradiation or urethral trauma, for example secondary to pelvic fracture.

Other risk factors for ISD, probably mediated neurologically, include myelodysplasia, Shy-Drager syndrome, spinal cord injury or infarction. ISD can also be neurologically mediated following radical pelvic surgery for gynaecological or colorectal malignancy. So called ‘simple’ hysterectomy, that is a hysterectomy performed for benign disease, is not a recognised cause of ISD. Whether simple hysterectomy is responsible for any urinary dysfunction is controversial. Urethral denervation or loss of hypogastric nerve (sympathetic neural activity) may also result in ISD. Patients with spina bifida typically have poor compliance, detrusor areflexia and a non functional proximal urethra which is wide open. They have the most severe form of ISD.
The subset of female patients who have a history of failed incontinence surgery are over represented in the ISD population compared with their non treated incontinent counterparts. One previous failed procedure for SUI carries a risk of subsequent diagnosis of ISD in 25% of cases and two previous failed surgeries a risk of 75%. One of the functions of the prostate is passive sphincteric activity. In combination with the bladder neck, it is closed at rest, thereby resisting leakage due to increased abdominal pressure. Almost all ISD in male patients is due to prostatic disease or its treatment, particularly radical retropubic prostatectomy. Although there may be some loss of support following radical prostatectomy (RP), the dominant condition causing severe urinary leakage is ISD. Other causes of ISD in men include spina bifida, T12 spinal pathology and abdomino-perineal resection.

Radical retropubic prostatectomy has been associated with highly variable rates of urinary leakage depending on the definition of incontinence and methods of data collection. Although rates of leakage up to 87% have been documented in series of men after RP, more current series are associated with fewer than 5% of men having significant ISD. A smaller group require surgical intervention and the rate of incontinence is decreasing as surgical technique is further refined. Bladder outflow obstruction with overflow incontinence and detrusor instability occur in this population but ISD from urethral outflow obstruction with transurethral resection, bladder neck incision or other method of tissue enucleation such as holmium laser, open prostatectomy, cryotherapy or bipolar diathermy are also at risk of structural sphincter damage and resultant ISD, although, except for the cryotherapy group, the incidence of ISD is low in each sub-group and post operative incontinence is more frequently a result of detrusor dysfunction.

### How does ISD differ from urethral hypermobility?

The distinction between Type I and II SUI (urethral hypermobility) and Type III or ISD has been used to allocate treatment for people with SUI. The pathological mechanism of leakage in Type I and II SUI was originally described by Enhorning in 1961 who suggested that the pressure increase during abdominal straining was neutralised if the urethra lies in an intra-abdominal position. This concept was support by basic science research in cats.

Basic scientific research investigating SUI models in cats simulated the neurological, structural and pharmacological factors which causes SUI. The animals were catheterised and perfused to determine the effects of sacral rhizotomy (a neurological insult), curare administration (muscular blockade), phentolamine administration (alpha blockade) and direct weights on the bladder on urethral and vesical pressures.

Total denervation of the pelvic floor as a result of rhizotomy did not result in stress incontinence. While curare and rhizotomy diminished the MUCP, no SUI occurred. Phentolamine was associated with lowered proximal urethral pressures and severe SUI as the proximal urethra became isobaric with the bladder.

The effect of direct weights being placed on the bladder was evaluated with and without the abdomen being open. With the abdomen closed, urethral and bladder pressures rose as abdominal pressure increased, always maintaining a positive urethral closing pressure. The application of weights to the bladder caused an increase in bladder pressure without a corresponding increase in urethral pressure resulting in urethral leakage. This simulates urethral hypermobility where there is a short-lived loss of pressure transmission of intra-abdominal pressure to the urethra while the bladder is still exposed to the increased pressure.

Provided the intra-abdominal position of the urethra is maintained (via normal urethral support), the urethra remains closed during increases in intra-abdominal pressure. If, however, the urethra descends, abdominal pressure will cease to close off the urethra and leakage will occur. This is different to the pathological mechanism involved in ISD, where the efficiency with which the sphincter resists rises in intra-abdominal pressure is altered due to an absence or weakness of internal sphincter coaptation, leading to leakage driven by a lower abdominal pressure.

Table 1. Types of SUI as adapted from McGuire

<table>
<thead>
<tr>
<th>Type of SUI</th>
<th>Definition</th>
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<tr>
<td>I</td>
<td>Proximal urethral closing pressure greater than 10cmH(_2)O at 0.5cm from vesical outlet, leakage associated with minimal rotational descent of the urethra (45(^\circ) or less).</td>
</tr>
<tr>
<td>II</td>
<td>Proximal urethral closing pressure greater than 10cmH(_2)O at 0.5cm from vesical outlet, leakage associated with gross rotational hypermobility of the urethra (greater than 45(^\circ)).</td>
</tr>
<tr>
<td>III</td>
<td>Proximal urethral closing pressure less than 10cmH(_2)O at 0.5cm from vesical outlet or a non functional open ‘internal’ sphincter and leakage not necessarily leakage associated with rotational descent of the urethra.</td>
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Thus there is a passive mechanism of support responsible for ISD, and an active support mechanism responsible for urethral support and prevention of urethral hypermobility. In this ‘hammock theory’ of active urethral support 16, the pelvic floor structures, in particular pubococcygeus contraction, causes the arcus tendineus to provide a backbone of support for urethral closure during a rise in intra-abdominal pressure.

There is also a clinical difference between SUI due to Type I/II versus Type III incontinence. Patients with Type I/II have lesser grades of incontinence and are less likely to have had previous surgery 17. In its pure form, urethral hypermobility causes leakage with high ‘impact’, for instance, coughing, sneezing, hearty laughing, and exercise (especially running and aerobics). Patients give a history of wearing pads for specific circumstances. There is usually minimal secondary bladder dysfunction, though it can occur with increasingly severe cases. On examination of the patient with Type I and II SUI, leakage on observation does not occur until the urethra has descended. During urodynamics, a stable compliant, normally sensitive bladder with no leakage until the urethra reaches a critical degree of descent is seen. These types of incontinence are often associated with mild degrees of mixed pelvic organ prolapse.

The diagnosis of Type III SUI is usually associated with a higher grade of leakage, and less provocation is required to induce leakage. Patients leak with minor movements such as standing, walking, bending, nose blowing or a sudden movement like tripping. The patients are often more elderly and their symptoms may appear like urge incontinence. The key is that while very little effort provokes leakage, some effort is required. However, these subjective measures cannot be used in isolation to diagnose ISD or Type III SUI. Studies comparing the correlation between symptoms and urodynamic findings do not show symptoms alone help differentiate the aetiology of the incontinence 17. The importance of making a diagnosis, especially if leakage is severe, is precisely that ISD may be curable, whereas, at best, if the cause is an overactive bladder, improvement is expected to a highly variable extent.

How is ISD diagnosed?

History and examination

Initially a clinical assessment is made. The clinical picture in the patient with ISD is dominated by exertion related leakage though, as discussed, minimal movements may provoke leakage. Assessment of these patients initially should include a history of leakage, severity, pads used, other lower urinary tract symptoms, symptoms of urge incontinence, elucidation of risk factors for ISD (see above) and general medical and obstetric history, including parity and risk factors for subsequent pelvic floor dysfunction such as instrumented delivery, length of second stage and large size of baby. Although there have been no systematic studies, it appears that obstetric factors per se are rarely responsible for ISD.

Physical examination involves evaluation of urethral mobility and support, the presence of pelvic organ prolapse and each vaginal compartment needs to be systematically evaluated with or without the POP-Q (ICS standardisation). The pelvic floor muscle function should be tested and a neurological evaluation of the perineum should be performed.

Urodynamics

Urodynamic assessment is then undertaken after ascertaining that the routine urine microscopy and culture is normal. McGuire 5 evolved the concept of ALPP measurement and provided a detailed description of how to perform this test during the urodynamic assessment. Identification of ISD involves a few relatively simple principles. Firstly bladder function, its sensation, stability and compliance, must be evaluated before the urethra is evaluated. In practice, if there is a strong history of stress incontinence, it is reasonable to evaluate bladder function to a point where the bladder is comfortably full and there has been no compliance shift or instability.

With the aid of fluoroscopy, the ALPP is done at a comfortable volume, typically 200-250cc with the patient in an upright position. The characteristics of bladder morphology (presence of trabeculation, diverticula and vesico-ureteric reflux), including whether the bladder is open or closed at rest, urethral support during a Valsalva manoeuvre or cough and characteristics of cystocele, are readily apparent.

During urethral assessment, the presence of an open bladder neck is recorded. Urethral mobility is then assessed by a maximal coughing effort by the patient and the extent of urethral descent and the nature of an associated cystocoele are recorded. The ALPP is then determined. This is the lowest vesical pressure at the time of leakage due to a manoeuvre, either cough or Valsalva which causes a rise in intra-abdominal pressure. The measurement must be reproducible.

The determination of ALPP is refined by repeated manoeuvre until the lowest pressure at which leakage occurs is recorded. Leakage is detected radiographically, which makes the assessment of leakage more discreet for the patient, though the impact of this on the patient (versus direct visualisation of leakage), has not been tested.

In the presence of a large cystocele, the prolapse must be reduced and the ALPP re-assessed. In practice, it is easy to return the fluoroscopy table to the supine position, and repeat the ALPP with the cystocele reduced e.g. held in place with the back-blade of a duck-bill speculum.

During urethral assessment, it also appears to be helpful to determine how much abdominal pressure is generated by a given
patient. Some elderly patients will have difficulty generating as little as 70 cmH\textsubscript{2}O pressure when measured intra-abdominally and their symptoms of urethral dysfunction may sound just like urge incontinence because they leak en route to the bathroom and perform very little exertion. Others with severe stress incontinence will have classic type II urethral hypermobility and will take 150 cmH\textsubscript{2}O to produce leakage. Although both groups may leak profoundly, their treatment is logically different. In the latter, an effort to stop urethral movement is required and ISD is absent so the treatment does not have to produce urethral coaptation. In pure ISD with good support, clearly an injectable may suffice.

McGuire \textsuperscript{1} related ALPP to the original Type I, II and III classification system, Type III or ISD being associated with an ALPP of <60 cmH\textsubscript{2}O. Type II SUI was associated with intermediate pressures (60-90 cmH\textsubscript{2}O), though there were patients outside that range (outliers), and Type I typically required greater than 90 cmH\textsubscript{2}O. There are treatment implications for these sub-groups. One good example is the work by Faerber and others \textsuperscript{39} in which superior cure rates for ISD patients outside that range (outliers), and Type I typically required greater than 90 cmH\textsubscript{2}O. There are treatment implications for these sub-groups. One good example is the work by Faerber and others \textsuperscript{39} in which superior cure rates for transurethral collagen were achieved in the Type I sub-group.

**How important are fluoroscopic urodynamics?**

The advantages of fluoroscopic urodynamic studies (FUDS) are three fold. Firstly, they provide an opportunity to accurately and reproducibly record the ALPP. With fluoroscopy, the exact pressure at which leakage occurs when provoked by a cough or Valsalva can be determined.

The second advantage of FUDS is they provide anatomical information about structure and function such as the presence of urethral hypermobility, prolapse and its degree, bladder diverticula or trabeculation and vesico-ureteric reflux. The site of leakage (bladder neck or internal sphincter versus striated sphincter) can also be seen and, importantly, if the bladder neck is open at rest. The site of urethral obstruction is also demonstrated and the bladder leak point pressure can be readily determined.

Finally, they provide for less error due to misinterpretation of the pressure trace as the investigator can simultaneously assess the anatomical detail of the lower urinary tract. This allows more specific elucidation as to the reason behind associated bladder dysfunction and assessment of what the bladder is doing at the exact point of leakage. This can also be recorded and reassessed. Despite these advantages, the yield of urodynamic studies performed with fluoroscopy versus without fluoroscopy has not been systematically evaluated.

**Controversy about leak point pressures**

Firstly, the terms Valsalva leak point pressures, ALPPs and stress leak point pressures have been used interchangeably in the literature. In practice, the Valsalva provides a highly graduated manoeuvre for refining the precise ALPP. Both cough and Valsalva are used to check what the value is for a given patient, and some people are unable to perform a Valsalva manoeuvre despite clear instructions.

The problem with application of ALPP has been its continual performance in a non-standardised fashion, as it is often stated, “no standardised measurement can be agreed upon” \textsuperscript{19, 20}. This has led several authors to conclude it lacks validity despite evidence to the contrary \textsuperscript{20}. While McGuire acknowledges it is not a useful measurement in isolation, details of testing need to be attended to ensure accuracy and reproducibility (Table 2) when it is used. Changes in testing method including catheter size, volume at testing, patient position and the absence of a fluoroscopic study; all affect its reproducibility \textsuperscript{21}.

Additionally, some patients are unable to generate sufficient intra-abdominal pressure increases for its measurement. In these patients, a cough leak point pressure or CLPP was suggested by McGuire and has been validated in subsequent studies \textsuperscript{22}. Urethral rigidity may allow the catheter to splint the urethra and prevent leakage and large cystoceles need to be reduced to determine the ALPP, otherwise urethral dysfunction may be masked \textsuperscript{21}.

Measurement of the ALPP is useful as it provides additional information about the patient’s SUI prior to deciding on an appropriate treatment. As yet, there are limited data correlating its measurement with treatment outcome, but, as a diagnostic tool, strong correlation between the subjective degree of SUI and the ALPP exists \textsuperscript{24}. Properly applied, ALPP has the ability to distinguish between ISD and urethral hypermobility, to allow grading of sphincter dysfunction depending on pressure at which leakage occurs, and to use as a starting point to plan treatment.

Ghoneim recently proposed a sub-classification of the Type III group into ISD-A, B or C, where C is the equivalent of the classic pipe-stem urethra \textsuperscript{25} and each lesser category has a differing degree of opening of the bladder neck and level of ALPP. While this approach provides an additional way to try

**Table 2. Conditions required for ALPP measurement.**

- Patient in upright or semi-recumbent position.
- Bladder filled with saline and contrast to 200-300ml or 2/3 of capacity as indicated by voiding chart.
- Normal compliance on CMG.
- Prolapse corrected with ring or back blade of speculum.
- Fine calibre catheter intravesical (9F originally) – if no leak seen, especially in male population, catheter may be removed and cough/valsalva repeated.
- Fluoroscopy.
and objectify the diagnosis, its relationship to treatment outcome remains untested.

**ALPPs in men**

Men with post-operative incontinence after either trans-urethral surgery or RP represent a special subpopulation of patients with ISD. An increase in urethral rigidity in this group raises the possibility that urethral leakage will be masked by the very presence of a urethral catheter. In practice, this rarely constitutes a diagnostic dilemma, as removal of the catheter and repetition of the coughs and Valsalva manoeuvres usually demonstrates the leakage.

If a rectal line is present, an estimate of ALPP may be achieved. It needs to be considered that the components of the ALPP that are usually included in the measurement are no longer acting (namely the pressure of the fluid in the bladder and the pressure due to the bladder wall). Thus an ALPP measured by the rectal line will be lower than one measured urethrally. Apart from outcome studies relying on the measurement, this is not likely to have clinical significance.

**MUCP versus ALPP and ISD**

The MUCP is measured during the urethral pressure profile and is the site of maximum urethral closure pressure gradient between the urethra and the bladder. A cut-off of less than 20cmH₂O is usually taken to diagnose a low-pressure urethra, a term that has been used interchangeably with ISD. The site at which MUCP occurs is also the flow control zone and the site of maximum urethral resistance. It corresponds to the rhabdo-sphincter, or skeletal muscle external sphincter, and is under voluntary control as well as subject to reflex changes during bladder filling (the guarding reflex). It is the zone where sphincter dyssynergia typically occurs during detrusor hyperreflex in upper spinal cord injury.

Those diagnosed with myelodysplasia or spina bifida best illustrate the pitfalls of using the MUCP to diagnose ISD. Spina bifida is a condition associated with severe stress incontinence; virtually any exertion causes leakage. In spina bifida, the external sphincter mechanism is closed and the pressures are often even relatively high. Despite high MUCP, they leak profoundly with exertion because their internal sphincter or bladder neck is wide open.

There are several other problems with relying on the measurement of urethral pressures using urethral pressure profilometry (UPP) and MUCP in the diagnosis of ISD (Table 3). There is considerable overlap between normal and pathological measurements as there is a recognised drop in MUCP with age and menopause that occurs in continent and incontinent subjects.

The MUCP and ALPP do not correlate strongly. This may be due to the overlap in values for the MUCP in continent and incontinent subjects, but they may also be assessing different mechanisms. Pajoncini suggests the MUCP assesses the internal sphincter or bladder neck function, whilst the ALPP assesses the rhabdo-sphincter. This theory may fit with Ghoneim's sub-classification of ISD, where the very mild cases (ISD-A) are difficult to diagnose and may be more accurately shown on MUCP measurement, but contradicts work by McGuire and others on the myelodysplasic population (spina bifida).

When a sling cures SUI, the ALPP rises, typically to infinity. After collagen injections cause improvement without cure, a definite rise in ALPP is seen. The same changes do not occur with MUCP which cannot be used as an outcome measure for SUI treatments.

**ISD treatment options**

As with other forms of stress incontinence, the treatment options for patients with ISD can be considered to be conservative, pharmacological or operative.

Conservative options are appropriate initially in any patient and may be the therapy of choice in those unfit to undergo surgery. Any reversible factors such as lack of oestrogen or atrophy, weight, chronic coughing and constipation should be addressed. The importance of ISD in the very elderly is that incapacitating incontinence may still be curable, highlighting the importance of making a diagnosis in the severely incontinent.

Although not yet released, clinical trial data for the drug duloxetine show efficacy for both people with ISD and urethral hypermobility.

The surgical options for ISD include injectable agents, of which there are three commonly available, different types of sling...
Injectable agents or bulking agents have been used for many years to treat ISD. Many agents have been tried, including glutaraldehyde cross-linked collagen, carbon particles, silicon macro-particles and older substances such as polytetrafluoroethylene (Teflon®). Collagen is a highly purified bovine dermal collagen that is cross linked with glutaraldehyde and dispersed in a phosphate-buffered physiologic saline. Its use in the treatment of incontinence was first reported in 1989. Hypersensitivity to collagen may occur and skin testing is therefore mandatory 1 month before intra-urethral use.

All agents are absorbed to some degree and collagen, being the most biocompatible, is also possibly the most readily absorbed. It can be placed trans-urethrally or peri-urethrally, with the former option more widely practised due to its ease and greater precision. Post-operative complications are uncommon. Success rates vary, with papers quoting between 13% and 77% of patients dry at 18 months or more.

There are few controlled studies of silicone macro-particles (Macroplastique®, Uroplasty Inc., Minneapolis, MN, USA, typically injected peri-urethrally) versus collagen. Silicon is inert and therefore does not provoke a granulomatous reaction such as was seen with Teflon® previously. Small particle size minimises the risk of migration (150µm). There is a higher rate of post-operative retention with Macroplastique® than with collagen, though this is almost always temporary. Success rates with a single injection of up to 60% (cured and significantly improved) have been reported. A prospective randomised study of collagen versus Macroplastique® did not demonstrate an objective difference between the two agents. Duraspheres® [Carbon Medical Technologies Inc., St Paul, MN, USA], when compared with collagen in a non-randomised follow up study, had similar rates of patient satisfaction (33%).

There is strong evidence that the use of suburethral slings show durable results for cure of stress incontinence due to ISD or urethral hypermobility. This led to their widespread use by many urologists for the treatment of either Type II or Type III stress incontinence.

Historically, many and varied materials have been used for suburethral slings, including autologous tissues such as rectus fascia, fascia lata, external oblique aponeurosis, pyramidalis fascia and pubocervical fascia or other non fascial tissues such as uterine or round ligaments, palmaris longus tendon, vaginal wall. In a recent review, Gomelsky and others concluded that rectus fascia and facia lata slings were durable and safe and should be considered the “gold standard” of material available for sling surgery.

Cadaveric tissues or allograft slings have also been used to try to minimise the morbidity associated with harvesting the native tissue but concerns still exist regarding the transmission of prions such as CJD in such tissues. The short-term results for such slings are similar to their autologous counterparts but long-term data are not available. Xenograft slings such as porcine dermis has also been used but, again, the data are early. DNA has also been extracted from some of these tissues so, as with allografts, there are concerns regarding prion or viral transmission.

Synthetic materials for use in suburethral slings have been experimented with since the 1950s with the use of nylon and perlon. A number of materials have been tried over the years, including silastic, Gore-tex®, Marlex® and Mersilene™. These sling types have not gained widespread use usually due to high infection or erosion rates.

Modification of the synthetic approach, along with an aim to restore the ‘fulcrum like interaction’ between the pubourethral ligament and the anterior vaginal wall in the treatment of SUI due to hypermobility, led to the development by Ulmsten of the Tension Free Vaginal Tape. The placement of a TVT for SUI has gained enormous popularity and widespread use, with in excess of 200,000 procedures performed in Europe alone.

The TVT exploits the ‘hammock’ theory of DeLancey, with restoration of the pubourethral ligaments and the suburethral vaginal wall by placement of a prolene tape around the midurethra. This produces a kinking affect with rises in intraabdominal pressure. In the original study group, a 91% cure rate with a minimum follow up of 12 months is quoted.

As with needle and colposuspension type surgery in patients with ISD, TVT placement in ISD is associated with a lower overall treatment success rate. The Ulmsten group report an absolute cure rate of 74% in a prospective study of 49 women with a mean follow up of 4 years. This is likely to be a result of the different pathophysiology of the condition of ISD, where there is intrinsic weakness of the sphincter and not loss of its supports and therefore intra-abdominal position.

Artificial urinary sphincters (AUS) in the treatment of female ISD are rarely required, but may be appropriate in select women, where concerns exist about poor detrusor function that may lead to an ongoing requirement for ISC post operatively if a suburethral sling is used. AUS implantation is more frequently used in the male post operative ISD population, where injectables have a lower success rate due to the presence of scarring. There is ongoing work in the use of male slings for this population.

Adjustable balloons have also been employed for treatment of male stress incontinence, although there are no long-term data to

90 Vol. 10, No. 4 • Summer 2004
date. The advantage of balloons and slings over the AUS is that they do not depend upon patient dexterity and the need to psychologically overcome the presence of a pump in the scrotum which has to be manipulated to enable bladder emptying to occur.

Conclusions
There is a paucity of basic science research in the literature on urethral function. It is clear that there are two mechanisms by which stress incontinence may occur. Urethral hypermobility and ISD are distinct concepts in the pathogenesis of SUI, however, in practice, many patients have features of both. ALPP is a measure that is readily diagnosed with fluoroscopic urodynamics and permits identification of ISD, quantification of urethral closure function if subsequent comparison is desired. It measures proximal urethral closure function as distinct from MUCP. The use of ALPP can be further applied to more specialised populations of ISD patients such as men post RP or the spina bifida group.

Once the clinical findings and urodynamics support the diagnosis of ISD, several treatment options are available that need to be tailored to the individual patient. A tendency for people to devise their own methods of testing leak point pressures has led to discrepancies in their utility. Leak point pressures are simple useful concepts which complement the cystometrogram and anatomical studies. There are few controlled studies evaluating the utility of concepts such as ISD, the relative value of leak point pressures or the prevalence of ISD. ISD is a potentially curable severe form of SUI which may be readily diagnosed.

References


Clarification
Re article by Denise Edgar, Dry Nights – a community education programme to increase parents’ awareness of managing bed wetting, Australian and New Zealand Continence Journal Vol.10 No.3: p.61-65. The brand name of the desmopressin acetate product produced by Ferring Pharmaceuticals is MINIRIN.

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