

W20: Voiding Dysfunction after Sling Surgery

Workshop Chair: David Castro-Diaz, Spain

27 August 2013 09:00 - 12:00

Start	End	Topic	Speakers
09:00	09:05	Introduction	<ul style="list-style-type: none"> David Castro-Diaz
09:05	09:25	Postoperative voiding dysfunction. Physiopathology and risk factors	<ul style="list-style-type: none"> David Castro-Diaz
09:25	09:30	Discussion	All
09:30	09:50	Evaluation and diagnosis	<ul style="list-style-type: none"> Tufan Tarcan
09:50	10:00	Discussion	All
10:00	10:20	Treatment and outcomes	<ul style="list-style-type: none"> Christopher Chapple
10:20	10:30	Discussion	All
10:30	11:00	Break	None
11:00	12:00	Case discussion on postoperative voiding dysfunction after sling surgery. Urinary retention, High post-void residual, Poor urinary flow, Urinary frequency, Urgency incontinence, Pelvic pain	All

Aims of course/workshop

Sling surgery is the most common procedure performed to treat stress urinary incontinence (SUI) in women. Although most of women obtain cure of incontinence after surgery, a small minority develops voiding dysfunction clinically manifested as significant post-void residual, poor flow rate, urgency and urgency incontinence or pelvic pain which quite often are not easy to deal with. In the absence of clear guidelines, evaluation and management of post-sling voiding dysfunction continues to be controversial particularly in regards to time and choices of therapy.

The aim of this workshop is to discuss the different options for the evaluation and management of voiding dysfunction after sling surgery for SUI.

Voiding Dysfunction after Sling Surgery

Aims and Objectives

Sling surgery is the most common procedure performed to treat stress urinary incontinence(SUI) in women. Although most of women obtain cure of incontinence after surgery, a small minority develops voiding dysfunction clinically manifested as significant post-void residual, poor flow rate, urgency and urgency incontinence or pelvic pain which quite often are not easy to deal with. In the absence of clear guidelines, evaluation and management of post-sling voiding dysfunction continues to be controversial particularly in regards to time and choices of therapy.

The aim of this workshop is to discuss the different options for the evaluation and management of voiding dysfunction after sling surgery for SUI.

Educational Value

After taking part in this workshop participants will be able to identify and properly manage voiding dysfunction after sling surgery for SUI including: evaluation, timing and methods of intervention and outcomes. Typical clinical cases of those different scenarios of postoperative voiding dysfunction will be openly discussed with the attendants. Decision tree analysis through Evidence Base Medicine tools will be used.

Description

Topics to be covered during the workshop will include:-Introduction:-Postoperative voiding dysfunction: definition and epidemiology. Etiology of postoperative voiding dysfunction after sling surgery. Risk factors for postoperative voiding dysfunction.-Evaluation and diagnosis: Evaluation for potential postoperative problems. Evaluation of urinary retention. Role of urodynamics. -Treatment and outcomes: Conservative treatment. Medical treatment. Surgical approach. Recurrent stress urinary incontinence. Evaluation of postoperative voiding dysfunction following sling surgery. Timing of intervention. Operative failures or non-obstructed patients. Clinical case discussion including the different scenarios of postoperative dysfunction will be shown in a step up approach finding the most appropriate evidence based management.

Speakers

Prof. Dr. David Castro-Diaz. University of La Laguna. Spain

Prof. Dr. Tufan Tarcan, Marmara University. Istanbul. Turkey

Prof. Dr. Christopher Chapple, Royal Hallamshire Hospital, University of Sheffield.UK

Schedule

09.00.-Introduction

09.05.-Postopetative voiding dysfunction. Physiopathology and risk factors

D. Castro-Diaz

09.25.-Discussion

09.30.-Evaluation and diagnosis

T. Tarcan

09.50.-Discussion

10.00.-Treatment and outcomes

C. Chapple

10.20.-Discussion

10.30-11.00 Break

11.00-12.00 Case discussion on postoperative voiding dysfunction after sling surgery.

-Urinary retention

-High post-void residual

-Poor urinary flow

-Urinary frequency

-Urgency incontinence

-Pelvic pain

Audience

Urologists and Gynaecologists

Level

Advanced

Keywords: Urinary stress incontinence, Urethral sling, Voiding dysfunction, Female

Postoperative voiding dysfunction

Incidence, Physiopathology and risk factors.

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Stress urinary incontinence in women is a very old problem for which more than 200 surgical procedures have been described with no one providing perfect outcome [1]. Within the last decade there has been a shift from classic techniques, mostly colposuspension and pubovaginal sling procedures, to midurethral synthetic tapes which have currently become the gold standard for the management of SUI, with several hundred thousand women been operated every year [2].

Voiding dysfunction after sling surgery is typically diagnosed when a patient shows de-novo symptoms or signs of lower urinary tract dysfunction including: urinary retention, high post-void residual urine, poor urinary flow, urinary frequency, urinary urgency, urinary urgency incontinence or pelvic pain. If these symptoms arise right after the sling procedure, the diagnosis of postoperative lower urinary tract dysfunction can be easily made. However sometimes this is not the case as symptoms may gradually develop even one year after the procedure [3].

Incidence

The incidence of postoperative voiding dysfunction across various procedures is variable and is difficult to compare. Historically the incidence of postoperative voiding difficulties lasting longer than 4 weeks occurred in 3% to 7% of patients undergoing Burch procedures, in 4% to 8% of those undergoing transvaginal needle suspensions, and in 3% to 11% of patients undergoing sling procedures. The reported incidence of voiding dysfunction, including urinary retention and de novo urgency and urge UI, following midurethral sling procedures ranges from approximately 2% to 25% [4]. This variability in the incidence of has been attributed to differences in recognition and diagnosis of urethral obstruction due to urethral hyper suspension as the lack of consistent clinical and diagnostic urodynamic criteria remain a dilemma. Furthermore, patient loss to follow-up may be an important confounding factor [5].

Physiopathology and risk factors.

Surgical intervention for voiding dysfunction and urinary retention has been reported in 0% to 5% of patients undergoing midurethral sling [4], while short-term voiding difficulties following Burch procedure appear to be more likely than following TVT [6] and it seems to be also the case for

pubovaginal slings as compared with TVT [7]. This may be easily explained because midurethral sling procedures are mechanically tension free likely resulting in an overall lower incidence of postoperative voiding dysfunction than seen with other types of open SUI. Transobturator slings have been found to promote a lower rate of postoperative voiding dysfunction than retropubic TVT. It has been observed that in patients undergoing midurethral sling placement, urinary retention and de-novo urgency / urge incontinence is less likely when using the transobturator versus the retropubic approach [8-10]. In addition to a lower incidence of de-novo urgency and urge incontinence, retrospective data suggests that resolution of preoperative detrusor overactivity is also greater in patients undergoing transobturator midurethral slings as compared to retropubic midurethral slings and bladder neck slings (47 % resolution versus 35 % and 14 % respectively) [11].

Voiding dysfunction after sling surgery is mostly related to varying degrees of urethral obstruction created by the sling [3]. In cases of complete urinary retention the detrusor muscle is not able to overcome the augmented urethral resistance created by the sling. In cases of milder postoperative voiding dysfunction, when there is no complete retention, but the patient express symptoms of frequency, urgency, urgency incontinence with or without poor urinary flow and poor urinary flow, the sling may be only partially obstructive. In these circumstances diagnoses not easy to make because at least some postoperative increase in urethral resistance has been noted to occur after sling placement [12].

Voiding pressure (PdetQmax) has been shown to be increased after pubovaginal sling procedure suggesting that this technique might promote bladder outlet obstruction [13]. However it is not clear whether or not tension free mid urethral slings increase voiding pressure as contradictory data exist with some studies suggesting increase of voiding pressure [14], while others have found no change in Pdet Q max after the procedure [15]. Consequently the evidence for postoperative obstruction after a successful midurethral sling surgery is rather weak. Given the finite incidence of urinary retention and de-novo voiding dysfunction after midurethral sling surgery, one can certainly surmise that at least some element of obstruction must occur likely being the main cause of postoperative voiding dysfunction particularly if we consider that many women suffering of SUI void their bladder by relaxing the pelvic floor and with low or no increase in detrusor pressure. In this particular group of patients minimal obstruction may explain retention and postoperative voiding dysfunction after a correct placement of a midurethral sling. On the other hand detrusor overactivity at higher volumes might be unmasked after the procedure as storage of urine in the bladder is more effective after resolution of-incontinence [17].

Some other risk factors for postoperative voiding dysfunction include advanced patient age, the presence of a high postvoid residual volume, and the use of Valsalva effort to void during preoperative urodynamic evaluation [16]. Furthermore the risk of either urinary retention or voiding dysfunction is increased in patients who have undergone prior prolapse surgery, prior incontinence surgery, and in those with a maximum urinary flow rate less than 15 ml /second [16-18].

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Voiding Dysfunction after Sling Surgery

Evaluation and Diagnosis

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Introduction

The methodology of clinical evaluation of a patient with voiding dysfunction (VD) after a midurethral sling (MUS) remains controversial. The presenting symptoms may vary in terms of the type and the severity in a range between urinary frequency and urinary retention. The pathophysiology of VD after MUS is not well understood although it is believed to be related to the urethral obstruction or irritation by the mesh in the majority of the cases [1]. Other causes such as bladder perforation, pelvic hematoma, urethral erosion or vaginal extrusion of the mesh should always be considered in the differential diagnosis. Although, obstruction appears to be the main etiological factor there is not a precise method to diagnose obstruction and predict the patients who will benefit from a urethral relieve surgery [2,3]. This part of the workshop will focus on the clinical and urodynamic evaluation of a patient with VD after MUS aiming to find the etiology and the appropriate treatment.

First Voiding Trial after MUS

The initial clinical evaluation of a patient after MUS starts at the time of the first voiding trial after surgery. There are several methods to perform the first voiding trial that can affect the incidence of VD. For example, Foster et al have shown that women after MUS are more likely to empty their bladders effectively before discharge if they are evaluated with a backfill-assisted voiding trial compared to spontaneous natural bladder filling and emptying [4]. Kim et al have further shown that postoperative VD is common in the early postoperative period but may be transient and associated with the immediate voiding conditions following surgery such as increased fluid load and bladder overdistention [5]. The latter study has shown that that even among patients who fail the initial voiding trial, 36.8% successfully can void on subsequent trials. On the other hand, Wheeler et al have demonstrated that 16.4% of patients who pass the initial voiding trial may fail on the second [6]. The aforementioned studies suggest that the bladder should not be overfilled for the first voiding trial and approximately 1/3 of the failures can successfully empty their bladders in subsequent trials.

When the patient cannot void after MUS surgery many surgeons prefer indwelling bladder catheterization up to one week (3 to 7 days) and re-test the patient after catheter removal. There is however almost no consensus in the literature about the strategy to follow when the voiding trial one

week after sling surgery fails. In cases of retention lasting longer than one week some surgeons prefer an early surgical intervention to cut the tape whereas some prefer to switch to clean intermittent catheterization as advocated by Elliott and Comiter [7]. However, there is a paradigm shift among surgeons toward earlier intervention since delayed time to urethrolysis and longstanding obstruction can potentially lead to irreversible bladder dysfunction.

Clinical Evaluation of Persistent VD after MUS

Women who present with any type of LUTS anytime after a MUS surgery have to undergo a thorough clinical assessment that includes a detailed history, physical examination, urine analysis and culture, frequency-volume charts (FVC), validated symptom and Q&L scores, radiological evaluation and uroflowmetry with post-void residual (PVR) measurement. For referral patients, operative reports indicating the type of sling surgery and the mesh, the preoperative symptoms and preoperative urodynamic findings (if they exist) should be known. Invasive (video) urodynamic studies and cystoscopic evaluation should be the secondary steps in cases who do not respond to conservative measures or medical treatment. However, urodynamic studies are not recommended for patients who develop postoperative retention but had adequate emptying prior to sling surgery. This situation clearly indicates a urethral obstruction and requires sling incision or urethrolysis. Video- urodynamic studies including pressure flow studies are typically reserved for patients where the etiology could not be clarified especially for those who can empty their bladders but have de-novo storage symptoms [7].

The Spectrum of VD after MUS and Timing of Presentation

A detailed history regarding the type and onset of symptoms is the most important part of the basic clinical evaluation. The presenting symptoms may include storage symptoms such as increased frequency, urinary urgency, nocturia and urgency incontinence or, emptying symptoms such as hesitancy, straining to void, weak urinary stream, incomplete emptying and urinary retention. Patients may also present with bladder pain, dysuria or urinary tract infections.

Unfortunately, specific definitions do not exist for postoperative VD after MUS and the definition of VD varies between studies. Urinary retention after MUS may be defined as catheter-dependency for at least 28 days [8]. There is no consensus about the cut off level of PVR after voiding trials that necessitates catheterization. For a clinically significant PVR, some authors propose proportional definitions such as 20 to 50% of the bladder capacity whereas others use clearly defined levels of PVR ranging from 100 to 150 ml [7]. The discomfort of the patient also plays an important role in the decision making for clean intermittent or indwelling catheterization. It is also to note that symptoms that persist beyond 4 weeks after sling surgery rarely resolve spontaneously [9].

The timing of symptoms is the best diagnostic parameter to understand the etiology so that symptoms that were not present preoperatively but appear after a MUS surgery should be considered as mesh- or surgery-related. Supporting that view, Patel et al have indicated “the temporal relationship between the sling procedure and onset of symptoms” as the single most important factor in the diagnosis

of sling-related obstruction or VD [8]. However, it should also be kept in mind that VD may develop insidiously and in these cases VD may not be easily related to the previous MUS surgery. For example, Carr and Webster have reported that in women with postoperative VD following prior incontinence surgery, 12 % of them described a gradual onset of symptoms as remote as one year or greater (2). It has also been suggested that mild symptoms after MUS are under-diagnosed and under-reported that in part may play a role in cases of insidious onset [10]. A high index of suspicion is certainly needed in cases with insidious onset of symptoms following MUS surgery.

Risk Factors to Note

Many authors have studied the preoperative urodynamic and clinical parameters to predict VD after a sling surgery. During the clinical evaluation of a patient with postoperative VD, it may be helpful to re-consider those findings although contradiction in the literature exists.

For example, the type of MUS surgery and concomitant vaginal surgeries, age and parity may affect the incidence of postoperative VD. In a meta-analysis, postoperative urinary retention was found to be slightly more in women undergoing RPMUS than those undergoing TOMUS [11]. Brubaker et al also reported that VD requiring surgery (and/or catheter use) was more common after RPMUS compared to TOMUS [12]. Houwing et al have compared VD rates and the need for reoperation between patients having MUS procedures alone versus those having MUS procedures with concomitant prolapse repair [13]. They have found that RP- or TOMUS with concomitant prolapse repair had a higher incidence of VD in the immediate postoperative period that however did not persist to the six-week follow-up visit. The authors concluded that there was no greater risk of lasting VD or need for reoperation after concomitant procedures.

Several authors have suggested that preoperative urodynamic findings indicating relatively impaired detrusor contractility may predict postoperative VD. For example, Kleeman et al have shown that a preoperatively high PVR was a significant risk factor in predicting the postoperative VD after different types of anti-incontinence and prolapse surgeries [14]. In another study, Miller et al have found that no other preoperative urodynamic parameters but a detrusor pressure less than 12 cmH₂O was significantly associated with urinary retention after pubovaginal sling surgery [15]. On the other hand, Hong et al have shown a low preoperative urine flow rate to be the only predictive preoperative factor for postoperative VD after RPMUS [16]. Although heterogenous findings and disagreement do exist, impaired detrusor contractility may be a risk factor for VD and especially for urinary retention after sling surgery. Further studies are needed to clarify the exact role of detrusor contractility in the outcome of MUS surgery.

Physical Examination

Physical examination of a patient with VD after MUS surgery should include a basic pelvic inspection with the evaluation of vulva and vaginal introitus, vaginal canal and urethra, together with the assessment of urethral mobility and pelvic organ prolapse. Vaginal extrusion of the mesh or a significant prolapse that bends the vesico-urethral angle causing obstruction should be ruled out. Vaginal examination may also reveal overcorrection of the urethral axis with bladder neck or midurethral kinking.

Stress test should also be applied to rule out persisting SUI. In patients who present with neurological symptoms, dyspareunia or pain, the physician should try to locate the origin of the pain. It should be remembered that neurologic symptoms might occur in groin areas or in suprapubic areas after RPMUS and TOMUS, respectively [12]. Persistent leg pain should raise the suspicion of urethral erosion [17].

Symptom Scores

The utilization of validated symptom scores in the pre- and postoperative periods enables a quantitative comparison of the symptoms and may lead to a more objective assessment of VD after MUS. There are several validated symptom scores recommended by the ICS to assess LUTS in women. Unfortunately, no symptom score exists specifically targeting VD after MUS.

Radiological Evaluation

Ultrasound examination of the urinary tract and pelvis is a cheap, practical and radiation-free method also enabling PVR measurement. Computerized tomography or magnetic resonance imaging may further be utilized in complicated cases. An undiagnosed bladder perforation or pelvic hematoma may cause bladder irritability and de novo urgency that is more common after a retropubic MUS (RPMUS) [18]. Bladder perforation after a transobturator MUS (TOMUS) is relatively uncommon but still possible [19,20]. Voiding cystourethrograms may be better combined with urodynamic studies and can provide a better assessment of mesh related urethral obstruction.

Urodynamic Evaluation and Diagnosis of Obstruction and de Novo Detrusor Overactivity

Urodynamic evaluation of a patient with VD after MUS may include non-invasive tests such as PVR measurement and uroflowmetry and invasive tests such as cystometry and pressure flow studies.

Bladder outlet obstruction in men is defined by the presence of a high pressure and low flow micturition revealed by pressure flow studies [21] whereas diagnosis of obstruction in women lack well-defined urodynamic criteria. Anatomical differences of the female pelvis allow women emptying of their bladder

just by relaxing the pelvic floor, sometimes with the additional help from the abdominal muscles without a strong detrusor contraction compared to men [22]. Therefore, even small changes in detrusor pressure during voiding may define female infravesical obstruction and it is therefore impossible to develop reliable diagnostic nomograms as we have for men. Instead, it may be a better strategy to compare the preoperative and postoperative urodynamic studies in the case of VD after MUS in order to delineate the effect of MUS surgery on micturition. However, the weak recommendation for invasive UDS for an index patient with SUI prior to MUS surgery leads to lesser utilization of preoperative UDS [23]. Thus, in today's practice, preoperative urodynamic data may not be present for comparison in the majority of cases.

The final goal of pressure flow studies is to differentiate patients who will benefit from urethrolisis. However, for many authors the only absolute selection criterion for offering urethrolisis is a clear temporal relationship of symptoms to surgery since PFS may not show classic obstructive voiding in women who benefit from urethrolisis [10]. In an attempt to diagnose female bladder outlet obstruction several authors proposed different urodynamic criteria. In 1998, Chassange et al defined obstruction using cutoff values for Q_{max} and $p_{det}Q_{max}$ [24]. They indicated a Q_{max} of 15 ml/s or less combined with $p_{det}Q_{max}$ of 15 cm H₂O or more to have a sensitivity of 80 % and a specificity of 83.1 % for diagnosing obstruction. The same group revised their cutoff values in 2000 and later in 2004, first using women with SUI and then asymptomatic women as controls [25,26]. In the latter study, the highest sensitivity and specificity for predicting obstruction were at Q_{max} 12 ml/s or less and $p_{det}Q_{max}$ 25 cm H₂O or greater. In another study, Nitti et al proposed criteria for video UDS where obstruction was defined as radiographic evidence of obstruction between the bladder neck and distal urethra in the presence of a sustained detrusor contraction of any magnitude during voiding [27]. Blaivas and Groutz designed a nomogram based on noninvasive Q_{max} and $p_{det}Q_{max}$ [28]. In 2006, Akikwala et al compared these 5 contemporary urodynamic definitions for female BOO on 154 women who underwent videourodynamics to assess their correlation with each other and with clinical suspicion of BOO [22]. They concluded that each urodynamic definition of female BOO had merit whereas video-urodynamic criteria and 1998 cutoff point criteria had the highest concordance. The Blaivas-Groutz nomogram was found to overestimate obstruction compared to the other criteria and suggested not to be used as the sole or standard definition of obstruction in women by Akikwala et al [22].

There are certain factors to be discussed regarding the diagnostic role pressure flow studies. First of all, studies utilizing cutoff points derived their results from patients with clinical obstruction at the onset and not from women with functional obstruction. Furthermore, since obstruction is usually seen with overactive bladder symptoms, it is sometimes difficult to demonstrate obstruction urodynamically especially if there are severe coexisting uncontrolled detrusor contractions. As a consequence of this it is sometimes difficult to differentiate urethral obstruction from de novo urgency without obstruction, if it really exists! It is also to note that about one third of women cannot void in the presence of a cystometry catheter in pressure flow studies.

Are there really cases in which obstruction is suspected clinically but clearly ruled out by urodynamics and vice versa? We certainly need further studies in this area to answer these questions.

Cystoscopy

Cystoscopy should be reserved for patients with hematuria, bladder pain or recurrent cystitis especially when bladder perforation or urethral mesh erosion is suspected. Urethroscopy is indicated to rule out urethral kinking (abnormally vertical urethral axis) in addition to evaluating for sling erosion into the urethra or bladder. Many authors suggest to perform cystoscopy routinely at the time of a urethrolysis operation to rule out infravesical problems.

Summary

The evaluation of a patient with VD after MUS should firstly include all the same basic steps of any female patient's clinical assessment with LUTS to rule out all possible pathologies. Postoperative VD is common in the early period after catheter removal but it is transient in the majority of cases. VD that occurs temporarily after MUS and persists for 4 weeks warrants further treatment since it is related to the urethral obstruction or irritation by the mesh. The spectrum of symptoms may vary in range from simple frequency to urinary retention. Patients with mild or intermediate symptoms may be under-diagnosed and present even years after sling surgery. Secondary steps of evaluation may include cystoscopy, video UDS with PFS usually reserved for patients with persisting de novo storage symptoms that do not respond to conservative and medical treatment. A urethral relieve surgery is certainly needed for patients with unresolved emptying symptoms after MUS where urodynamic studies have little additional value. It should be kept in mind that urodynamic criteria for bladder outlet obstruction in women are imprecise and the diagnosis of obstruction and decision for a urethral relief surgery should depend on a combination of clinical parameters and urodynamic findings.

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Postoperative voiding dysfunction

Treatment and outcome

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In recent years there has been an increasing use of slings surgery – predominantly using synthetic materials for the treatment of stress urinary incontinence. This has largely replaced the once popular colpo suspension. In those women with stress urinary incontinence there is often very limited bladder contractile power required to empty it. When a significant resistance is introduced into the bladder then inevitably voiding difficulty can result; in addition a proportion of such patients may also experience concomitant storage dysfunction with urgency and urgency incontinence. This presentation will focus on the management of storage dysfunction and will attempt to provide an overview of contemporary practice with reference to contemporary literature.

The first issue is to define what criteria are used to define voiding dysfunction? What residual is significant and at what level of 'retention' should intervention be commenced? Should it be symptomatic? In particular bearing in mind that the term voiding dysfunction is subject to individual interpretation, how common is it? The American Urological Association Stress Urinary Incontinence Clinical Guideline Panel reports a rate of retention for all stress incontinence procedures between 5% to 8% 4 weeks postoperatively [1] It is clear that patients should be adequately counselled about the potential for voiding difficulty preoperatively, but should they be taught intermittent self catheterisation preoperatively?

When considering that clinically significant retention is present, at what time following surgery should intervention be instituted? The timing of intervention still remains controversial. Although the timing of surgical intervention is debatable, contemporary studies have indicated that symptoms that persist beyond 4 weeks after sling surgery rarely resolve on their own [2]. In addition there is a perception that patients who have a prolonged period of voiding difficulty are more likely to be troubled by continuing problems.

What form of intervention should be used? What technique should be used? and what is the likely rate of recurrent incontinence following treatment? Certainly in some patients they may wish to tolerate retention and use intermittent clean catheterisation rather than run the risk of developing recurrent incontinence. The treatment options include early dilation/downward traction on the sling to decrease its tension. Following this, incision of a sling can be used either in the midline under local anaesthetic or laterally. Failing all else then a formal urethrolisis can be carried out. Not surprisingly more extensive procedures carry a greater risk of morbidity including a return of stress urinary incontinence, albeit this is reported to occur in up to approximately 25% of cases. Having said this there will be a few patient with persistent voiding problems, in these patients a repeat urethrolisis can be performed with some reported success.

What about the incidence of urgency and urgency incontinence in 10% of cases overall and increasing in incidence in the presence of obstruction? This can be difficult to treat and may persist even after relief of obstruction.

All of these important clinical questions will be discussed in the light of the available literature.

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