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Diagnosis and treatment of intravesical obstruction as a complication after TVT surgery for the treatment of stress urinary incontinence in women

[1]Dr Hubchev, Georgi,

Abstract

The focus of the publication is the diagnosis and treatment of intravesical obstruction - a complication after TVT surgery. The aim is to establish the complication rate. For the period 2005-2019. 436 women with TVT were operated on for treatment of stress incontinence, 45 (10.3%) of them developed IVO. In 334 women using the TVT-O-33 method, IVO was developed, in 78 operated on TVT-R, the problem was in 12 patients, and in 24 with TVT-Ophira, this complication was not detected. Early IVO at day 1 postoperatively was observed in 16 women (35.5%), at day 14 IVO had 53.3%, and late complication was observed in 5 patients (11.1%). Treatment begins with conservative methods, and in the case of non-response proceeds to surgery. I used a retrospective method to determine the complication rate within the appropriate postoperative period. The study concluded that 15.4% of IVO was detected after TVT-R, 9.8% with TVT-O and 0% with Single incision.

Keywords: *intravesical obstruction, risk factors, clinical features, sling surgery, stress urinary incontinence*

I. Introduction

Stress urinary incontinence in women is a current problem of urology, which does not endanger patients' lives, but significantly degrades their quality, which often leads to social maladaptation [1,2]. According to epidemiological studies, the incidence of urinary incontinence in women is very significant: up to 25% of young women, 44 to 57% of post-menopausal women, and up to 75% of elderly women have problems with urinary continence [3].

Mesh insertion is the most common surgical procedure used to treat stress urinary incontinence (SUI) in women [4] , with 3.7 million meshes sold worldwide between 2005 and 2013 [5]. However the safety of these procedures is the subject of international debate and scrutiny [6] with court actions against mesh manufacturers underway in various countries, including Australia, Belgium, Canada, England, Israel, Italy, the Netherlands, Scotland, USA, and Venezuela [7]. In the USA, the FDA has proposed to raise the risk classification of urogynaecological meshes, requiring premarket notification and special controls [8].

[1] *MD, Associate Professor, Chief of Department of Obstetrics and Gynecology, UMBAL" Deva Maria,, - Burgas*

Functional intravesical obstruction in women is one of the urgent and difficult problems to solve. Patients' complaints are very diverse, which makes it difficult to correctly diagnose and choose treatment tactics. Women with IVO may complain not only of prolonged, difficult or periodic urination, a feeling of incomplete voiding of the bladder, but also of a desire to urinate. If no special study, including a combined urodynamic study, has been performed, then such women may be treated for chronic and long-term treatment for chronic cystitis, overactive bladder, and more [9].

According to various authors, the prevalence of IVO among women is around 24%. The most common form is dysfunctional urination, which is seen in 70% of all women with IVO [10].

Complications associated with mesh procedures for SUI include haemorrhage, organ perforation, mesh erosion, infection, IVO and pain [11], which may require further surgery.

Various types of pelvic floor muscle training are widely used as conservative treatment, including the use of the biological feedback method. In the recommendations of European and American urological associations, biological feedback therapy is presented as one of the standards for the treatment of IVO [12].

The concept of the mechanism of free suburethral sling is based on the integral theory, according to which the sling replaces the action of the suburethral connections and thus maintains the middle urethra, preventing the lumen of the urethra from opening during an increase in intra-abdominal pressure. Many studies suggest that when suburethral sling is properly applied, no urodynamic obstruction during urination is caused.

Based on the above concepts for sling function, the probability of developing IVO (intravesical obstruction) after TVT surgery may be due to excessive urethral compression. Unfortunately, no uniform standard for optimal compression of suburethral sling when inserted has been developed yet. One of the proposed techniques involves administering a cough test intraoperatively (when the patient is under local anesthesia) while placing the sling below the middle third of the urethra, which allows the surgeon to adjust the level of compression itself. Although studies based on evidence that this technique is unified are not presented in the literature.

II. Discussion

The present study is based on the results of the surgical treatment of 436 patients with stress incontinence who have undergone three methods of implanting synthetic polypropylene midurethral slings. The operations were carried out at UMBAL Ruse and UMBAL “Deva Maria” - Burgas for the period 2005 - 2019. The study is retrospective. TVT-O- 334 operations were performed, TVT-R - 78 operations and TVT-Ophira-24. Despite the relatively simplistic way of performing sling operations, as well as the availability of a number of studies proving the safety of the placement of synthetic tapes, as well as relatively accurate anatomical landmarks, there is a high likelihood of complications, often quite complicated. The use of suburethral synthetic slings can lead to a number of complications, one of which is infravesical obstruction (IVO).

One of the causes of IVO in the early postoperative period may be a local swelling of the tissues in the area of sling placement, which impedes adequate recovery of free urination. Based on this principle, Chung E. has shown in his study that the use continuous catheterization for more than 5 days avoids the development of IVO and the symptoms of OAB [13]. In my practice in such situations, I use periodic catheterization of the bladder at least 4-6 times a day.

IVO is often the cause not only of difficulty in urinating, but also of emerging urgent urges (de novo) to urinate, but also of urinary incontinence.

The study I conducted found that out of all 436 operated women, postoperative IVO was observed in 45 of them (10.3%).

As an early IVO on the 1st postoperative day, it was observed in 16 women (35.5%), distributed accordingly, operated by the TVT-O method - 12 women (26.7) and by the TVT-R - 4 women (8.8 %) developed early IVO.On day 14 IVO had 53.3% of all 45 patients, 17 (37.8%) of whom had TVT-O and 7 (15.5%) women operated on for treatment of urinary incontinence by TVT-R.

A persistent late complication was observed in a total of 5 patients (11.1%), 4 (8.8%) of whom had TVT-O, and 1 patient (2.2%) had TVT-R.

In all 24 patients who underwent TVT-Ophira to correct urinary incontinence, no such complication was identified.

Abdominal urination is a common situation in both healthy women and women with urinary incontinence. Then bladder emptying occurs because of tension with minimal detrusor shrinkage. The low detrusive opening pressure of the urethra may be due to sphincter insufficiency and low urethral resistance.

Patients with signs of reduced detrusor contractility before the surgery are also at risk of developing obstruction after a sling operation. Often patients' complaints are about weakening of the flow of urine and incomplete bladder emptying, not always coincide with the objective symptoms of the disease, but related to low volume urination and inflammation of the bladder, which causes a feeling of incomplete emptying. At the same time, the presence of only symptoms of urinary disturbance may be an unreliable marker of the pathological process, low Qmax with uroflometry, or the presence of residual urine may indicate the need to examine the patient's pressure before the surgery in order to place differential diagnosis of hypocontractility and other types of dysfunctional urination. In this case, experienced surgeons modify the technique of stretching the sling when it is inserted, although, I again note that, a standard for stretching and tightening the suburethral strips has not yet been proposed. The only reliable way to evaluate bladder contractility before and after surgery is with a urodynamic study - in particular, a flow pressure test, which is shown before the surgery. This allows the surgeon to discuss with the patient all the possible scenarios and possible complications.

All 45 patients lacked an IVO clinic prior to surgery for SUI.

Following surgical treatment with TVT sling placement, the main clinical symptoms in the 45 patients followed were as follows:

60% of patients had difficulty, sometimes painful urination, drip or low flow; or they needed tension to urinate and empty their bladder;

30% of patients had difficulty, sometimes painful urination, drip or low flow; they again needed tension to begin urinating and emptying the bladder; they are forced to engage in a forced position of the body in order to start urinating and emptying the bladder (upright or semi-supine); their residual urine was (more than 100-150 ml immediately after urination);

10% of patients experienced difficult, sometimes painful, low-flow urination; urgent (urgent) urination; urgent urgent incontinence.

Subjective attenuation of urine flow in combination with a decrease in peak flow rates, but without the urodynamic signs of IVO, is not uncommon after suburethral plastic surgery. However, patients with clinically pronounced IVO often talk about mixed symptoms of bladder filling and emptying. In such a situation, the patient's main complaint may be an urgent urge to urinate, urgent urinary incontinence. As a rule, all this is accompanied

by difficult urination, the need for tension to empty the bladder or to accept a forced position of the body. Although de novo emergency development is considered secondary to the background of IVO, different options have been described for the timing of the occurrence of the two conditions. Symptoms of urine collection, such as increased urination, urgency, and nocturia, are observed in 20% of patients after TVT surgery. In a group of patients with isolated suburethral plastic surgery without concomitant correction of genital prolapse, urine retention can be detected in 1–9% of cases, which is defined as the need for catheterization of the bladder for more than 28 days or surgery to remove retention [14].

Features of diagnostic search

Physical examination in most cases does not reveal pathology, but in severe cases it is possible to detect urethral adhesion with synthetic sling. Sometimes it is possible to determine urethral angulation by sensing the sling through the anterior vaginal wall in the mid-third of the urethra or through the bladder neck.

Prolapse in the anterior wall of the vagina can sometimes lead to the development of IVO. Ignoring a significant cystocele before the surgery to eliminate urinary incontinence is one of the reasons for failure in the postoperative period. Otherwise, the prolapse in the anterior wall of the vagina may progress with time, which sometimes leads to angulation of the urethra against the fixed sling. Accordingly, all the symptoms of IVO listed above may develop. Unlike true obstruction, in the case of cystocele progression, complaints occur gradually rather than immediately after surgery.

Urodynamic examination before and after the surgery

All 45 patients underwent urodynamic examination before and after surgery. At present, the importance of the urodynamic study for predicting urinary disorders after sling surgery is not straightforward. Many authors say that pre-operative uroflometry and pressure-flow testing have no prognostic value for postoperative IVO, while others have demonstrated the role of determining the free uroflometry Qmax index for the success of the functional results of the sling surgery. Similar contradictions exist regarding the implementation of "pressure-flow" in women. Nitti., applies the following urodynamic criteria for obstruction - detrusor pressure at Qmax above 30-40 cm H2O and free Qmax less than 15 ml / s [15]. It turns out that 33% of patients with difficulty urinating do not have the needed criteria for urodynamic obstruction. An interesting point is that urethrolysis is equally effective in both groups; thus, the urodynamic study does not play a role in predicting the outcome of surgical treatment. Although complex urodynamics may not be necessary for all patients with IVO after TVT surgery, this study may provide important information about the current condition of the lower urinary tract function, such as the presence of hyper or hypoactivity of the detrusor. Furthermore, the unconvincing urodynamic findings should not reduce the evidence of sling dissection.

In the postoperative period, in the development of symptoms of impaired bladder emptying, the value of urodynamic studies is indisputable. Currently there is no clear indication of the critical volume of residual urine, which can be considered significant and requires active measures. Based on my own clinical practice, I believe that less than 200 ml of residual urine, while maintaining self-urination and no patient complaints, requires no further actions. In such situations, the patient may be discharged and re-examined on an outpatient basis after 1 week.

Measuring the intra-urethral pressure is not a standard urodynamic method, it should only be used as part of research in specialized urology centers. In general, many data are presented on the need for this study to confirm the diagnosis of sphincter insufficiency; however, few sources describe the use of profilometry in patients after

surgery. In his study, Gamble shows that the development of urgent de novo and urgent urinary incontinence has been shown to be associated with an increase in maximal urethral closure pressure [16]. Data from our clinical experience show that intra-urethral pressure does not change significantly after performing sling surgery. The effect of suburethral synthetic sling is manifested both in increasing the passive resistance of the urethra and in enhancing the transmission of pressure to the urethra i.e., passive factors, until the active factors of urethral closure change.

Reducing the force of contraction of the detrusor, leads to a prolonged act of urination and / or failure in emptying the bladder - another cause of difficulty urinating.

Of course, the act of urination itself depends on the patient's mental state and anxiety level during the study and can influence the initiation of the urination reflex and therefore the detrusor function.

In this context, the term "situational contractility of the detrusor" or "situational lack of detrusor contractility" was introduced, this happens when, in the opinion of the physician conducting the study in an interactive mode with the patient, the urination was compromised.

I believe that performing a complex of urodynamic studies (especially the pressure-flow study) in patients with difficulty urinating is certainly necessary as this is the only way to objectively evaluate detrusor contractility and to prove the presence or absence of IVO as well as a decrease in detrusor contractility.

III. Methods for eliminating difficulty in urinating after sling surgery

Conservative methods

The amount and timing of IVO treatment arising from suburethral sling is entirely dependent on the symptoms that concern the patient.

In the presence of acute urinary retention, periodic catheterization of patients is required to overcome intravesical obstruction. In my study, it was performed in 16 (35.5%) of patients who received IVO in the early postoperative period.

In some cases, with changes in the continent, the optimal solution for the patient is to perform periodic catheterization. Re-insertion of a permanent urethral catheter does not improve the patient's condition, even with IVO development. Periodic catheterization is the most rational tactic for dealing with acute urinary retention, with the patient's reluctance to recurrent operations as well as the risk of recurrence of urinary incontinence.

In this regard, some authors recommend repeated surgical interventions, to be performed as soon as possible after surgery, which reduces the risk of structural changes in the detrusor due to prolonged obstruction, and early re-surgery facilitates easy identification of the band before germination with connective tissue. A permanent urethral catheter is not a method of treating IVO after TVT surgery, but it can be used as a temporary measure in cases where the patient's general condition does not allow rapid recovery. In all other situations, periodic catheterization of the bladder should be performed.

R*educing the tension in the sling*

The procedure for loosening tension in the sling I apply in the early postoperative period (1 week) under local anesthesia and consists of cutting the anterior wall of the vagina along the seam, determining the location of the tape and pulling the tape caudally with a clamp (1 -2 cm). It should be taken into account that there is always a risk of complete removal of the sling during its removal from the wound canals. I performed this procedure on

24 women` (53.3%). Of these, 17 women (37.8%) had surgery with TVT-O to treat urinary incontinence and 7 (15.5%) had surgery with TVT-R. After the procedure, the intravesical obstruction was overcome in all.

Sling Removal

Sling removal was performed in 5 patients (11.1%) of all 45 who developed IVO. Of these, 4 (8.8%) women operated on the TVT-O method and 1 (2.2%) women operated on the TVT-R. I remove the sling in the middle line. The technique of surgery consists of performing a reverse U-shaped incision or midline along the anterior wall of the vagina, detecting the sling and removing it. A clip between the sling and the periurethral tissue may be placed to prevent damage to the urethra. Subsequently, the separated portions of the sling are separated from the urethra in the direction of the internal obturator muscle and the obturator membrane. The ends of the sling can be resected, completely cut, or left in the tissue. In my opinion, in the presence of IVO alone, without pain or hyperactive bladder, we can limit ourselves to cutting the sling. If the patient complains of pain or urgent urges along with obstruction appeared in the postoperative period, then the sling should be eliminated to the maximum extent.

Significance

When inserting different types of sling, it is not uncommon to develop acute IVO. Patients should have a detailed history, pre- and post-operative examinations: physical, microbiological, ultrasound examinations, urethrocystoscopy, urofluorometry and cystotonometry. Treatment should always start with conservative methods and, if unsuccessful, switch to surgical treatment.

In my study of 436 sling operations for the treatment of stress urinary incontinence, the rate of intravesical obstruction as a complication was 10.3%. As an early IVO on the 1st postoperative day it was observed in 35.5% of cases. All 24 women who received early intravesical obstruction were catheterized and all IVO symptoms were responded to.

On day 14, postoperative IVO was developed by 24 women (53.3%). They underwent a procedure to reduce the tension in the strap. After the procedure, IVO was overcome.

Persistent late complication was observed in 4 patients (8.8%) with TVT-O performed, in 1 patient (4.5%) with TVT-R, and in TVT-Ophira, there were no patients with such complication.

The high SUI rate necessitates the application of a high sling rate as well. In addition to the successes of this TVT sling surgery, a complication such as IVO develops gradually in some patients. The solvation of this problem relieves patients of urinary tract and kidney infection and also significantly improves women's social, sexual and professional lives.

IV. Conclusion

In order to avoid IVO as post-operative complications, the technique for suburethral sling placement should include a complete absence of belt tension:

• In patients with marked urethral hypermobility, the band should be positioned so that, over time, physical pressure does not result in stronger urethral pressure than the installed sling.

• When the sling is inserted, especially when the holders are removed (most slings have one), additional unwanted tension may occur in the tape.

• Being overweight is also a risk factor that contributes to excessive exercise in the pelvic floor and, respectively, and in the sling itself.

• The insertion of a surgical instrument between the urethra and the strap allows additional control of tension in the sling.

• It should be noted that some slings have certain stretchability and this may affect the lumen of the urethra in the future. In these situations, deformation of the strap and its excessive stretching should be avoided.

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