

MINIREVIEW

MID-URETHRAL SLINGS FOR STRESS URINARY INCONTINENCE. DIFFERENCES BETWEEN TRANSOBTURATOR AND RETROPUBIC MID-URETHRAL SLINGS

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ABSTRACT

Nowadays, the surgical success rate for stress urinary incontinence (SUI) is approximately 90 % the mid-urethral synthetic slings being currently the most effective surgical options in women with SUI. The initial treatment should consist of conservatory measures such as pelvic floor exercises, hormonal medication or vaginal pessary, the failure or refusal of these methods will then guide the surgeon towards a surgical decision with the use of a mid-urethral sling either of retropubic or transobturator type. The choice between the two slings should be done after a complete evaluation of the urinary function taking into consideration the coexistence of a mixed incontinence, a dysfunction of the intrinsic sphincter, a rigid urethra but also the age and the weight of the patient as well as the possible previous surgical interventions for SUI. The advantages of each type of mid-urethral sling and their associated complications should be preoperatively explained to the patient, the decision to opt for one or another sling depending also on the professional experience of the surgeon. The aim of this review is to present the advantages and the disadvantages of two types of mid-urethral slings – the retropubic and the transobturator

RÉSUMÉ

Echarpes mi-urétrales pour l'incontinence urinaire à l'effort. Différences entre les écharpes mi-urétrales transobturatrice et rétropubienne

De nos jours, le taux de succès chirurgical de l'incontinence urinaire à l'effort (IUE) est d'environ 90%, les élingues synthétiques mi-urétrales étant actuellement les options chirurgicales les plus efficaces chez les femmes avec IUE. Le traitement initial doit consister en des mesures conservatoires telles que des exercices du plancher pelvien, des médicaments hormonaux ou du pessaire vaginal, l'échec ou le refus de ces méthodes guideront alors le chirurgien vers une décision chirurgicale à l'aide d'une fronde mi-urétrale de type rétropubien ou transobturateur. Le choix entre les deux brides doit être fait après une évaluation complète de la fonction urinaire en tenant compte de la coexistence d'une incontinence mixte, d'un dysfonctionnement du sphincter intrinsèque, d'un urètre rigide mais aussi de l'âge et du poids du patient et des interventions chirurgicales précédentes pour IUE. Les avantages de chaque type d'écharpe mi-urétrale et leurs complications doivent être expliqués en pré-opératoire au patient,

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sling- as well as the possible intra-and postoperative complications and their management.

Key words: stress urinary incontinence, sling, transobturator, retropubic.

Abbreviations: SUI=stress urinary incontinence; TOTS= transobturator mid-urethral sling; TVT= tension-free vaginal tape.

INTRODUCTION

The stress urinary incontinence (SUI) is known as a condition in which an involuntary loose of urine appears during different activities that increase the intraabdominal pressure such as sneezing, coughing or the effort of defecation¹. When the intraabdominal pressure achieves a higher level than the required pressure for the closure of the urethra, an involuntary leakage of the urine will produce. The stress incontinence represents 60% of all types of incontinence and it has been reported to affect between 4% and 35% of women². In Switzerland, the condition is affecting almost 400 000 of women. An increase of the prevalence rate of the SUI with the age has been by some reports revealed³.

An increase of the intensity of the physical activity represents a trigger for urine loss however a deficiency of the intrinsic sphincter is absent on the urodynamic analysis⁴. The physiological mechanism of closure of the urethra is assured by the urethral closure pressure as well as by a normal transmission of the pressure during the physical effort^{4,5}. A dysfunction in the closure mechanism will result urine lost as drops, splashes or swells depending on the grade of the SUI⁶. With regard of the causes of the reduction in the urethral closure pressure, the integral theory proposed by Petros and Ulmsten⁷ emphasizes the central role of the pelvic connective tissue, which is incorporated in different pelvic support structures. The insufficiency of the connective tissue of the pubo-urethral ligaments and of the suburethral vaginal wall will impair a normal transmission to the urethra of the pubo-coccygeal muscular contraction. Consequently, in the same way as during the micturition, the urinary tract opens during a physical effort. The SUI, the involuntary incontinence, the permanent leakage of urine, the loose of urine in small amounts are the result of the inability of the muscular contraction to close the urethra due to the laxity of the pubo-urethral ligaments and of the suburethral hammock. The symptomatology associated with an involuntary loose of urine suggests a defect in the

la décision d'opter pour l'une ou l'autre écharpe en fonction également de l'expérience professionnelle du chirurgien. Le but de cette revue est de présenter les avantages et les inconvénients de deux types de fronde mi-urétrale – la fronde rétropubienne et la fronde transobturatrice – ainsi que les complications intra- et postopératoires possibles et leur gestion.

Mots-clés: incontinence urinaire à l'effort, fronde, transobturateur, rétropubien.

anterior vaginal compartment⁸. The risk factors that contribute to the destruction of the connective tissue are various, however, the most frequently mentioned are: pregnancy, childbirth, low serum estrogen level in the postmenopause, hysterectomy, overweight, vascular anomalies or the above mentioned chronic increased abdominal pressure through cough or constipation^{9,10}.

The surgical treatment of the SIU has been revolutionized in the late 1990s with the development of the suburethral slings-and namely the tension-free vaginal tape (TVT)- which were based on the principle of a tension-free mid-urethral support of the urethra through a synthetic polypropylene sling, a concept which nowadays governs the gold standard surgical therapy of the SIU^{4,11}. The transobturator mid-urethral sling (TOTS) has been initially used in 2001 and is considered to represent a progress in the surgical treatment of SIU as it lowers the perioperative risk associated with the use of a TVT (retropubic) such as bowel or bladder injury¹². The purpose of this article is to review the most important aspects of using the mid-urethral slings in the SUI women in terms of efficiency, side effects, intraoperative complications as well as to present a succinct approach to the management of sling-associated complications.

TYPES OF MID-URETHRAL SLINGS AND MECHANISM OF ACTION

The support of the middle portion of the urethra can be made with a synthetic sling which can be inserted either through the retropubic space or through the obturator foramen. The retropubic mid-urethral slings or TVT can be fixed either using a bottom to top procedure (from the retropubic space in the suprapubic area) or a top to bottom procedure (from the abdominal wall to the mid-urethra). The modern TOTS slings can be placed either in – out (vaginal incision – obturator foramen – inguinal area) or out in (the reversed order). The recently introduced mid-urethral slings that require only a vaginal incision can

be fixed either at the urogenital diaphragm or the obturator internus muscle¹³.

The basic principle of these slings is the support of the middle portion of the urethra when the intraabdominal pressure increases during efforts of different grades. The essential aspect of the procedure is the absence of the tension in the synthetic (polypropylene) sling¹⁴. During an effort, the sling lifts the urethra up which will be fixed under the symphysis hence maintaining the urethra closed¹⁵. The arms of the retropubic mid-urethral slings which are also tension-free slings are passed through the fascia of the rectus abdominis muscle and exteriorized through the skin. In a period of 2 weeks until 3 months, the sling will be incorporated in the surrounding tissue and the resulting fibrosis will fix and maintain the sling in its initial position¹⁶.

SURGICAL OUTCOMES

Taking into consideration the mechanism of SUI as well as factors related to the patients such as weight, age, urodynamic results or previous surgery for SUI, the surgeon must weigh the risk-benefit balance of each of the two mid-urethral slings before deciding which of the sling is the most suitable. With regard to their cure rate, a recently published large systematic review¹⁶ reported a success rate of 62% and 98% for the TOT-S and of 71% and 97% for the retropubic sling which means that the success rates of the two types are almost similar. The cure rate consisted of postoperative SUI, sexual function, life quality and erosion of the slings. Recurrence of SUI which requires reoperation has also been analyzed in follow-up studies and the rates were slightly higher for the TOT-s compared to the retropubic slings^{17,18}. A five years follow-up study¹⁹ which has been in 2015 showed that, regardless of its mechanism of occurrence, a postoperative SUI has been diagnosed in 49% and 56% of women who received a retropubic sling and a TOT-S respectively. The assessment of the postoperative questionnaires revealed an improved sexual activity and life quality for women with TOT-S although the reported satisfaction rates of women with retropubic slings were not significantly low. In both groups of the patients the rate of postoperative complications has been reported to be under 2%.

When it comes to the cure rates among the two types of the TOT-S, it seems that the two types of TOT-slugs are equally effective as no statistical significant differences in terms of cure rates have been observed between the two types¹⁹. On the other side, the out-in approach seems to increase the risk of injuries of the vaginal tissue while the in-out approach has been reported to cause severe postoperative pains in

the inguinal area as a result of lesions of the inguinal nerves²⁰. Although the learning-curve for the in-out procedure has been demonstrated to be more rapid than the out-in procedure, currently there is insufficient evidence to support the implementation of one of the techniques in the routine surgical practice²¹. The decision between the in-out or out-in technique must also intersect the surgeon's experience. In contrast to the similar success rates between in-out and out-in techniques of the TOT-S, studies have showed that the bottom-top retropubic slings have a higher objective (SUI)- and subjective (impact on daily activities) cure rates as well as a lower morbidity rate than the top-bottom retropubic slings²². However, similarly to TOT-s, the decision between the two techniques has to be individualized in each case focusing also on the surgeon's experience.

Both of the slings have in common the fact that their absolute indication is given by a symptomatic SUI as well as an existing apical prolapse with concomitant unknown (occult) SUI²³. However, as mentioned above, other factors such as age, the presence or absence of a dysfunction of the intrinsic sphincter must also be evaluated. Among the contraindications, disturbance of the hemostatic system by genetic disorders or medication increases the risk of bleeding during a retropubic sling placement which favors the use of the TOT-S in these cases while during the pregnancy period none of the slings can be used²⁴.

The single-incision slings which are much shorter than the full-length mid-urethral slings are less likely to cause bowel or vaginal lesions during the operation compared to the retropubic or TOT-S while the success rate can achieve 84% at 12 months postoperatively^{4,25}.

ASSOCIATED COMPLICATIONS AND THEIR MANAGEMENT

The majority of reports on the associated complications of the two types of slings has evaluated the prevalence of intraoperative lesions especially bladder, bowel, vascular and neural lesions as well as the severity of the intraoperative hemorrhage, postoperative pain, the length of the operation and the hospital admission as well as the prevalence of urine retention. The risk of bowel lesions is increased in women with previous abdominal surgery who undergo a retropubic²⁵ treatment while more women with TOT-S experience postoperative pain, especially inguinal pain compared to the retropubic approach²⁶. However, the pain has not been reported to be severe and usually requires only medication. Among the long-term complications that can also occur after years and progressively increase in severity the most

frequently observed were: recurrent urinary tract infections, voiding dysfunction, erosion of the sling, dysuria or dyspareunia²⁷. The prevalence rate of dyspareunia is lower in women who received a TOT sling than those who have a retropubic sling²⁸.

The most important aspect of an incorrect placement of the sling is its early diagnosis⁴. One of the methods that plays an important role in the diagnosis of sling misplacement is the pelvic floor ultrasound. In this way, the relation of the sling to the urethra can be good visualized and evaluated while other possible postoperative complications, such as urine retention and the post-voiding residual urine, can also be assessed²⁹. Other advantages are the early diagnosis of hematomas or seromas, which usually cause severe pains in the first two postoperative days^{4,29}.

Voiding dysfunction has a prevalence of 5% and is often a result of the placement of the sling very close to the urethra or bladder neck²⁹. One option to correct the voiding problems is to correct the stiffness of the sling and namely to manipulate easily its fixation³⁰. There is evidence that showed that the most suitable place for the sling is the transition between the middle to the distal portion of the urethra^{4,29}. Moreover, it seems that a distance of less than 3 mm between the sling and the urethra must warn the surgeon that a correction of the sling's stiffness is necessary^{4,29}. However, a too relaxed sling can cause symptoms of SUI while the absence of any significant modification on its stiffness results in a severe voiding dysfunction and longer catheterization of the bladder³⁰. If not early recognized, the beginning of the incorporation of the sling in the surrounding tissue makes difficult its ease so that the only reasonable solution is to split the band or large resection of the sling in case of infections²⁴. However, the band split leads to late SUI in almost 50% of women regardless of the sling type³¹. In this case, the placement of a new sling can be considered after a precise urodynamic evaluation³².

CONCLUSIONS

In terms of efficacy, the TOTS and the retropubic sling have been proved to allow similar cure rates. In terms of intra-and postoperative complications, the TOTS typically provoke postoperative inguinal pain while the retropubic slings increase the risk of visceral lesions and obstructive micturition. It is essential to postoperatively identify an incorrect position of the sling as early as possible in order to avoid a recurrence of the SUI. One easy and efficient method that helps in recognizing the complications is the pelvic floor sonography which can measure the distance between the urethra and the sling hence helping in

the decision of making easier the fixation of the sling. More important than all of these aspects, is the detailed examination of the patient, the presentation of the advantage and side effects of each type of sling and, not at least, the surgeon's personal experience with the mid-urethral slings.

Compliance with Ethics Requirements:

„The authors declare no conflict of interest regarding this article“

„The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law.“

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