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Management of stress urinary incontinence

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ABSTRACT

Female stress urinary incontinence (SUI) is a common condition with significant impact on a woman's quality of life. The prevalence of SUI is about 50%. Previously, the majority of incontinence procedures were performed via an abdominal approach (Burch colposuspension). The tension-free procedures, with a synthetic tape material, have replaced almost completely the previous surgeries and is nowadays considered the gold standard option for surgical treatment of female SUI. A wide spectrum of tapebased surgical procedures and devices are currently available. Today, Burch colposuspension has a role in patients undergoing abdominal pelvic organ prolapse (POP) repair as a concomitant procedure in those patients with urethral hypermobility or those with contraindication to mid-urethral slings (MUS) placement. The objective success rate reported of this procedure ranges between 49% and 88%. Midurethral synthetic slings represent the most common procedures for SUI in North America and Europe. Cure rate of retropubic MUS approaches 86% with a satisfaction rate of about 75%. For transobturator tape MUS the objective success rate at 12 months is 87% and the satisfaction rate is 85%. Single incision mini-slings (SIMS) were introduced in 2003 and they have a different anchoring mechanism, located at the two extremities, that allows the stabilization of the tape in the obturator internal muscle or deeper in the obturator channel trough a single vaginal incision. Reported objective cure rate is 78% and satisfaction rate is 82%. According to the most recent EAU guidelines about incontinence and the UK National Institute for Healthcare and Clinical Excellence (NICE), the surgeon must be able to offer alternative surgical treatments and have the knowledge of efficacy and safety of these approaches at counseling of the patient. The objective cure rate is rather similar among the different types and routs of mid-urethral slings and the difference vs. Burch colposuspension seems to disappear at 5 years followup, when effectiveness is comparable. There is no significant difference in erosion rates between transobturator and retropubic approaches among mid-urethral tapes, but they are lower when compared to SIMS. The injury rate of nearby organs is quite low for all types of approaches, except for retropubic slings.

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Introduction

Female stress urinary incontinence is a common condition with significant impact on a woman's quality of life. It is often underreported and undertreated, due to differences in definitions and study populations but also due to embarrassment.¹ The prevalence of stress urinary incontinence (SUI) ranges from 29% to75% with a mean of about 50%.²

In an effort to standardize terminology in 2010, an International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report defined SUI as the "complaint of involuntary loss of urine on effort or physical exertion (e.g., sporting

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activities), or on sneezing or coughing."³ Prior to this, several definitions of SUI existed in the literature. Green⁴ developed an early classification of SUI into two types. Type I is caused by the loss of the posterior urethrovesical angle, and type II is the loss of the posterior urethrovesical angle in association with urethral hypermobility (downward displacement of the urethra with a maximal straining angle of $\geq 30^{\circ}$ from baseline). McGuire et al.⁵ identified a third type of stress incontinence that occurs when the leakage of urine is associated with very low leak point pressure, with a typical stow pipe urethra at the video urodynamic and lack of urethral hypermobility. They recognized this type of incontinence as secondary to the loss of urethra sphincter activity. This condition is also known as intrinsic sphincter deficiency (ISD). A clear definition of SUI and an understanding of potential causes is mandatory, as the results of the different treatments available vary significantly based on the type and severity of incontinence.

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Historic prospective

Surgical treatment for SUI is offered when conservative measures and rehabilitation have failed. In 1995, Ulmsten⁶ introduced a novel concept of surgery for SUI, based on stabilizing the mid portion of the urethra with a syntetic tape avoiding any tension to the urethra. This procedure is now known as a retro pubic tensionfree vaginal tape and it is performed via a vaginal approach.

Previously, the majority of incontinence procedures were performed via an abdominal approach. The two most popular where the Burch colposuspension and the Marshall–Marchetti– Krantz procedure. Another surgical option in the 1970s and 1980s was the pubo-vaginal sling. Sling operations aim to stabilize the urethra by placing a strip of material around the underside of the urethra and secure the ends to a fixed structure above. For this purpose, the tissue from the patients' vagina or the rectus– abdominis muscle fascia is harvested and used to stabilize the urethra. Abdominal procedures require hospital stay and may have significant morbidity for the patients.

The tension-free procedures, with a synthetic tape material, have replaced almost completely the previous surgeries and is nowadays considered the gold standard option for surgical treatment of female SUI.⁷ A wide spectrum of tape-based surgical procedures, devices, and different types of synthetic materials are currently available.

This abundance of procedures and materials may have contributed to an increase in complication rates. Use of inadequate type of materials may result in suboptimal integration of foreign material into the tissues. The mechanical properties of mesh materials and devices vary significantly and there is no unequivocal agreement regarding best technique. The ideal material that can reduce mesh-associated complications is yet to be found.⁸ Currently, the majority of the tapes are made of polypropylene. Different synthetic materials are summarized in the Table.⁹ Each is associated with its own particular risks and benefits.

Most surgical tape devices approved for urogynecologic procedures are composed of non-absorbable synthetic polypropylene, as suggested by National Institute for Health and Care Excellence Guidelines.¹⁰ Absorbable mesh materials (polyglactin) lose 75% of its strength in 21 days, and they are therefore not suitable for procedures that depend on the mesh to form a permanent bridge.¹¹ A recent Cochrane Review examining Mid-urethral Sling (MUS) operations reported a vaginal erosion rate of 6.2% for multifilament tape compared to 2.6% of monofilament tape.¹²

According to FDA recommendations on management of SUI, the physician must consider several factors before placing surgical mesh.¹³

- (1) Surgical mesh is a permanent implant that may make future surgical repair more challenging.
- (2) Mesh surgery may put the patient at risk for requiring additional surgery or for the development of new complication.

Table

Classification of mesh materials

Туре І	Macroporous with pore size greater than 75 μ (allowing macrophages, fibroblasts, blood vessels, collagen fibers to penetrate pores), for example Prolene [®] ,Marlex [®] , Trelex Natural [®]
Type II	Microporous with pore size less than 10 $\mu,$ for example, Gore-Tex $^{\scriptscriptstyle (B)}$, DualMesh $^{\scriptscriptstyle (B)}$
Type III	Macroporous, but with multifilamentous or microporous components, for example, PTFE mesh (Teflon [®]), braided Dacron [®] mesh (Mersilene [®]), braided polypropylene mesh (Surgipro [®])
Type IV	Submicron pore size, for example Silastic, Cellgard, Preclude [®] Pericardial Membrane, Preclude [®] Dura-substitute

- (3) Removal of mesh as a result of mesh complications may involve multiple surgeries and significantly impair the patient's quality of life and complete removal of mesh may not result in complete resolution of complications.
- (4) Mesh placement is contraindicated in women with current urinary tract infection or currently pregnant.

Other contraindications for incontinence surgery, especially for mid-urethral slings, include suburethral or periurethral areas with active infection, signs of tissue necrosis, sensitivity or allergy to polyprolpylene, coagulopathy, compromised immune system, planned pregnancy, and known urethral obstruction. Prior radio-therapy is a relative contraindication.¹⁴

Current surgical options

Burch colposuspension

Before the introduction of the mid-urethral sling, Burch colposuspension was considered the gold standard procedure for the treatment of stress urinary incontinence.¹⁵ The aim of this procedure is to limit mobility of the suburethral tissue by providing support lateral to the urethra and bladder neck. It consists of suspending the anterior vaginal wall to the ileopectineal ligament with sutures via an abdominal, laparoscopic, or robotic-assisted approach. A modification where sutures are placed through the pubic, known as the Marshal–Marchetti–Krantz procedure, has largely been abandoned due to the possible complication of osteitis in the pubic bone.¹⁶ Furthermore, a Cochrane Review regarding retropubic colposuspension reported that the Burch colposuspension provides better cure rate as compared to the Marshall–Marchetti–Krantz procedure.¹⁷

Today, Burch colposuspension has a role in patients undergoing abdominal pelvic organ prolapse (POP) repair as a concomitant procedure in those patients with urethral hypermobility or those with contraindication to MUS placement.¹⁸ However, it is still unclear as to the patients who will have the greatest benefit from the combined procedures. Early and 5-year follow-up of a randomized control trial comparing POP repair with or without concomitant Burch colposuspension suggests that Burch colposuspension does not significantly improve outcomes of previously incontinent women.¹⁹ The objective success rate reported of this procedure ranges between 49% and88% with a mean of about 75%. The mean satisfaction rate is about 80%. Injury to surrounding organs is low at about 1%. Urinary retention is a rather common postoperative complication at about 10%. De novo urinary urgency is found in about 7% of treated patients.^{20–27}

Mid-urethral retropubic tape

Currently, mid-urethral synthetic slings represent the most common procedures for SUI in North America and Europe.⁷ The aim of these vaginal tapes is to create a hammock to support and stabilize urethra during increases in abdominal pressure, for instance at coughing, sneezing, or any other activity that cause a contraction of abdominal wall muscles. The tapes are placed in a tension-free fashion via a small vaginal incision trough which two trocars are passed blindly in the retropubic space.²⁸ This can be done either in a top-to-bottom (retropubic space to vagina) or in a bottom-to-top (vagina to retropubic space) fashion. No sutures are required to hold the tape in place. The most common complications of this procedure are bleeding, infection, mesh exposure or erosion, de novo urgency, injury to nearby structures, voiding dysfunction, and pain. Cure rate approaches 86% with a satisfaction rate of about 75%.^{27,29–36} Reported complication rates

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