

Current Opinion/Update

Which sling for which patient?

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Without Abstract

Introduction

In the past decade slings have become the preferred technique for the treatment of stress urinary incontinence (IUE) in various centers [1]. It is interesting that a concept from the turn of the last century has only now become popular, namely in the urological field. Various factors have contributed to the popularization of slings, among them, the fact that needle suspensions have not stood the test of time, together with the various paradigm changes and the evolution of biomaterials [2].

The popularization of slings was initially associated with the idea of treating more serious cases, such as type III urinary incontinence and patients with previously failed procedures. The refinement of surgical techniques allowed for minimally invasive procedures to obtain the same results as autologous slings, with a decrease in morbidity, operating time, and postoperative convalescence [3, 4]. These changes, in our institution, caused the slings to leap from seventh place among elective urological procedures in 1988 to first place in 2003 (Fig. 1, Fig. 2).

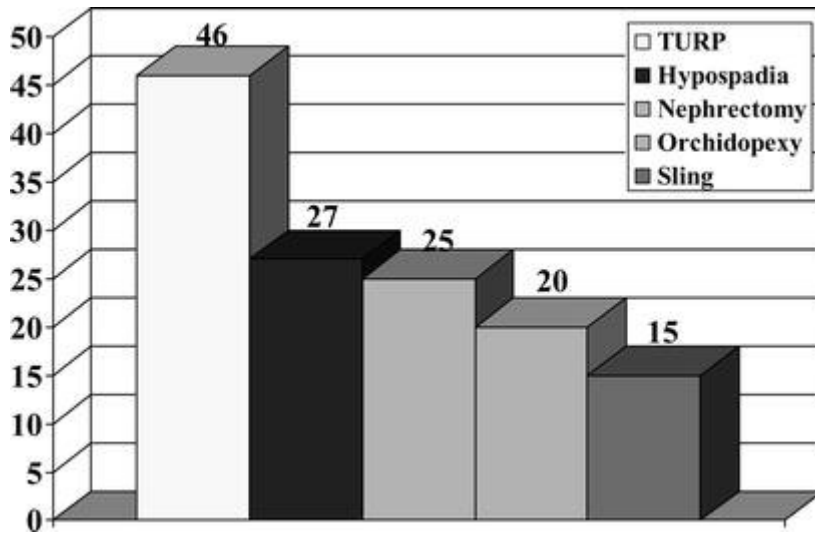


Fig. 1 Frequency of elective urological procedures in 1998. Note that before the introduction of minimally invasive techniques, the slings were the fifth procedure in frequency.

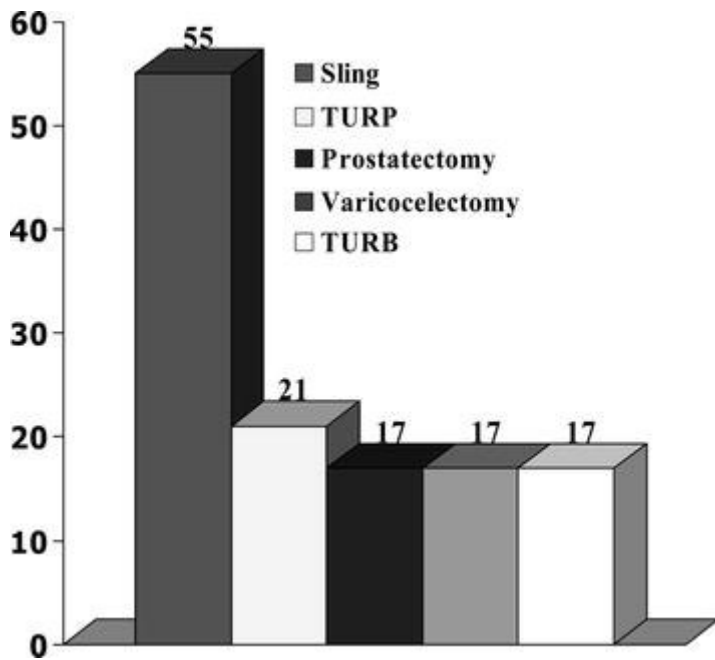


Fig. 2 Frequency of elective urological procedures in 2003. Note that minimally invasive slings are the most frequent procedure.

There were four principal paradigm shifts that, associated with new concepts such as integral theory [2] and biosurgery [5], resulted in a plethora of new slings on the market. Aware of new paradigms and concepts, the surgeon can rationally select the most appropriate technique for each patient.

History

In 1907, Von Giordano presented the concept of suburethral sling for the first time at a surgery convention in Paris [1]. At the time, the proposed surgery was exclusively performed abdominally, with grafted pediculate flaps sutured underneath the urethra. In addition to being technically difficult, this short sling produced tension and consequently obstruction, at a time when the concept of intermittent self-catheterization was unknown.

The first paradigm shift was initiated by McGuire and Lytton in 1978, which introduced the combined approach, both abdominal and vaginal, the use of free grafts of the fascia of rectal abdominal muscles, and the idea of a tension-free sling [3]. The second paradigm change was introduced by Petros and Ulmsten who, based on integral theory, developed the “tension-free vaginal tape,” better known as TVT [4].

The change of sling position from bladder neck to the medial third of the urethra, created a pubourethral “neoligament”[®]. A polypropylene monofilament tape, already used by other groups in Brazil [6], produced similar results to autologous slings and with significant reduction of morbidity.

The great acceptance of TVT brought, for the first time in history, fatal complications due to vascular lesions. The idea of reinforcing the urethral pelvic ligament led to the development of the vaginal tendinous sling, initially using bovine pericardium and intestinal submucosa from swine [7], later converted by gynecologists who used polypropylene and developed the technique of the mini sling. In these techniques the urethral support was created vaginally, using a small suburethral sling, fixed to the tendinous arc on each side. Although safe, this technique required dexterity and materials that hampered its acceptance.

The third paradigm shift was proposed by Delorme in 2001 who, according to the principles of biosurgery, developed the first transobturator sling [8]. Among the advantages of the procedure, we can stress safety and feasibility, even in obese patients and patients with previous surgeries since the Retzius space is preserved and cystoscopy is not necessary.

The fourth paradigm shift, which we introduced in 2002, was readjustability [9]. The use of a hybrid sling that joins silicone multiconic self-anchoring tails to the suburethral support of low elasticity polypropylene monofilament mesh allows for good intraoperative adjustment and postoperative readjustment as well.

In contrast with autologous slings, loosening should be done early, in the first 4 weeks, because late intervention can fail due to fibrosis. On the other hand, the sling can be tightened at any time.

Indications

The slings, initially recommended only for the more complicated cases of urinary incontinence, especially type III SUI [1, 3], have become the preferred technique for all cases because of their minimally invasive features, reduction of morbidity and good results, even in the long-term follow-up [1, 4, 8, 9]. The presence of cystoceles does not preclude the use of slings, and concomitant repair can be made in the very same procedure, when indicated.

New concepts

McGuire introduced the concept of tension-free backboard urethral support. This meant the end of the idea that advocated the correction of SUI by placing the bladder neck in a high retropubic position. This idea was responsible for a large number of voiding dysfunction and high enteroceles.

Integral theory followed, which, among its propositions, advocated the creation of neoligaments with synthetic mesh and valorized pubourethral ligaments. Such a theory diffused the concept of tension-free correction even more and led to technical simplification, since it eliminated the harvesting of the graft and also sutures to maintain the mesh in position, creating the concept of a self-anchoring sling. Also, placing the tape at the level of the mid-urethra significantly contributed to the reduction of urinary retention in the postoperative period.

The concept of biosurgery, a term coined by Hubert Manhes in France [5], was very important in the advance of minimally invasive laparoscopic surgery and also in the development of transobturator slings. Manhes defends the idea that surgeons in this century should leave behind the purely mechanical concepts of surgery, since they work with living tissue that has its own laws of cicatrization and healing.






Delorme developed the transobturator sling using the minimally invasive approach and other principles of biosurgery such as reinforcing the urethropelvic ligaments with a nonwoven nonknitted mesh and no sutures. The transobturator sling is easy to perform and has very low morbidity. Delorme postulates that this type of polypropylene, since it is inelastic, allows for more precise adjustment, contributing to reduction of postoperative retention and obstruction.

The silicone self-anchoring tails permitted adjustment for the first time in both directions [9]. These silicone self-anchoring tails induce the formation of a fibrous capsule, which functions as a tunnel, in the interior of which it can be adjusted. In

order to do so, one of the ends of each tail must be identified and positioned in the desired direction (Table 1).

Table 1 Historical overview of sling development

	1st generation	2nd generation	3rd generation	4th generation	5th generation	6th generation
Who?	1907, Von Giordano	1978, McGuire and Lytton	1993, Petros and Ulmstein	2001, Delorme	2002, Palma	2004, Manhes
What?	Aponeurotic pediculate muscle flap	Free graft of abdominal rectum fascia	Polypropylene mesh	Polypropylene band	Hybrid sling	Biomaterials (biosurgery)
					Polypropylene mesh + silicone tail	
How?	Abdominal via	Combined approach	Vaginal approach	Transobturator approach	Universal approach	Anatomical plans
	Bladder neck	Bladder neck	Tension-free	No cystoscopy		No stitches
			Medial third of urethra			
Average duration of surgery	3–4 h	2 h	30 min	15–20 min	15–20 min	Depends on the affected organ
Length of hospital stay	5 days	4–5 days	1–2 days	1 day	1 day	2 days
Risks	Irritative symptoms	Irritative symptoms	Visceral lesions	↓ Vascular lesions	↓ Vascular lesions	Inherent to the material used
	Retention	Retention	Vascular lesions	↓ Visceral lesions	↓ Visceral lesions	Extrusion
			Irritative symptoms	↓ Irritative symptoms	↓ Irritative symptoms	Infection
			Retention	↓ Retention	↓ Retention	
			Death			

	1st generation	2nd generation	3rd generation	4th generation	5th generation	6th generation
Treatment of the complications	There was none	Intermittent catheterization	Prolonged vesical probing/intermittent catheterization	Prolonged vesical probing	Surgical treatment of the lesions	Material handling
		Urethrolisis	Surgical treatment of the lesions	Surgical treatment of the lesions	Early and late readjustment	
			Urethrolisis			
Professional	General surgeon	Urologist	Urologist	Urologist	Urologist	Urologist
			Gynecologist	Gynecologist	Gynecologist	Gynecologist
	Pelvic surgeon					
						???

Why so many slings?

The explosion of slings is a multifaceted phenomenon; nevertheless, some aspects are more relevant than others. According to Stanton [10], the ideal sling should be resistant, easily available, readjustable, and removable. From the scientific point of view, the meta-analysis conducted under the auspices of the American Urological Association, which has been duly divulged, has verified the negative long-term results produced by vaginal procedures and needle suspensions. The results obtained by retropubic suspensions and slings are comparable in the long term.

From the clinical point of view, minimally invasive slings represent a great advance in surgical techniques, reducing surgical time, morbidity, convalescence and the learning curve, all at the same time. The important role of biotechnology is inestimable, both in the creation of new materials and in the production of new instruments. The increase in life expectancy, especially for women, has caused the rate of incidence for urinary incontinence to rise above 25% during postmenopause.

Added to this is the creation of demand generated by the media and the search for a better quality of life for patients, both of which are relevant aspects. The industries for medical devices, understanding the importance of the theme and the potential of the market, have contributed to the development of various products.

Thus, a plethora of slings have emerged, which can actually become a source of doubt for surgeons (who make up a great diversity of specialists) when faced to choose which sling to use for a particular patient. As there is no evidence-based answer, and also because new biotechnologies precede the evidences, we have suggested major and minor criteria (Fig. 3) that can help in choosing the best sling for each patient.



Fig. 3 Criteria for sling selection.

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