

Bulking agents: anesthesia techniques

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ABSTRACT: *Bulking therapy for the minimally invasive treatment of stress urinary incontinence (SUI) may be offered to women with urodynamic SUI, wishing to avoid the complications associated with more invasive surgery, on the basis of low operative morbidity and low long-term success rates. These bulking agents may be injected by a retrograde or antegrade technique in the periurethral tissue around the bladder neck and proximal urethra. This therapy is strongly dependent on the anesthetic technique of choice; moreover its application as an outpatient procedure implies the potential for a cost-effective treatment for selected patients with SUI. In the present paper all factors affecting the choice of different types of anesthetic techniques are discussed. (Urologia 2009; 76: 45-8)*

KEY WORDS: *Bulking agents, Stress urinary incontinence, Anesthesia techniques, Periurethral injectable therapy*

PAROLE CHIAVE: *Agenti volumizzanti, Incontinenza urinaria da sforzo, Tecniche anestesilogiche, Iniezione periuretrale*

Introduction

Stress urinary incontinence (SUI) affects a large proportion of middle-aged and elderly women, considerably lowering their quality of life and causing major economical costs to the society. When all conservative means are ineffective, a surgical treatment is contemplated, including retropubic suspension, pubovaginal and tension-free slings. Tension-free tapes are considered as minimally invasive procedures, yielding a lesser degree of discomfort and a faster return to normal daily activities for the patients, who nevertheless still require surgery, troncular anesthesia, and an overnight hospital stay in most cases.

Emphasis on minimally invasive options for the sur-

gical treatment of SUI as an alternative to the mentioned surgical procedures has resulted in the development of agents and techniques that substantially improve these conditions towards social continence, but currently give suboptimal cure/dry rates. The application of injectable therapies as compelling procedures implies the potential for cost-efficient treatment for selected patients with urinary incontinence. A number of different substances have been used and reported to be safe and effective in the peer reviewed literature including: bovine glutaraldehyde cross linked (GAX) collagen, polytetrafluoroethylene (Teflon), polydimethylsiloxane elastomer (silicon), carbon coated zirconium beads, hyaluronic acid/dextranomer, and autologous tissues such as fat and cartilage (1). At present, there is

no current evidence suggesting that any of the available periurethral injectables is superior to others with respect to efficacy, durability or safety. This treatment may be offered to women with urodynamic stress urinary incontinence, wishing to avoid the complications associated with more invasive surgery, on the basis of low operative morbidity and low long-term success rates.

These substances may be injected by a retrograde (more common) or anterograde technique in the periurethral tissue around the bladder neck and proximal urethra.

Which kind of anesthetic technique?

If we consider scientific literature, most authors do not pay much attention to the anesthetic technique during this manoeuvre, stating that it may be performed either under general or local anesthesia, according to the surgeon's preference.

The choice of the anesthetic technique depends on the following factors:

- Anesthetist's preference and ability;
- Patient's safety (physical conditions, kind of surgery);
- Patient's preference;
- Surgeon's preference.

There are three main types of anesthetic techniques: general, loco-regional and local anesthesia.

As per the loco-regional anesthesia, there are two main central techniques: peridural and subarachnoid. Table I shows the main characteristics of these two kinds of central loco-regional techniques.

The advantages of both the loco-regional and local anesthesia versus the general one are as

TABLE I - CHARACTERISTICS OF CENTRAL LOCO-REGIONAL ANESTHETIC TECHNIQUES

Characteristics	Subarachnoid	Peridural
Technical simplicity	Yes	No
Systemic toxicity	No	Possible
Cardiovascular stability	Variable	Good
Outcome predictability	Yes	Variable
Analgesia quality	Good	Variable
Headache	Possible	No
Topographic selectivity	Yes	Variable

follows:

- decrease in the surgical stress for patient's organism through the block of the nociceptive afferences, with reduced neuroendocrine and metabolic answers;
- compliance on the patient's part;
- improvement of respiratory performance in the postoperative period;
- less cardio-circulatory involvement;
- fewer thrombo-embolic complications;
- less incidence of side effects (nausea, vomiting, drowsiness, pain);
- better control of pain in the postoperative period;
- possibility of avoiding complications linked to general anesthesia (difficult intubation, abdominal ingests pneumonia; malignant hyperthermia; technical accidents such as hypoxia; cardiac arrest; pollution of the surgical theatre by gas);
- shorter hospitalization time;
- lower costs.

The disadvantages of loco-regional anesthesia are:

- necessity of anesthetist's good experience and technique;
- not always perfect analgesia in relation to the operative time.

Loco-regional anesthesia is contraindicated in the following conditions:

- patient who does not want this kind of anesthesia or he/she is not compliant;
- cutaneous infections or sepsis;
- severe hypotension, shock;
- coagulation defects;
- spinal cord and peripheral neurogenic diseases (neuropathies, multiple sclerosis, amyotrophic lateral sclerosis);
- well-known allergy to local anesthetics;
- anatomical malformations.

Local anesthetics may be responsible for the following systemic and local complications:

a) systemic

- CNS toxicity (paraesthesia in the mouth; tremors; convulsions; coma);
- cardiac toxicity (decreased inotropism; bradycardia; arrhythmia; atrium-ventricular block; ventricular fibrillation);
- allergic reactions;
- vaso-vagal reactions;
- moderate/severe hypotension;

b) local

- nervous fibers lesions (mechanical/chemical);
- infections at the anesthesia site;
- hematoma;

- post-spinal cephalgia;
- complications due to spinal/peridural anesthesia.

When the operator chooses local anesthesia, after placing the female patient in the lithotomy position, the introitus and urethra may be anesthetized with topical 2% lidocaine gel or 2.5% lidocaine – 2.5% prilocaine cream (Emla™) for 10 minutes. After that, a 1% lidocaine solution may be administered through a periurethral or transurethral route of injection, as additional anesthesia, in different sites of the urethra. Should collagen be used, the anesthetic solution is infiltrated periurethrally in the 4 and 8 o'clock positions on each side of the urethra for a total of approximately 4ml on each side (2). In case of polydimethylsiloxane infiltration, the anesthetic solution may be injected into the urethra at the six, ten and two o'clock positions, 1.5 to 2cm distal from the bladder neck (3), in the same positions where the bulking agent is infiltrated afterwards (3). Madjar et al described an anesthetic technique used to implant Durasphere (nonabsorbable, pyrolytic, carbon coated zirconium oxide beads suspended in 2.8% glucan as a carrier gel), transurethrally (4). This procedure is carried out using local anesthesia with intraurethral application of 1% lidocaine hydrochloride jelly; following a routine video-monitored cystoscopy, the bladder is completely drained. The cystoscope is withdrawn to the distal urethra in order to simultaneously view the bladder neck, mid and proximal urethra. A needle is introduced through the cystoscopic sheath and directed at 45 degrees to the lumen, and into the urethral wall at the 4 o'clock position (left hand dominant surgeons may find the 8 o'clock position preferable). After the needle tip penetrates the urethra wall and the bevel is no longer seen, it is advanced, parallel to the urethra lumen, for 1 to 2 cm. At this point, 1.5 mL 1% lidocaine solution are injected into the submucosal layer. This step results in partial coaptation of the urethral walls and hydrodissection of the space where the beads are eventually injected (4).

During the transurethral injection of non-animal-stabilized hyaluronic acid/dextranomer (NASHA/Dx) copolymer, it may be enough to put an anesthetic jelly transurethrally for approximately 10 minutes (i.e., 5 mg of Emla™ cream), and to start then with the injection manoeuvres according to the manufacturer's guidelines (5).

Conclusions

The anesthetic techniques employed during periurethral and/or transurethral bulking agents injection are not well documented in literature. There are no

studies comparing the different types of anesthetic techniques, and the administration of general and/or local anesthesia usually depends exclusively on the investigator's preference; moreover, it is often not clear if different anesthetic techniques have been performed in the same report. The use of local anesthesia certainly could allow performing this minimally invasive procedure in an office-setting reducing costs. Nevertheless, there are no evidences supporting this hypothesis.

Future studies comparing different anesthetic techniques could allow us to choose the most cost-effective anesthetic procedure aiming at enhancing both the patient's health and the intervention effectiveness and safety.

Riassunto

Gli agenti volumizzanti iniettati per via retrograda o anterograda nel tessuto periuretrale attorno al collo vescicale, o a livello dell'uretra prossimale, rappresentano una opzione terapeutica alternativa a procedure chirurgiche più invasive per il management dell'incontinenza urinaria da sforzo. Poiché tale approccio terapeutico potrebbe essere fatto sia ambulatorialmente che in regime di Day Surgery, grande importanza assume la tecnica anestesilogica impiegata durante tale procedura. La scelta del tipo di tecnica anestesilogica da impiegare (generale, loco-regionale, locale) dipenderà da diversi fattori quali le preferenze e l'abilità dell'anestesista, la sicurezza e la preferenza del paziente, la preferenza del chirurgo. Le tecniche anestesilogiche impiegate durante l'iniezione periuretrale e/o transuretrale di agenti volumizzanti ("bulking agents") non sono ben documentate in letteratura. Non vi sono studi che confrontino i differenti tipi di tecnica anestesilogica, e la somministrazione di una anestesia generale e/o locale solitamente dipende esclusivamente dalle preferenze dell'operatore e spesso non è chiaro se nello stesso report vengano eseguiti contemporaneamente più tipi di anestesia. L'impiego di una anestesia locale certamente potrebbe rendere possibile l'esecuzione ambulatoriale della procedura riducendo i costi. Tuttavia non vi sono evidenze che supportino tale ipotesi. Sono necessari ulteriori studi che mettano a confronto le differenti tecniche anestesilogiche al fine di poter scegliere la procedura anestesilogica con il miglior rapporto costo-beneficio.

Gli Autori dichiarano che la ricerca riportata nel loro lavoro è stata eseguita nel rispetto della Dichiarazione di Helsinki e dei principi internazionali che regolano la ricerca sugli animali.

DICHIARAZIONE DI CONFLITTO DI INTERESSI

Gli Autori dichiarano di non avere conflitto di interessi.

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