Management of Iatrogenic Male Incontinence

An Essay

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LIST OF ABBREVIATIONS

AUS artificial urinary sphincter
BCR bulbocavernosus reflexes
BF Biofeedback
BMI Body mass index
BUN Blood urea nitrogen
BPH benign prostatic hyperplasia
cGMP cyclic guanosine monophosphate
CNE EMG *Concentric needle Electromyography*
CSPANs capsaicin-sensitive primary afferent neurons
DLPP Detrusor leak point pressure
DRE Digital rectal examination
EAU European association of urology
EMG Electromyography
ES Electrical stimulation
ExMI Extracorporeal magnetic innervation
GAX-collagen glutaraldehyde cross linked collagen
IPSS international prostate symptoms score
ICS International Continence Society
ICIQ-SF incontinence questionnaire short form
IMI Iatrogenic male incontinence
I-QoL urinary incontinence quality of life scale
LUT lower urinary tract
LPP leak point pressure
MUP maximal urethral pressure
NOnitric oxide
NOS nitric oxide synthases
OAB Overactive bladder
PAG periaqueductal grey
Pabd intra-abdominal pressure
PCa prostate cancer

Pdet detrusor pressure
PFES Pelvic Floor Electrical Stimulation
PFMT pelvic floor muscle training
PMC pontine micturition center
PME premature ejaculation
PMT polyprolene mesh tape
PPI post prostatectomy incontinence
PTFE polytetrafluoroethylene
Pves intravesical pressure
PVR post voiding residual
QoL quality of life
RP radical prostatectomy
RRP retropubic radical prostatectomy
SNRI serotonin-noradrenalin-reuptake inhibitor
SPN sacral parasympathetic nucleus
SUI stress urinary incontinence
TUIP transurethral incision of the prostate
TURP transurethral resection of the prostate
UI urinary incontinence
UUI urge urinary incontinence
VLPP Valsalvq leak point pressure
UPP Urethral pressure profilometry
RALP Robotic assisted laparoscopic prostatectomy

Introduction

Introduction

Iatrogenic incontinence is a devastating complication that is frustrating for both the surgeon and the patient. The specific incidence rate of postprostatectomy incontinence is difficult to ascertain. However, regardless of the type of prostatectomy; either being transurethral, transvesical or radical retropubic prostatectomy, or the nature of the prostate disease, several risk factors are common to all. The most significant risk factors include preexisting detrusor and sphincteric dysfunction, increasing age, and surgical expertise **(Diokno et al., 1986)**.

The increasing number of radical prostatectomies entails an increasing number of patients suffering from postoperative stress incontinence. The huge range of reported incontinence rates is most likely determined to a large extent by the unknown influence of the operating physician **(Wei et al., 2000)**and the lack of a standardised definition of "incontinence."

The risk of incontinence following prostatectomy includes preoperative factors (eg, age and preoperative continence status), intraoperative factors (eg, surgical technique and surgeon's experience), and postoperative factors **(Catalona et al., 1999).**A better understanding of the male pelvic anatomy has decreased the postoperative incontinence rate **(Wei et al., 2000)**; the radical prostatectomy as modified by Walsh revolutionised the surgical technique **(Walsh, 2000)**. Due to the preservation of the neurovascular bundles, postoperative sexual function improved and, in addition, a significant improvement in the postoperative continence rate occurred **(Nelson et al., 2003)**.

The precise aetiology of Iatrogenic incontinence has not been completely understood until now; however, dysfunction of the bladder neck as well as intraoperative damage of the nerves and sphincter may play a causative role **(Foote et al., 1991)**. In this regard, damage of the urethral sphincter can result not only from direct muscle damage but also from damage of the neuronal innervation. According to newly evolving understanding, the reason for incontinence despite good function of the sphincter is a sphincteric laxity due to postoperative intrinsic sphincter deficiency **(Noguchi et al., 2006)**.This is caused by a disturbance of the male integral system following surgery.

Introduction

The diagnosis should be performed in a two-step assessment which includes a urinary diary and a questionnaire to assess the complaints. There are several more or less complicated questionnaires. With the International Consultation on Incontinence Questionnaire—Short Form (ICIQ-SF), recommended by the EAU, a very simple and short questionnaire is readily available **(Seckiner et al., 2007)**.

Noninvasive therapy is the first-line treatment for early incontinence that follows prostatectomy within the first 6 mo to 12 mo. In particular, pelvic floor muscle training (PFMT) is the most widely recommended noninvasive treatment, the effectiveness of physiotherapy strongly depends on intangible factors like patient motivation and compliance **(Nahon et al., 2006)**.

Currently, there is no approved pharmacologic therapy for male stress incontinence. However, for female stress incontinence the use of duloxetine, a serotonin-noradrenalin-reuptake-inhibitor (SNRI), is an established therapy **(Mariappan et al., 2007)**.

In recent years, the efficacy of duloxetine in men has also been evaluated. Despite the efficacy shown, duloxetine has not yet received approval for treatment of male stress incontinence. Nevertheless, duloxetine is commonly used off-label to treat male stress incontinence **(Filocamo et al., 2007)**.

In early postprostatectomy incontinence, de novo urgency with or without detrusor overactivity may play a certain role. For these patients, additional anticholinergic treatment should be pursued. Currently there are no evidence-based recommendations in the existing guidelines for this treatment **(Walsh & Jewett, 1980)**.

Some 2–5% of the patients with incontinence after radical prostatectomy exhibit a persistent incontinence for >1 yr postoperatively despite conservative therapy attempts. For these patients invasive modalities are recommended.

Types of invasive modalities include:

1) **Injection therapy:** Various substances (eg, collagen, teflon, silicone, autologous fat, autologous chondrocytes, dextranomer/ hyaluronic acid copolymer). Short-term data are good, but reaching satisfactory long-term

results requires reinjection **(Secin et al., 2005).** *Stem-cell therapy:* autologous myoblast and fibroblast injections.

2) **Slings:** Bone-anchored sling systems. Readjustable sling systems. Functional retrourethral sling. Pro-ACT system; The ProACT system is an adjustable therapy option; it uses the principle of augmenting titration for optimal urethral coaptation.

3) **Artificial urinary sphincter:** is, despite the new surgical treatment options, still the gold standard for the surgical treatment of male incontinence.

Anatomy and physiology of the bladder and urethera

Anatomy of The urinary bladder

The urinary bladder is a hollow viscus with a strong muscular wall. It is characterized by its distensibility. It is a temporary reservoir for urine and varies in size, shape, position and relations according to its content and the state of neighboring viscera. When empty, it lies entirely in the pelvis but as it distends it expands anterosuperiorly into the abdominal cavity , a full bladder may ascend to the level of umbilicus. ***(Glass, 2005)***

The bladder is superior to the prostate and anteroposterior to the seminal vesicles (*figure 1)*. Anteroinferiorly; the bladder is related the symphysis pubis. The space between the anterior bladder wall and the posterior aspect of the symphysis pubis is known as anterior perivesical space or space of Retzius. ***(Moore et al, 2010)***

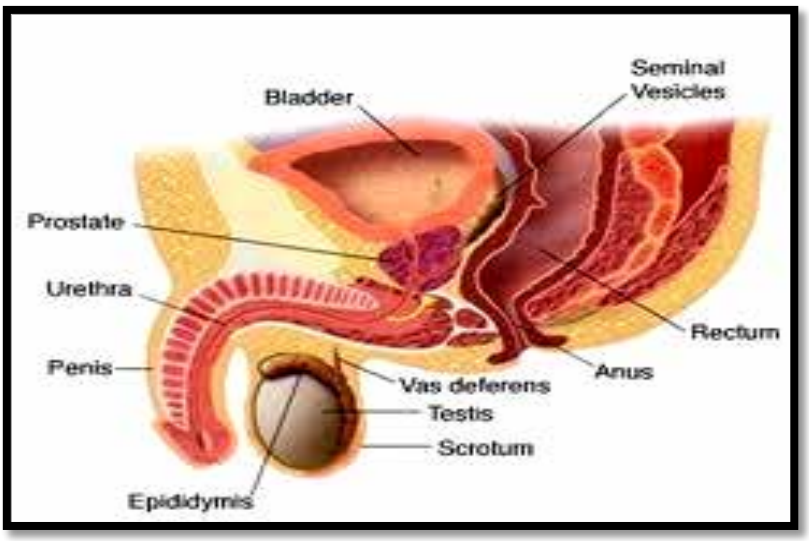

Figure 1: Median sagital section through male pelvis showing relation of the urinary bladder.

Quoted from (Glass, 2005)

The bladder consists of smooth muscle (Detrusor muscle). It is adapted for mass contraction, not peristalsis. The muscle is lined by mucus membrane, surfaced by transitional epithelium. ***(Brooks et al, 2007)***

When empty, the bladder is somewhat tetrahedral and is described as having a ***superior surface*** with an apex at the urachus , two ***infrolateral surfaces***which slopes downwards and medially to meet its fellow,and a***base*** (fundus) of the bladder is the posterinferior surface**,** with the bladder neck at the lowest point where the urethra opens. ***(Brooks, 2007)***

The apex: in both sexes faces towards the upper part of the symphysis pubis. The urachus anchors the bladder apex to the anterior abdominal wall. The urachus is composed of longitudinal smooth muscle bundles derived from the bladder wall. Near the umbilicus, it becomes more fibrous and usually fuses with of the obliterated umbilical arteries. An epithelium-lined lumen usually persists throughout life and uncommonly gives rise to aggressive urachal adenocarcinomas. ***(Brooks, 2007)***

The base (fundus) of the bladder is the posterinferior surface and it is triangular in shape. In females it is closely related to the anterior vaginal wall; in males it is related to the rectum although it is separated from it above by the rectovesical pouch and below by seminal vesicle and vas deferens on each side. ***(Moore et al, 2010)***

The trigoneis a triangular area at the base of the bladder lying between the two ureteral orifices (above and laterally) and the internal urethral orifice (centrally and below). In the empty bladder, these three openings are 2.5 cm apart from each other but when distended, the ureteral orifices may be 5 cm apart. ***(Tanagho EA, 2008)***

The muscle of the trigone forms three distinct layers:
1-superficial layer derived from the longitudinal muscle of the ureter.

2- deep layer.

3- detrusor layer.

The urothelium overlying the muscular trigone is usually only three cells thick and adherent strongly to the underlying muscle by a dense lamina propria. During filling and emptying of the bladder, this mucosal surface remains smooth. ***(Brooks, 2007)***

The neckis the lowest region and is also the most fixed. It is 3-4cm behind the lower part of the symphysispubis.Toward the neck of the male bladder, the muscle fibers form the involuntary internal urethral sphincter. This sphincter contracts during ejaculation to prevent retrograde ejaculation (*figure 3).****(Moore et al,2010)***