Female sexual function and urinary incontinence

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Chapter 1

General introduction

Concerning sexuality, major progress is made in understanding of sexual psychophysiology, pharmacology and the role of sex steroid hormones. Also, awareness increased of cultural factors affecting sexuality (1). The past 50 years has witnessed the sexual revolution of the 1960s and the 1970s (parallel with the widespread use of birth control pill and other effective forms of contraception), the growth of the pharmaceutical industry and the development of both prescription and non-prescription products that affect sexual function. The introduction of pharmacological therapy for erectile dysfunction (ED) not only made treatment of this medical condition simple and effective, but also dramatically increased the awareness of ED in the general public (2). Now, one of the most frustrating and refractory diseases for the urologist, ED, is now enthusiastically discussed and treated in the primary care setting.

This is different for women; female sexual problems are not as widely accepted and discussed. Although, currently there is a rapid and steady growth of knowledge about normative sexual behavior in both men and women and the evolution of current definitions of normal and bothersome sexual function in women. New theories and conceptualizations are being developed in the urgent attempt to keep up with the rapid flow of new knowledge and theory, but especially concerning female sexual function, many questions and controversies remain unsolved.

Since Kinsey's work from the 1940s and Masters and Johnson's landmark studies in the 1960s, we have witnessed substantial advances in the understanding of sexual function and pathology (3;4). Female sexual dysfunction was recognized as a separate diagnostic category in the International Classification of Diseases in 1992, and in the American Psychiatric Association's Diagnostic and Statistical Manual in 1994. Female sexual dysfunctions (FSDs) are described to include disorders of sexual interest/desire, arousal, orgasm, and pain associated with self-distress. Current definitions of sexual dysfunction emphasize the importance of including both low sexual functioning and personal distress components for a diagnosis of desire, arousal, and orgasmic disorders. Although men with erectile dysfunction proved to be the initial beneficiaries of the surge in scientific investigation of human sexuality, women with sexual disorders are steadily gaining attention. In the National Health and Social Life Survey (NHSLS), a 1992 probability sample study of sexual behavior, a greater proportion of women reported sexual problems than men (5). In the demographically representative cohort of 1,749 women and 1,410 men aged 18–59 years, 43% of women and 31% of men experienced sexual dysfunction (5). Additional population-based surveys have confirmed that female sexual disorders are common, with a relatively consistent prevalence reported throughout the world (6-15). Although the nature of women's sexual dysfunction is a topic of continuing debate, a heterogeneous etiology of biological (e.g., age, menopause, hormones) and psychosocial (e.g., mental health, relationship status) and organic (somatic) factors is widely accepted and supported by the literature (13;14;16-18).

The universal importance of optimal sexual function to women's well-being and quality of life throughout their life span is also becoming increasingly well recognized. Although there is evidence of a greater awareness of women's sexuality in culture and the research arena, such awareness is limited in the clinical practice setting. Clinicians, even those specialised in women's health, infrequently initiate discussion of female patients' sexual health and well-being.

Although sexual function is now being studied in several medical specialties dealing with women's health, it has been largely overlooked by the field of urogynecology (19-21).

Female sexual dysfunction

Female sexual dysfunction (FSD) includes disorders of desire/libido, arousal, pain/discomfort, and inhibited/absent orgasm. FSD is multicausal and multidimensional involving biological, psychological and interpersonal determinants. It is age related, progressive and highly prevalent, affecting thirty to fifty percent of North-American women (22). Based on epidemiological data from the USA National Health and Social Life Survey, a third of the women between the age of 18 to 59 years lack sexual interest and nearly a fourth do not experience orgasm (5). Approximately twenty percent report lubrication difficulties and twenty percent consider sex not pleasurable. One estimates that at least forty percent of women have one sexual problem; lack of desire and arousal being the most common (5). In surveys and clinical samples, eleven to thirty-three percent of women have a specific sexual disorder (5;23).

FSD has a major impact on quality of life and interpersonal relationships. For most women it is physically disconcerting, emotionally distressing and socially disruptive. In contrast to the widespread interest in research and treatment of male sexual dysfunction, less scientific research has been performed to evaluate FSD. Only a limited number of researchers have addressed the psychological and physiological aspects of FSD and compared to men, fewer treatments are available.

A major problem in development of clinical research is the absence of well defined, broadly accepted diagnostics and quantifiable parameters. Improving knowledge about female pelvic anatomy and sexual physiology will help to understand and classify FSD's more adequately.

Anatomical aspects of FSD

In contrast to the booming interest in the neurovascular anatomy in men in relation to the survival of the radical prostatectomy, anatomical factors relating to FSD gained recognition within urogynecology only recently. The female bladder base and urethra are anatomically adjacent to the vagina; pelvic floor dysfunction may therefore be associated with sexual problems. These compartments are innervated by somatic and sensory autonomic nerve supply

that is of both sympathetic and parasympathetic origin. During urogynecologic surgery, nerve structures can be injured, potentially affecting SF. Most literature on peripheral neuropathy following pelvic surgery and sexual function has focused on the male sexual response. This is mainly because there are discrete, objectively measurable physiological events in men. In fact, nerve sparing surgeries, which aim to preserve the nerves that control penile erection and ejaculation, have become popularized. Increasing the awareness of the possible complications and recognizing the anatomical structures will help to reduce the rate of neural damage at the time of the surgery. This increased awareness is reflected by the recent studies published in the medical literature and presented at conferences targeted at the urogynecologic, gynecologic, and female urologic community (24).

However, more evidence-based data are needed to elucidate possible nerve injury from the so-called minimally invasive urogynecologic surgery. Nerve sparing pelvic surgery in women should be a critical focus area for all pelvic surgeons.

The clitoris plays a crucial role in achieving female orgasm (25). It is innervated by the dorsal clitoral nerves. These peripheral sensory afferents originate from the pudendal nerve. The clitoris is also innervated by fibers of the uterovaginal plexus, also known as the cavernous nerves. Clitoral and labial swelling during sexual arousal is associated with parasympathetic mediated vasodilating mechanisms; nitric oxide (NO) being the most important neurotransmitter (26;27). NO control of vasodilatation and the neuronal signaling between the dorsal and cavernous nerves contribute to the engorgement of the clitoral cavernous bodies. This supports the initiation of sexual arousal by tactile stimuli to the clitoris (28). The somatic and autonomic pathways and their relationship to the clitoris, urethra and vagina have not yet been elucidated in detail, so up till now many aspects of the clitoral neuro-anatomy and neurophysiology are controversial.

Urinary incontinence (UI)

Continence and micturition involve a close balance between urethral closure pressure and detrusor muscle activity. Normally the urethral pressure exceeds the bladder pressure, resulting in continence. Both the proximal urethra and bladder are located within the pelvis. Increased intra-abdominal pressure, for example by coughing or sneezing, is transmitted to both urethra and bladder equally, leaving the pressure differential unchanged. Normal voiding is the result of changes in both of these factors: the urethral pressure falls and bladder pressure rises. UI may arise when this mechanism becomes insufficient, for example due to changes in anatomy or functioning.

Stress urinary incontinence (SUI), also known as 'effort incontinence', is caused by insufficient pelvic floor and/or sphincter muscles. It is the loss of urine associated with coughing, laughing, sneezing, exercising or other movements that increase intra-abdominal pressure and thus

increase pressure on the bladder. In women, physical changes following pregnancy, childbirth, and menopause contribute to SUI. *Urge urinary incontinence* (UUI) is the involuntary loss of urine, while suddenly feeling the need or urge to urinate. The most common causes of UUI are involuntary and inappropriate detrusor muscle contractions.

SUI and UUI in women are highly prevalent conditions in the female population (29;30). *Lower urinary tract symptoms* (LUTS) including *overactive bladder* (OAB) symptoms (complaints of urgency and frequency with or without UI) are also commonly reported by the female population (31;32).

In a recent review on the impact of OAB and UI on the quality of life (QoL) it was shown that healthy people and patients affected by these conditions conduct lives at different levels of quality (33). UI and OAB may lead to emotional disturbances, embarrassment, avoidance behaviour and social isolation (34-37). The role of emotional health in terms of the ability to carry out daily activities (ie, role-emotional) is deemed to be highly affected by OAB. Several studies also demonstrated that UI or OAB severely impair mobility because women tend not to go out because of fear of leakages (38). The severity of the incontinence has been shown to be the single most relevant predictor of the QoL, regardless of the type of UI (39). This impact on the overall QoL underlines the relevance for clinicians, healthcare managers, and health economic researchers of coping with this problem. Awareness needs to be raised among clinicians as to the impact of UI or OAB onto patients' QoL.

OAB, UI and FSD: an intriguing association

In recent years, FSD has become a popular research area because of the importance of sexual function in determining QoL. More interest is showed in the sexual dysfunction in women with urogenital complaints (40;41). As many as forty percent of the 22 million women with UI say that sexual intercourse is an inciting event for their symptoms and report hypoactive sexual desire as a result. Sexual activity can cause direct pressure on vulvovaginal structures as well as displace the bladder neck, creating an uncomfortable coital experience and potentially resulting in urinary trauma (41).

In studies from 1980 to 2001 concerning the presence of UI during sexual activities and the impact of UI on sexual function in women, prevalence rates of FSD ranging between 0.6 and 64% were documented (42). At least thirty percent of American women have symptoms of FSD and one may expect that this number rises with age (43). Diseases affecting the lower urinary tract, being UI, overactive bladder (OAB), pelvic prolapse and hormone deficiencies may also significantly increase the rate of FSD. The quality of sexual functioning of patients with OAB, with or without UI, is significantly affected (44). Continent women with OAB have more frequent sexual activity then incontinent women and 50% of the incontinent women report a reduction in sexual desire related to OAB, aging and menopause. Although not all incontinent

women report incontinence during intercourse, the majority is embarrassed by their OAB with resulting loss of self-image (45).

Incontinence at sexual intercourse or 'coital incontinence' is an important aspect of UI and sexual function. About 33% of the sexually active women with urinary symptoms suffer from coital incontinence. Research suggests that women with coital urinary incontinence have a lower quality of life and tend to have more severe frequency, urgency, bladder pain, stress and urge incontinence, nocturia, and nocturnal enuresis than women without complaints of coital incontinence (46-48). Recently, coital incontinence (CI) was included in the Symptoms section of a new joint report on the terminology for female pelvic floor dysfunction and it was defined as the "complaint of involuntary loss of urine with coitus" (49). Its classification is based also on the timing of occurrence: "This symptom might be further divided into that occurring with penetration and that occurring at orgasm" (49). UI at orgasm is thought to be associated with overactivity of the bladder (50;51). Not only the leakage itself but also the risk of UI during sexual intercourse worries women. They fear intercourse and feel ashamed in the relationship with their partner.

SUI is associated with leakage at penetration (52). One in every four women assessed at an urogynecology clinic has FSD in relation to SUI (50). Urinary leakage occurring during intercourse should be considered a common, although underreported symptom, affecting sexually active women with pelvic floor dysfunction. The reported incidence of coital incontinence in incontinent women can vary between 10% and 27% (52-54). However, this complaint is difficult to diagnose, because women rarely mention it spontaneously (55). The impact of coital incontinence on women's QoL has been recently elucidated (47;48). Sexually active women with urinary symptoms including coital incontinence report a significantly worse QoL than those without (48). However, even without considering possible leakage at intercourse, the incidence of FSD in women with UI and/or LUTS is relatively high, so it is mandatory to assess sexual function in these patients (56).

Chronic pelvic pain (CPP) is another significant factor compromising sexual function (57). Undoubtedly, there is a close multifactorial relationship between FSD and LUTS including CCP with different pathophysiological mechanisms interacting simultaneously. Further knowledge concerning these interactions will provide a promising horizon in terms of better treatments and improved quality of life for these patients.

Treatments for UI and FSD

The potential impact of surgical procedures for UI on women's sexual health has been studied extensively (58-71). In theory, successful treatment of UI should improve female sexual function. This concept, however, has not yet been confirmed, as sexual functioning after surgery is variously reported as 'improved', 'unchanged', or 'worsened' (58;59;61;63;67-70;72;73).

Unfortunately, only a few validated instruments are available for evaluating female sexual functioning. Assessment is also difficult because of the diversity of surgical procedures for SUI.

Until recently, attention to post-therapy QoL issues was minimal. From the patient's point of view surgical therapies do not always result in improvement of QoL. In this respect, profound knowledge of the impact of surgery for UI is of great importance to urologists and urogynaecologists. The interest in and attention to post-therapy QoL issues and in this respect sexual function is growing. Proper understanding of the basic functional anatomy of the clitoral/vaginal region is most certainly a primary prerequisite to improve the results of surgery.

Outline of the thesis

The aim of this thesis was to evaluate the intriguing and relevant relationship between UI and FSD in urological practice. This relationship is addressed from anatomical, clinical and health care points of view. The initial question was whether urologists should play a role in sexual health care of women with urinary incontinence.

In chapter 2, three-dimensional anatomical reconstructions and results of dissection in cadavers are described. The reconstructions illustrate the clitoral innervation in order to deduce its anatomical relationship to other pelvic structures. This is important to preserve clitoral nerves during pelvic surgery. Furthermore, this chapter evaluates the possible effects of incontinence surgery from an anatomical point of view, especially with regards to the nerves important for sexual function.

In chapter 3, sexual function is evaluated among women after a sling procedure. This study attempts to clarify the impact of surgery for stress urinary incontinence on female sexual function. In addition, the relevance of the presence of preoperative coital incontinence is discussed extensively.

Chapter 4 discusses the impact of female urinary incontinence on the sexual relationship with male partners.

The chapters 5 and 6 overview practices, attitudes and believes of Dutch urologists towards FSD and sexual abuse.

Chapter 7 analyses how Dutch incontinence nurses deal with sexuality and sexual abuse in their daily practice.

Finally, chapter 8 provides a 'helicopter view' on data of this of this thesis followed by a discussion on future prospects.

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Chapter 2

The somatic and autonomic innervation of the clitoris; preliminary evidence of sexual dysfunction after minimal invasive slings

(Submitted)

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Introduction

Within a decade, the midurethral (vaginal) slings became by far the most popular surgical treatments for stress urinary incontinence (SUI), with more than one million women treated (1). Despite the numerous studies on objective and subjective outcomes of this minimal invasive procedure, very few studies have addressed the impact of vaginal sling procedures on sexuality. Small series evaluating the sexual well-being before and after the tension-free vaginal tape (TVT), the transobturator in-out (TVT-O) and/or the transobturator out-in (TOT) procedures show conflicting results. Of these studies, some suggest deterioration (2-7) of sexual function, some improvement (2-4;8-11), whereas others were equivocal (12-16). A prognostic factor in the improvement of the sexual functioning of these patients is the cure of incontinence during intercourse (17;18). Negative effect on sexuality is hypothesized to be related to the implanted material because of damage to important vascular and/or neural genital structures (2-7).

The clitoris plays an important role in achieving female orgasm by sexual stimuli (19). It is innervated by the dorsal nerves of the clitoris (DNC). These peripheral sensory afferents of the clitoris originate from the pudendal nerve. The clitoris is also innervated with fibres coming from the autonomic pelvic plexus (also known as the inferior hypogastric plexus): the cavernous nerves of the clitoris. Clitoral and labial swelling during sexual arousal, is associated with parasympathetic vasodilator mechanisms, among which nitric oxide (NO) appears to be a primary neurotransmitter contributing to the mediation of this function (20;21). NO control of vasodilatation and neuronal signaling between the cavernous nerves and the dorsal nerve of the clitoris contribute to the engorgement and subsidence of clitoral tissue. This supports the initiation of sexual arousal by tactile stimuli of the clitoris (22). Therefore, in theory, injury to the clitoris and/or its innervating nerves, both somatic and autonomic, could lead to altered sexual function.

To investigate the anatomical relation of vaginal slings to important neural genital structures, basic knowledge about and detailed descriptions of the neuro-anatomy of the clitoris are needed. The clitoris is a structure of which few diagrams and minimal descriptions are provided, potentially impacting its preservation during surgery. Research has demonstrated the integral relationship between the clitoris, and the distal urethra and vagina (23-25). O'Connell et al. provided a major contribution to the research on the anatomy of the clitoris (23;26). They found the clitoris to be intimately related to the distal urethra, which lead them to suggest that the role of the urethra in sexual function is related to the position of the surrounding erectile tissue rather than the urethral sphincter (23). The DNC was described in detail, the autonomic nerves, however, were poorly addressed.

Disruption of the somatic innervation of the clitoris can lead to a diminished sensibility of the clitoris, thereby affecting sexual arousal due to the absence of tactile stimuli. The DNC is located along the medial aspect of the ischiopubic ramus (IPR) where it runs along the pubic bone in a sulcus described as the sulcus nervi dorsalis clitoridis (27). Risk of injury to the DNC along the IPR had been suggested by Delorme with the medial to lateral passage of the needle which is used for placing vaginal slings and may alter postoperative sexual function such as arousal, orgasmic function or pain (28). This possible risk has been illustrated by Lowenstein, showing the topographic relation of mid-urethral sling for stress urinary incontinence to critical female genital structures (29). In a cadaveric study, performed by Achtari et al., the potential risks of three vaginal slings to the DNC were evaluated. Distances of a TVT, transobturator in-out (TVT-O) and transobturator out-in (Monarc) to the DNC were similar (11-12 mm) (30). Given the outside-in course, the Monarc was claimed to (theoretically) be the safest device. Another cadaveric study found similar results, although they only documented the course of the DNC from the piercing of the perineal membrane to its terminal branching and not its course along the IPR (31).

The cavernous nerves of the clitoris are involved in the neural control of vasocongestion and, consequently, the lubrication-swelling response. Disruption of these nerves could lead to altered vascular function during sexual arousal and possibly disordered orgasm. However, although important for normal sexual function, in afore mentioned studies no attention was paid to possible disruption of the cavernous nerves of the clitoris (29-31).

The aim of this study was to reinvestigate the neuro-anatomy of the clitoris by performing dissection in an adult female pelvis and by using (immuno)histochemical and three-dimensional (3D) reconstruction techniques on a female fetus. In this study we focus on 1) the autonomic innervation of the clitoris, 2) the course of the DNC, 3) to investigate the anatomical sites of potential nerve damage during vaginal sling surgery for SUI.

During dissection, it is difficult to recognize and dissect small nerve fibers such as those from the pelvic plexus. Therefore, there is a high risk of artifacts because tissue strings may be mistaken for small nerves. The study of serially sectioned human fetuses has an advantage over conventional cadaver dissections, because of immunohistochemical staining; structures of interest are easily recognized (32-35).

Dimensions may change but the topographic relationships of tissues persist throughout fetal development which makes the study of fetuses excellent for describing anatomy (32;36). Furthermore, 3D reconstructions of the innervation of the clitoris can be prepared to deduce its anatomical relationship to other pelvic structures and provide an insightful illustration which can be used by pelvic surgeons.

Methods

Fetal 3D-reconstruction

Fetal pelves from the collections in the departments of Anatomy and Embryology at the Leiden University Medical Centre and at the Amsterdam Medical Centre were studied. Eleven paraffin embedded fetuses (all female), ranging from 10 to 27 weeks of gestation; 6-26 mm crown-rump length (CRL) were serially sectioned. Six were stained with haematoxylin and eosin, three with haematoxylin-azophloxine and two with both haematoxylin and neurofilament (35). The fetal tissue was fixed in 4% paraformaldehyde, embedded in paraffin and transversely sectioned into serial sections of 10 µm. Analysis of the transverse sections was performed from superior part of the pubic arch to just below Alcock's canal. Digital images were taken of the serial sections, photographing every second section. These images were used to prepare three dimensional reconstructions with the Amira software package (v3.0, Visage Imaging GmbH, Fürth, Germany). Unfortunately, in the transversed sections, the perineal membrane (or urogenital diaphragm) was not recognized and thus not reconstructed.

Cadaver study

The pelvis of a female cadaver without signs of any pelvic surgery was used for this study. Usually, the age of death of these women is older than 70 years of age. Preservation of the cadaver was performed by injection of the embalming fluid AnubiFiX™ into the femoral artery. Due to this fixation process, the cadaver remains flexible which enables a natural dissection and allows surgical procedures. The cadaver was donated to the university for medical research and hence does not require separate ethics approval to be dissected. A trained urologist (H.W.E.) performed parts of both procedures (TVT and TVT-O) on one cadaver, one sling placement on each side. Both procedures were performed exactly similar as they are normally performed on patients.

The pelvis was sectioned through the midline from the pubic symphysis anteriorly to the sacrum posteriorly. The urethra was sectioned along its full length in the midline. The clitoris and its somatic and autonomic nerves were dissected and the shortest distance between the needle/sling and the nerves were measured and various stages of the dissection were recorded photographically.

An interactive three-dimensional reconstruction is attached to this article, available as a supplementary file showing the pelvis, the pelvic organs, the clitoris, its autonomic (cavernous) nerves and the branches of the pudendal nerve, the obturator nerve and the levator ani muscle of a female foetus (12 wk of gestation; same foetus as shown in Figures 1A-H).

Results

Three-dimensional reconstruction

Anatomy of the clitoris

The clitoris is a multiplanar structure positioned deep to the labia minora, labial fat and vasculature, bulbospongiosus and ischiocavernosus muscles, inferior to the pubic arch and symphysis. It has a broad attachment to the pubic arch, and via extensive supporting tissue to the mons pubis (the adipose tissue lying above the pubic bone of adult females, anterior to the symphysis pubis) and labia. The clitoris consists of a tip, also known as the glans clitoridis, the erectile body and the crura (or corpora caverosa) (Fig. 1A). The clitoris has a close relationship to the distal urethra and vagina (Fig. 1B). Because this study involved human fetuses, aged 10-27 weeks of gestation, these two structures are still partly merged.

Dorsal nerve of the clitoris

The three-dimensional reconstruction illustrates the course of the dorsal clitoral nerves. They originate from the pudendal nerve in the Alcock's canal immediate medial to the pubic bone and lateral to the rectum, forming a bundle that fannes out laterally, passing the levator ani muscle and ascending to the clitoral bodies (Fig. 1C, D, E and F). The 3-D images also revealed that both dorsal nerves of the clitoris run medial and close to the puboischial ramus (Fig. 1E). Furthermore, the close relationship of the clitoral crura to the clitoral dorsal nerve was notable. They further traverse distally along the clitoral crura and run posterior to the body of the clitoris before hooking over it in anterolateral direction. There, they medially cross the cavernous nerves and pass over the clitoral body (Fig. 1E and G). As they pass over the body, they merge with the autonomic nerves. After passing over the body, the merged somatic and autonomic nerves pass further caudal and anterior over the clitoral body to the glans clitoridis (Fig. 1E and H).

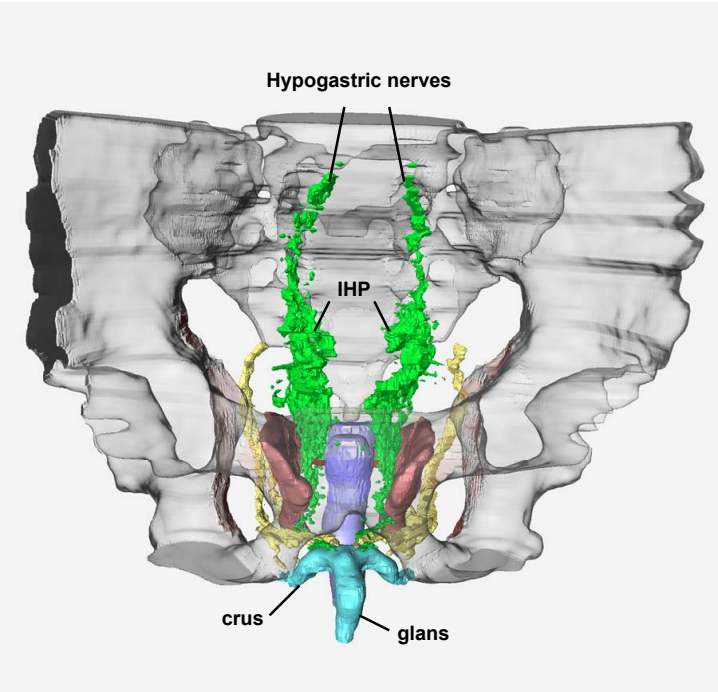
Autonomic nerves of the pelvic plexus

From the superior hypogastric plexuses, two nerves (the hypogastric nerves) run bilaterally into the small pelvis, to be joined by the pelvic splanchnic nerves coming from sacral roots S2 to S4, to form the pelvic plexus, also known as the inferior hypogastric plexus (IHP) on both sides of pelvic organs (Fig. 1A). The IHP showed to be a triangularly shaped plexus in a sagitally plane. It is in close contact with its target organs as a flat meshed plaque of nerve tissue, stretching from anterolateral to the rectum, passing the cervix and vagina laterally and extending from the lateral vaginal wall to the base of the bladder and lateral to the urethra with branches to the clitoris.

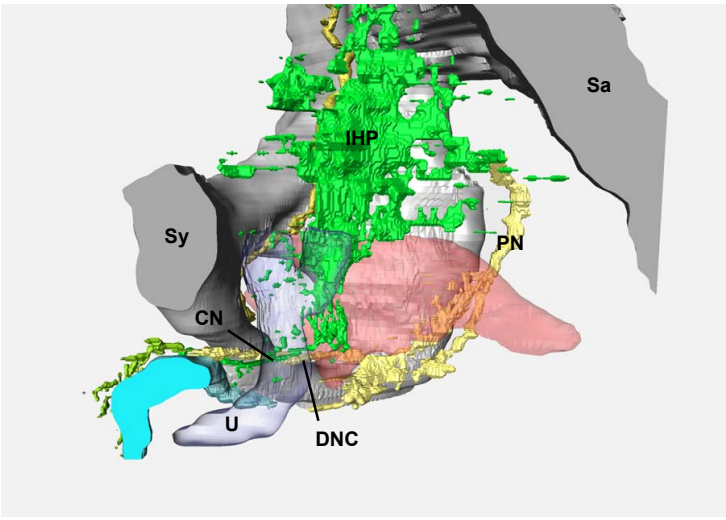
Its nerves extend onto the lateral walls of the proximal and mid-vagina, where they form a dense network. These nerves travel superior to cover the proximal anterior vaginal wall, where

Figure 1

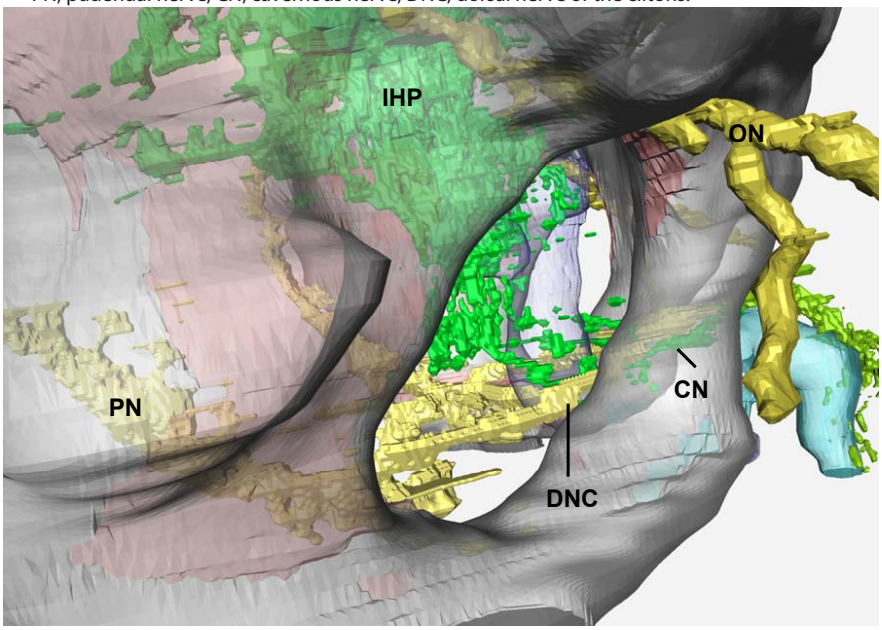
A. Anterior view (3D) of the clitoris (blue), the pelvis (grey), the urethra/vagina (U, purple), the pudendal nerves (yellow), the hypogastric (autonomic) nerves (green) travelling into the pelvis and forming the inferior hypogastric plexus (IHP), the merged autonomic and dorsal nerves (light green).



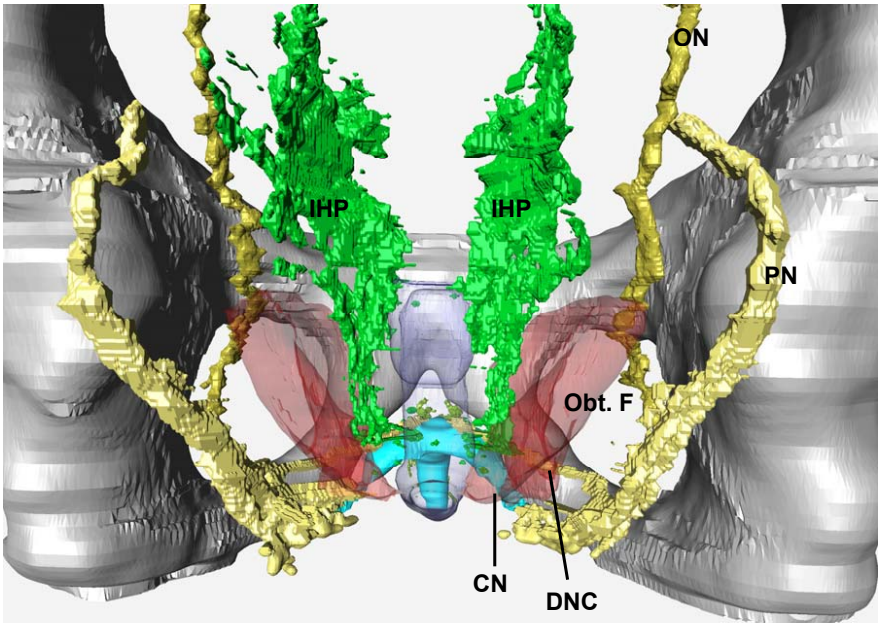
B. Lateral view (3D) of the midsaggital cut pelvis with the symphysis (Sy) centered (grey), the levator ani muscle (red) the clitoris (blue), the autonomic (green) and somatic (yellow) nerves and the urethra/vagina (U, purple). IHP: inferior hypogastric plexus, PN: pudendal nerve, CN: cavernous nerve, DNC: dorsal nerve of the clitoris, Sa: sacrum.



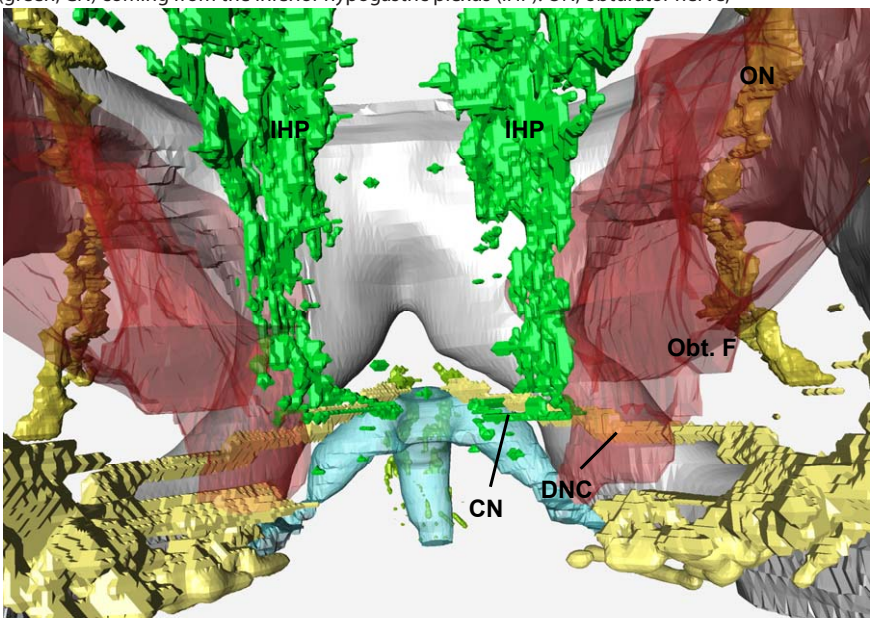
C. Lateral view (3D) of the pelvis (grey) on the obturator foramen, the clitoris (blue), the autonomic (green) and somatic (yellow) nerves and the urethra/vagina (purple). IHP; inferior hypogastric plexus, PN; pudendal nerve, CN; cavernous nerve, DNC; dorsal nerve of the clitoris.



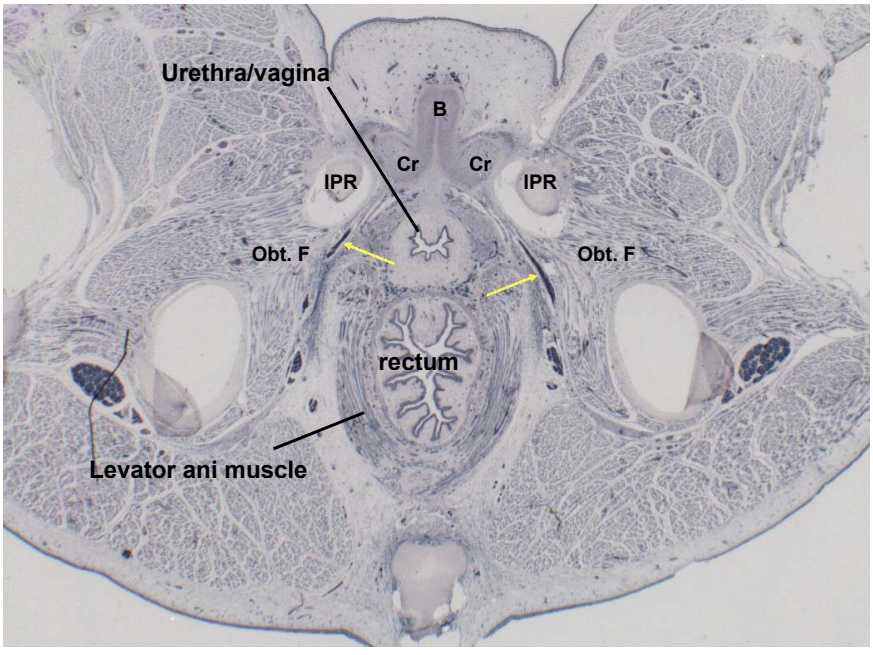
D. Posterior view (3D) of the pelvis with the pubic bone centered (grey), the clitoris (blue), the autonomic (green) and somatic (yellow) nerves and the urethra/vagina (purple). IHP; inferior hypogastric plexus, ON; obturator nerve, PN; pudendal nerve, Obt. F; obturator foramen, CN; cavernous nerve, DNC; dorsal nerve of the clitoris



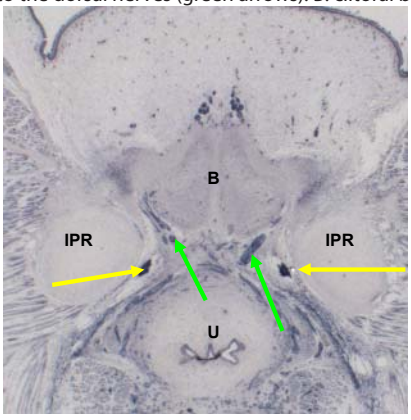
E. Anterior and slightly lateral view (3D), of the pelvis (grey) the obturator foramen (Obt. F), the obturator nerve (ON), the clitoris (purple), the dorsal nerve of the clitoris (DNC, yellow) and the cavernous nerves (green, CN) coming from the inferior hypogastric plexus (IHP). ON; obturator nerve,



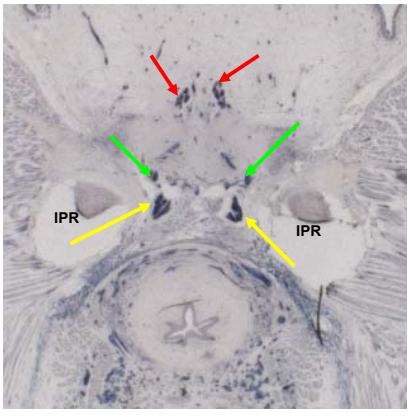
F. Stained section, showing the body of the clitoris (B) with its crura (Cr) close to the ramus inferior of the pubic bone (IPR), and the dorsal clitoral nerves (yellow arrows) passing along the obturator foramen (Obt. F.).



G. Close-up of a stained section. The close relationship of the ramus inferior of the pubic bone (IPR) to the clitoral dorsal nerve (yellow arrows) is notable and it shows that the branches of the cavernous nerves of the clitoris pass medial to the dorsal nerves (green arrows). B: clitoral body, U: urethra/vagina.



H. Stained section, showing both cavernous nerves (green arrows) and the dorsal nerves of the clitoris (yellow arrows) hooking over the clitoral body and travelling further caudally alongside and into the clitoral body and glans (red arrows).



I. Stained section, the autonomic nerves merge with the branches of the dorsal nerves as they pass over the clitoral body (light green arrows).

they form the cavernous nerves at the 2 and 10 o'clock positions along the urethra. (Fig. 1B and F)

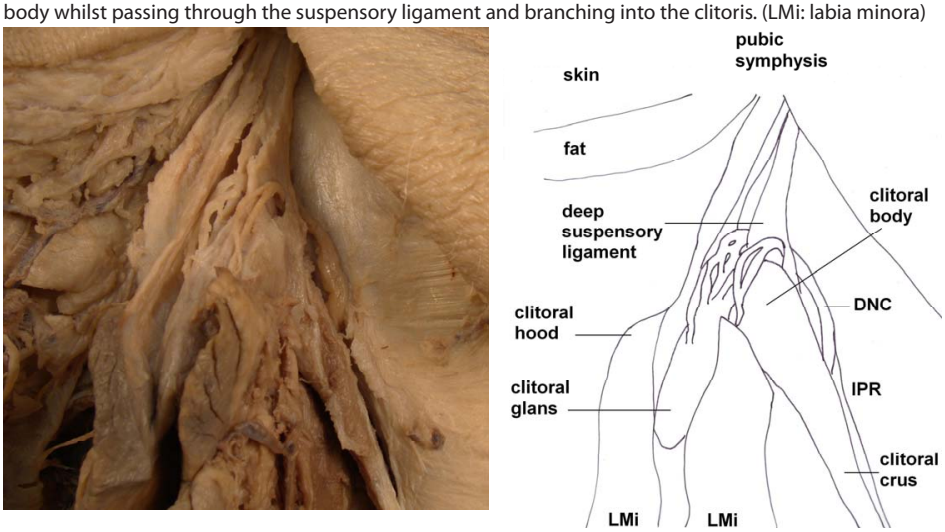
There, they travel further caudal to the clitoral bodies crossing the dorsal clitoral nerve medially (Fig. 1C). The nerve bundles then travel alongside the branches of the dorsal nerve passing over the clitoral body. After passing over the clitoral body, these autonomic nerves merge with the branches of the dorsal nerve and travel further caudally alongside and into the clitoral body and glans (Fig. 1E, H and I).

Dissection

Anatomy of the clitoris

The initially almost straight clitoral crura commence proximally running along the puboischial ramus and join distally under the pubic symphysis as a single clitoral body that projects anteriorly into the glans. There it projects into the fat of the mons pubis. They are situated between the clitoral crura and form a midline core in the triangular shaped clitoral structure. Dissection shows that the apex of this triangular structure is the most superior point of the clitoral body, where it attaches to the under surface of the pubic symphysis by the deep suspensory ligament (Fig. 2). As the clitoral body projects from the bone into the mons pubic fat, it descends and folds back on itself in a boomerang-like shape in a dorsalcaudalward direction forming the glans clitoridis. The glans of the clitoris is a relatively small nodular structure that becomes partially covered by the glando-preputial lamella and prepuce (or clitoral hood).

Figure 2. Anterior view of the dissection clitoris. The mons pubis has been opened to show the deep suspensory ligament. Furthermore, the clitoral crus, body and glans are shown with the dorsal nerve of the clitoris (DNC) ascending along the inferior ramus of the pubic bone (IPR), hooking over the clitoral body whilst passing through the suspensory ligament and branching into the clitoris. (LMi: labia minora)



Dorsal nerve of the clitoris

The course of the pudendal nerve (PN) around the ischial spine was approached posteriorly by removal of the skin and superficial fascia between the anterior inferior iliac spine, the ischial tuberosity and the posterior superior iliac spine. The gluteus maximus muscle was dissected from its origin to expose underlying structures. The sacrotuberous ligament was identified and transected to identify the PN subjacent to the sacrotuberous ligament and around the ischial spine of the pelvis. The entrance of PN into Alcock's canal was identified. Alcock's canal was then unroofed which revealed the three main branches of the PN, namely, the inferior rectal nerve, the perineal nerve and the dorsal nerve of the clitoris (DNC). The DNC was then followed until its termination in the clitoris. The DNC travels along the perineal membrane (or urogenital diaphragm) and runs inferior to the inferior pubic ramus. By opening the perineal membrane the TVT-O tape was exposed. (Figure 3 A-B) The distance of the TVT-O to the DNC was 2 mm and they were separated by the perineal membrane. (Figure 3)

Figure 4 is a schematic lateral view on a midsagittal sectioned right pelvis showing the course of the DNC from the PN to the clitoris lateral from the levator ani muscle.

Figure 3 A. Frontal view of the right female genital and perineal area. In order to expose the DNC the skin was opened between the right labia majora and minora. To show the route of the TVT-O sling, the perineal membrane was opened subsequently. DNC; dorsal nerve of the clitoris, TVT-O; the tensionfree vaginal tape obturator; IPR; inferior pubic ramus, LMa; labia majora, LMi; labia minora.

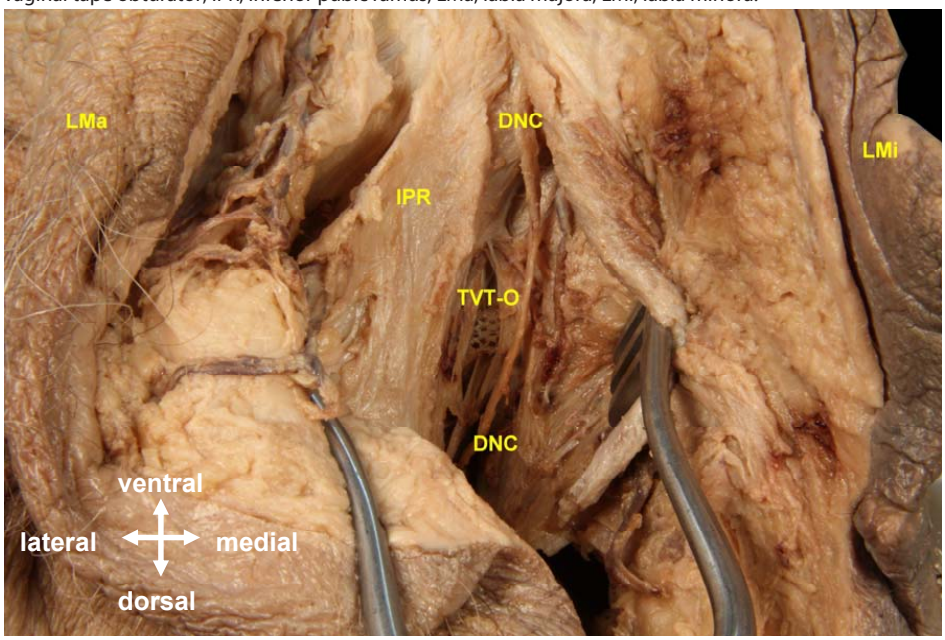
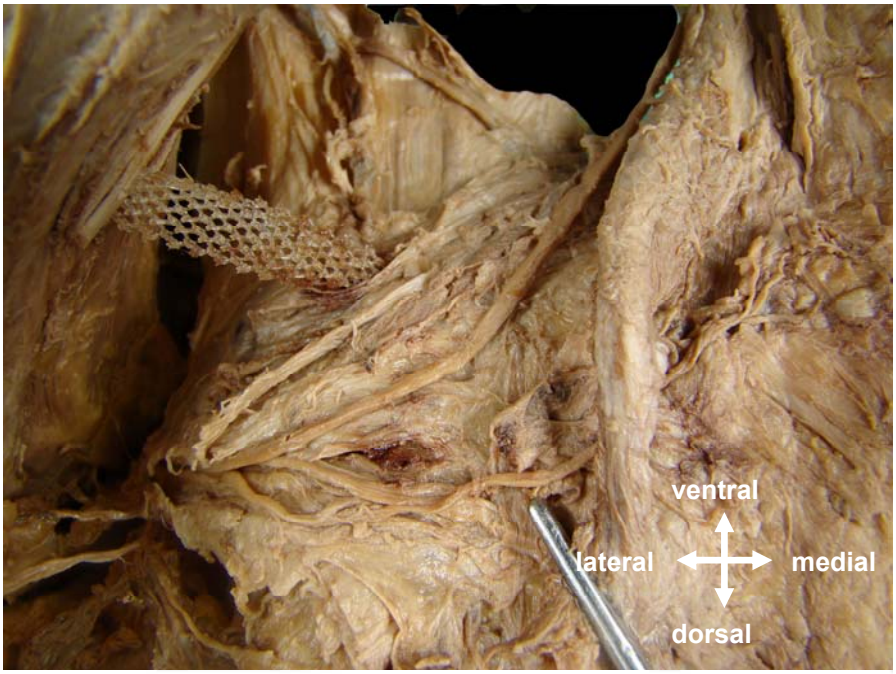


Figure 3 B. Close-up of figure 3A. The bulbospongiosus muscle and clitoral crus were moved medially to show the course of the DNC. To show the route of the TVT-O sling, the perineal membrane was opened. DNC; dorsal nerve of the clitoris, TVT-O; the tensionfree vaginal tape obturator; IPR; inferior pubic ramus.



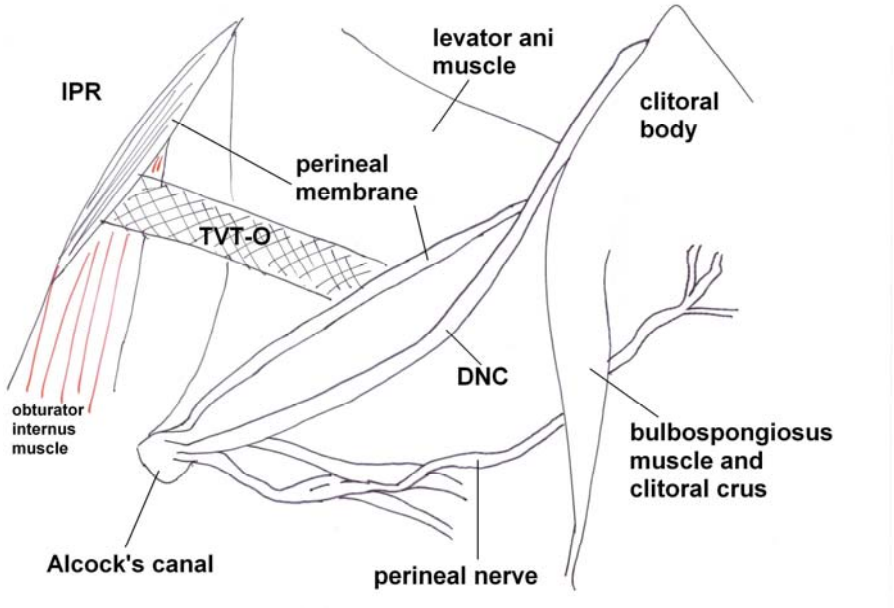
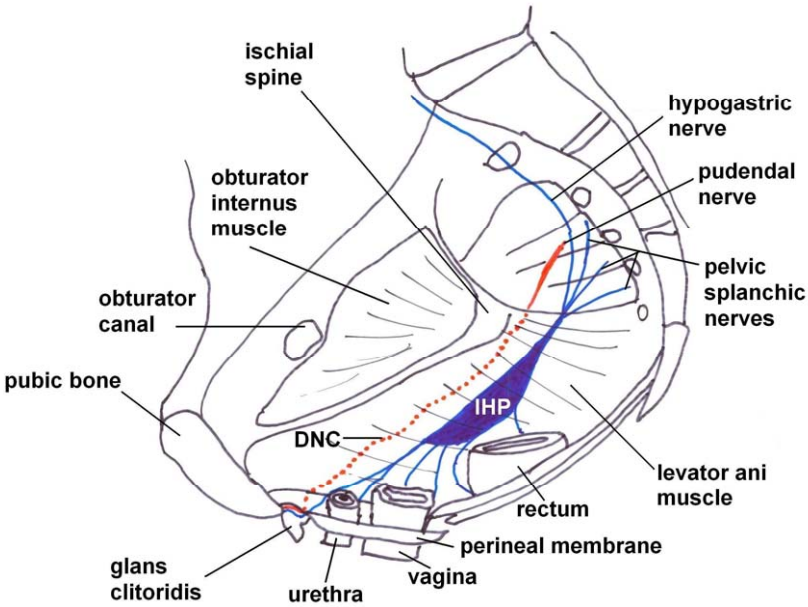


Figure 4 A schematic lateral view on a midsaggital sectioned right pelvis showing the course of the autonomic nerves from the hypogastric nerve to the target organs and the course of the DNC from the pudendal nerve, lateral from the levator ani muscle to the clitoris.



Autonomic nerves

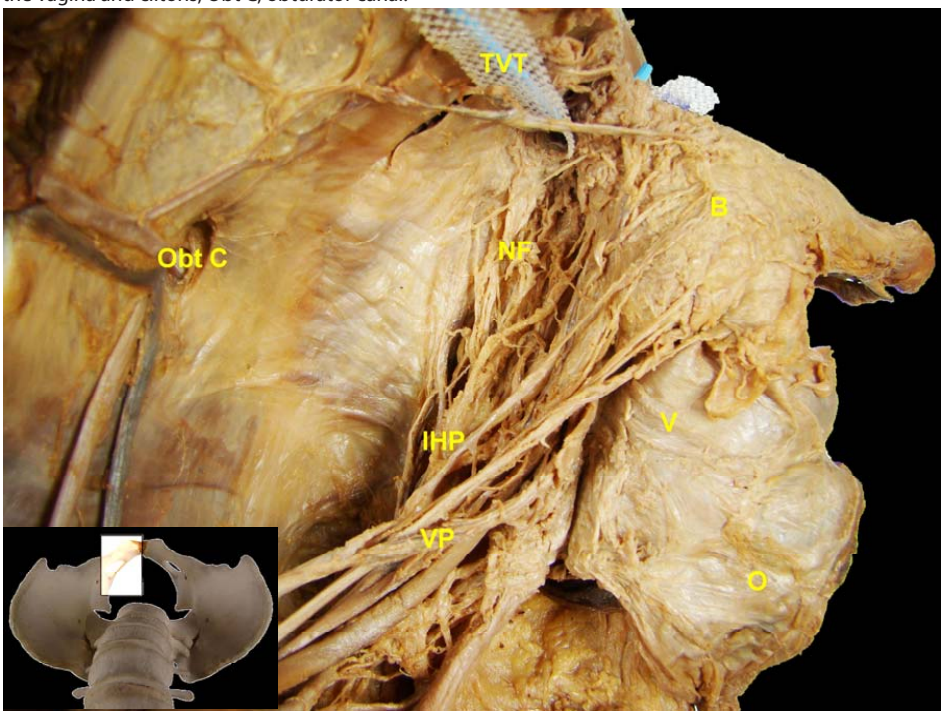
The superior hypogastric plexus was identified inferior to the bifurcation of the aorta. The proximal hypogastric nerves were identified in the subperitoneal layer (between the peritoneum and the endopelvic fascia) and followed alongside the ureter into the small pelvis to the inferior hypogastric plexus (IHP). Figure 4 is a schematic lateral view on a midsagittal sectioned right pelvis showing the course of the autonomic nerves from the hypogastric nerve to the target organs.

The IHP, a flat meshed plaque of nerves was dissected. Its branches, which follow the connective tissue plane within the small pelvis which supports the uterine cervix, vagina and bladder, were identified and dissected into their target organs. Special attention was paid to the branches passing along the urethra and innervating the clitoris. The autonomic nerves, running from the IHP, were found to be pierced by the TVT-needle. (Figure 5)

Discussion

This study describes the neuro-anatomy of the clitoris; its somatic and autonomic pathways. Previous studies on the innervation of the clitoris were mainly focused on the dorsal nerve of the clitoris, paying no attention to the cavernous nerves coming from the pelvic plexus, which play an important role in female sexual function (23;25-27;31;37-39). The cavernous nerves are

Figure 5: View from above (abdominal view) into left female half pelvis. In order to expose the area lateral to the vagina, the uterus was removed from the level of the cervix and the bladder and vagina had been retracted medially and anteriorly. The peritoneum and part of the fascia have been removed. IHP; inferior hypogastric plexus, B; bladder, V; vagina, O; Ovarian, TVT; the TVT tape, NF; nerve fibres from the IHP to the vagina and clitoris, Obt C; obturator canal.



involved in the neural control of vasocongestion and, consequently, the lubrication-swelling response. Disruption of these nerves could lead to altered vascular function during sexual arousal and possibly disordered orgasm.

In 1982, Walsh and Donker described the anatomic location of the pelvic plexus (or IHP) in men and the nerves innervating the corpora cavernosa (40). These pioneering observations and descriptions of the anatomical basis for radical prostatectomy fostered resurgence in the use of surgery as treatment for localized prostate cancer and led urologic surgeons to refine a nerve-sparing technique within the following two decades. Only in the recent years, attention is paid to the IHP in females and nerve-sparing techniques are being developed in surgery for cervical cancer (41-43).

Although the IHP has been described in females, little attention has been paid to the cavernous nerves coming from this IHP and their anatomical relation to other pelvic structures. Yucel et al reported that the cavernous nerve supply the female urethral sphincter complex and clitoris (25). The branches of the cavernous nerve were described and, as in our study, noted to join the clitoral dorsal nerves. The cavernous nerves have also been described in mice, using immunostaining to show communicating nerves between the cavernous nerve and the dorsal

nerve of the clitoris which supports the initiation of sexual arousal by tactile stimuli and following clitoral swelling (22). This study underlines the importance of both somatic and autonomic innervation of the clitoris in normal female sexual function.

In the study performed by O'Connell et al. the course of the dorsal nerve was described but the cavernous nerves were poorly addressed (26). Other important studies on the neuro-anatomy of the clitoris focused mainly on the DNC (26;27;39;44). Similar to our findings, the DNC is described to originate from the pudendal nerve and to ascend along the ischiopubic rami.

Vaginal sling procedures for stress urinary incontinence have been developed in the nineties by Ulmsten (45). After research showed the procedure to be safe and effective, the TVT and derived procedures became a well established surgical procedure for the treatment of female urinary stress incontinence. Especially in these early years, no attention was paid to the topographic relation to important genital structures. Only in recent years, the possible risk of nerve damage during vaginal sling procedures, especially the obturator procedures, has been suggested (29).

The aim of this study was not only to describe the neuro-anatomy of the clitoris, but also its relation to surrounding structures which are anatomical landmarks in vaginal tape procedures for SUI. When performing vaginal sling surgeries, a sagittal incision is made within the anterior vaginal wall mucosa about 1 centimeter from the urethral meatus and the vaginal mucosa is dissected of the mid-urethra. When performing the TVT procedure, a tape is placed (blindly) behind the pubic symphysis using trocars attached to the tape when performing the TVT procedure (46).

When performing the TOT, the 'outside-in', procedure, a similar midline incision is made in the anterior vaginal wall between the mid-urethra and bladder neck, enough to introduce the index finger. Dissection is carried out laterally to the level of the vaginal sulcus without penetration of endopelvic fascia. The IPR of the pubic bone and the obturator foramen are located manually, and the medial edge of the ramus is pinched between thumb and index finger. The skin puncture is made at the level of the clitoris right above the pinching thumb. The curved sling passer is guided from the thumb to the index finger and then rotated and delivered to the vaginal incision with the tip on the index finger. The arm of the tape is hooked to the tip of the passer and brought out to the skin (46).

When performing the TVT-O, the 'outside-in', a similar midline incision is made and peri-urethral tunnels are developed bilaterally. Unlike the TOT, where the dissection stops at the IPR, with the TVT-O the obturator membrane is perforated with the tip of the scissors. A winged metal trocar, which is designed to help guide the tape around the IPR, is inserted into the peri-urethral tunnel and the tip is pushed just beyond the perforated membrane. The trocar is then rotated around the IPR to exit out the skin through stab incisions located 2 cm above a horizontal line at the level of the urethral meatus and 2 cm outside the thigh folds. The same procedure is performed on the other side and the sling is tensioned and the procedure completed (46).

As described, during these procedures, the part of the mid-urethra along the anterior vaginal wall is an important surgical site; here the first incision is made. This study illustrates that the urethra is surrounded by autonomic nerves coming from the IHP. Not only do they travel to and innervate the urethra, the cavernous nerves travel from the vaginal nervous plexus occupying the 2 and 10 o'clock positions on the anterolateral vagina and they travel at the 5 and 7 o'clock positions along the urethra. It is therefore, possible that during the mid-urethral incision in all vaginal procedures and the para-urethral tunneling during the obturator procedures, the cavernous nerves are disrupted. The results of the cadaveric part of this study showed that indeed the cavernous nerves are being pierced during the TVT procedure.

The IPR plays an important role in the obturator procedures; the tapes are placed around this bony structure. Furthermore, dissection is performed paraurethral to the IPR, where during the inside-out technique the obturator membrane is perforated with scissors. Because the DNC travels along the medial side of the IPR, especially at the level of the urethral meatus, it is at risk to be damaged during obturator procedures, both outside-in and inside-out. The results of the dissections confirmed that the DNC is at risk for nerve damage during the TVT-O procedure.

Achtari et al. have also dissected female cadavers and measured the distance of the DNC to the TVT, TVT-O and Monarc. The results showed a distance varying from 19-40 mm, the TVT-O being the closest to the DNC (30). A similar study in fresh cadavers measured a distance between the DNC and the TOT of 3-14 mm. Despite this small distance, they concluded the TOT to be a safe procedure. This study was however biased because straight needles were used to mimic the course of the TOT, instead of curving trocars (31). As the results of this study shows, it is possible that during dissection to the foramen and during placement of the tape, the DNC is injured.

This study is the first to illustrate, in detail, both somatic and autonomic pathways of the clitoris and thereby, significant progress has been made in the field of female sexual anatomy and its representation. This may facilitate further research in the related fields of female sexual health and education and can be used by surgeons in the field of urogynecology. Furthermore, the topographic relation of vaginal slings to the important critical female genital structure, the clitoris, has been illustrated and described for the first time. Future (clinical) research should be performed to confirm these results and to investigate the consequences of injury to the clitoral nerves on the clitoral sexual response and female sexual functioning.

Conclusion

This study shows and described the somatic and autonomic innervation of the clitoris in detail including their relation to important surrounding structures.

Furthermore, the relation of vaginal sling procedures for SUI to the clitoris and its innervation has been evaluated. Given the course of the dorsal clitoral nerve; inferior to the inferior pubic

ramus, it is at risk for iatrogenic injury after placement of transobturator tape. Furthermore, the autonomic innervation of the vaginal wall is disrupted by the tensionfree vaginal tape procedure, which could lead to altered lubrication-swelling response. When the "inside–out" technique is used, the introducer can come into contact with the dorsal nerve of the clitoris because the introducer to passes through the obturator foramen close to the ischio-pubic ramus.

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Chapter 3

Sexual function improvement following surgery for stress incontinence: the relevance of coital incontinence.

(J Sex Med 2009;6:3208-3213)

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Introduction

Urinary incontinence (UI) is a common condition among women which is estimated to affect 25 to 45% of the female population (1). UI poses a tremendous economic burden on the health care system and impairs work productivity (2). Also UI has been shown to have a detrimental effect on the quality of life in terms of psychological, socio-economical as sexual issues (3). The incidence of female sexual dysfunction (FSD) in women with UI is as high as 26-47%. Over half of sexually active women with UI have FSD because of their urinary symptoms and 25% are incontinent during sexual intercourse (4). Stress urinary incontinence (SUI) is the involuntary leakage of urine on effort of exertion, or on sneezing or coughing and is due to urethral hypermobility and sphincter weakness. Because it is both embarrassing as unpredictable, SUI causes an inactive lifestyle, loss of self esteem and psychosexual problems (5;6).

Within a decade, the tensionfree vaginal tape (TVT), the tensionfree vaginal tape obturator (TVT-O) and the transobturator suburethral tape (TOT) became by far the most popular surgical treatments for SUI, with more than one million women treated (7). Despite the numerous studies on objective and subjective outcomes of this minimal invasive procedure, very few studies have addressed the impact of vaginal sling procedures on sexuality. Small series evaluating the sexual well being before and after the TVT and/or TVT-O procedures show conflicting results. Of these studies, some suggest deterioration (5;8;9) of sexual function, some improvement (10-16), whereas others were equivocal (17-21). These studies suggest that a negative effect of incontinence surgery is related to the implanted material, tissue damage or damage of vascular and/or neural structures whereas a positive effect can be related to disappearance of preoperatively existing coital incontinence.

Aims

With this study we attempt to clarify the impact of surgery for stress urinary incontinence on female sexual function. We hypothesize that the sexual function of women with coital incontinence will be ameliorated by the effect of surgery. To test this hypothesis within a large study group, data from two previous TVT, TVT-O and TOT studies were used (11;22).

Materials and methods

We used data collected from two previous retrospective studies evaluating sexual function after the TVT procedure and after the TVT-O and TOT procedure (11;22). From January 1999 to November 2002 a TVT procedure was performed in 69 women for treatment of SUI. From January 2005 to December 2005 a TOT or TVT-O procedure was performed in 78 women for treatment of SUI. Of these 147 women, 136 were sexually active before and after surgery and completed

the questionnaires. Genuine SUI was confirmed objectively by urodynamic assessment preoperatively in all patients. Exclusion criteria were detrusor overactivity, pelvic organ prolapse and pathological findings in the urethra and/or bladder on cystoscopy To evaluate sexual function, we used a non-validated sexual questionnaire developed by Lemack, in Dutch (23). This questionnaire, as well as a letter of introduction explaining the objectives of the study, was mailed to all patients 3-12 months after the procedure, with the majority in 3-4 months after the procedure.

The study was approved by our institutional medical ethics review board. We analyzed the data using SPSS release 16 (SPSS Inc., Chicago, III). Differences in percentages were evaluated using Pearson's chi-square test and the McNemar test. P-values < 0.05 were considered statistically significant.

Main Outcome measures

Pre and postoperative results of a non-validated sexual questionnaire.

Results

A total of 136 questionnaires, completed by sexual active women, were taken from the databases. This group consisted of 61 TVT patients, 32 TVT-O patients and 43 TOT patients. The mean age of the 136 sexual active women was 52 years (range 32-79 years). The menopausal status was known in 72 women (28 were premenopausal and 44 women were postmenopausal). The other 64 women did not answer this question. Table 1 shows pre- and postoperative patient characteristics.

Table 1 Pre- and postoperative patient characteristics of 61 TVT patients, 32 TVT-O patients and 43 TOT patients.

		n=136				
		Preoperative		Postoperative		p value
Frequency of intercourse	More than twice/week	15	11%	13	9.6%	0.60
	1-2 times/week	60	44.1%	57	42.2%	
	1-3 times/month	49	36%	52	38.5%	
	Less than once/month	12	8.8%	13	9.6%	
Sexual intercourse is	Pleasurable	112	82.4%	105	77.2%	0.17
	Neither pleasurable nor painful	15	11%	18	13.2%	
	Painful	9	6.6%	13	9.6%	
	Other	0	0%	0	0%	
Do you experience urinary leakage during intercourse?	No	59	43.4%	119	87.5%	<0.001
	Yes, rarely	15	11.0%	11	8.1%	
	Yes, occasionally	40	29.4%	4	2.9%	
	Yes, frequently	12	8.8%	1	0.7%	
	Yes, always	10	7.4%	1	0.7%	

Preoperatively, most women had intercourse once or twice a week (44.1%) or one to three times a month (36%). Sexual intercourse was described as pleasurable in 82.4% of women and 9 women (6.6%) experienced painful sexual intercourse preoperatively. A total of 77 women (56.6%) experienced coital incontinency before surgery; 7.4% had urinary leakage always, 8.8% frequently, 29.4% occasionally and 11% experienced urinary loss rarely.

Postoperative data showed no significant difference in frequency and appreciation of sexual intercourse. The number of women that considered intercourse as pleasurable decreased from 112 to 105 (82.4% to 77.2%, not significant). After surgery, the number of women with dyspareunia increased from 9 to 13 (6.6% to 9.6%) ($p = 0.17$). In a comment they stated that they experienced pain during intercourse due to vaginal narrowing. Postoperatively an increased number of in total 119 women (87.5%) had no urinary incontinence during intercourse ($p<0.001$). This signifies that 60 women became continent during intercourse as they were incontinent preoperatively. Seventeen women (12.5%) still reported leakage during intercourse, of which 11 women rarely and 4 women occasionally. One patient had no benefit from surgery; pre and postoperatively she always experienced leakage during intercourse. However, this patient reported intercourse postoperatively to be better than prior to surgery. Another patient reported an increase in incontinence during intercourse after surgery, from occasionally to frequently.

We asked women to describe intercourse postoperatively compared to preoperatively (Table 2). Sexual intercourse after surgery did not differ from preoperative in 99 (72.8%) women. Eight women (5.9%) described intercourse postoperatively as worse than prior to surgery. This was explained by a decrease in vaginal lubrication and pain because of vaginal dryness. Of these eight women, five were postmenopausal. Postoperative sexual intercourse was reported as improved by 29 women (21.3%). Of these women, 25 (86.2%) were incontinent during intercourse prior to surgery. There was a significant higher rate of preoperative coital incontinence in the group of women who reported better postoperative intercourse. ($p=0.01$) In women with initial coital incontinence 32.5% reported improvement of intercourse postoperatively, in women without initial coital incontinence 6.8% reported improved intercourse.

Table 2 Appraisal of intercourse postoperatively compared to preoperatively in women with and without preoperative coital incontinence.

		Urine loss during intercourse prior to surgery?						p value
		Yes (n=77)		No (n=59)		Total (n=136)		
Overall, how would you describe intercourse postoperatively?	Better than prior to surgery	25	32.5%	4	6.8%	29	21.3%	0.01
	Worse than prior to surgery	5	6.5%	3	5.1%	8	5.9%	
	No difference from prior to surgery	47	61.0%	52	88.1%	99	72.8%	

Discussion

Our findings suggest that incontinence surgery (TVT/TOT/TVT-O) for SUI significantly improves coital incontinence in women and thereby their sexual function.

Few studies have focused on the impact of surgical procedures for SUI on female sexual function and conclusions are conflicting. Murphy et al. analyzed sexual function in women after TVT and TOT using validated questionnaires (the Pelvic Organ Prolapse/Incontinence Sexual Questionnaire-12) (15). In both groups an improvement in sexual function was found but a relationship between improvement of sexual function and disappearance of coital incontinence was not studied. Berthier et al. compared different studies concerning sexual function after incontinence surgery and found sexual improvement in 1.8 to 33% of women (10). This is consistent with an improvement in 21.3% in this study.

However, surgical treatment for SUI may also have a negative effect on sexual function. Vaginal innervation, concentrated on the anterior and distal aspects of the anterior vaginal wall, plays an important role in sexual arousal and may be damaged by surgery for SUI (24). Sexual arousal results in congestion and vaginal wall thickening, tenting and lubrication, as well as production of mucous secretion (25). These functions may be disturbed as a result of anti-incontinence surgery because of narrowing, scarring, tape erosion or a too tight tape. Also, women, as well partners, may experience dyspareunia as a result of vaginal narrowing or because of the presence of the tape and/or stitches during intercourse. In the present study, an increase of number of women experienced pain (6.6% to 9.6%) due to vaginal narrowing. Yeni et al. observed an overall negative influence of TVT on sexual function (n=57) in a prospective study using the Female Sexual Function Index (FSFI) before and after the procedure compared to a control group (9). However, these authors also observed SUI to have a similar negative impact on sexual function. Mazouni et al. performed a retrospective study using a mailed questionnaire in 55 women and observed a deterioration of sexual function in 25.6% of women after TVT, including dyspareunia in 14.5% and loss of libido in 5.4% (8). This is in contrast to our findings of 5.9% worsening of intercourse due to vaginal lubrication problems. Decreased lubrication is a symptom in postmenopausal women and therefore can not to entirely be attributable to the surgery.

In this study the lack of sexual complaints at the baseline raises doubts on the population selection as sexual dysfunctions are highly prevalent in the general population. However, by asking for a change in sexual intercourse, we gained important information about a women's subjective experience on sexuality postoperatively compared to preoperative. Basically, assessing sexual function pre- and postoperatively and calculating a difference would not have provided us this information.

In the present study, an improvement in intercourse was found in 21.3% of women after incontinence surgery. When we elaborated our results on sexual intercourse in women in relation to coital incontinence, an improvement was found in 32.5% and this is significantly higher compared to women without coital incontinence preoperatively. This was anticipated considering that intercourse may, as an stress factor, mechanically provoke the loss of urine, and urinary dysfunction can lead to a decreased quality of sexual life (9). Intercourse causes pressure exerted on the vaginal wall which has a close anatomic proximity to the bladder and urethra, with risk of sexual difficulties as coital incontinence in women with SUI. Not only SUI but also overactive bladder symptoms (urgency with or without urinary incontinence), have a detrimental effect in female sexual health (26-28). As in this study, successful treatment of overactive bladder symptoms improves sexual function (29). Incontinence at penetration is thought to be associated with SUI and leakage at orgasm with complaints of an overactive bladder (29;30). In this study, the population exists only of women with genuine stress incontinence, which has been confirmed objectively by preoperative urodynamic assessment. Therefore, no further investigation has been made to details of the coital incontinence. Perhaps leakage at orgasm arose in those who remained dissatisfied after surgery as we know sling procedures can cause urgency and urge incontinence. Unfortunately, this has not been investigated.

In addition, 23%-56% of incontinent women experience coital incontinence, leading to a decrease in the frequency of sexual intercourse in 11% and a complete arrest in 45% of these women (6;31). Therefore, as reported by Iosif and by Berthier et al. as in this study, improvement in coital incontinence resulted in improvement of sexual function (10;32). We conclude that coital incontinence is a prognostic factor in the success of incontinence surgery. This is an important finding which a clinician should keep in mind in treatment of women with SUI. Every woman with SUI should be asked for coital incontinence and this item should play an important role in considering incontinence surgery. In our study we did not analyze sexual inactive women but it is possible that coital incontinence is the reason for their sexual inactivity. Therefore, it is of utmost importance for a clinician to ask women with SUI about their sexual activity. If sexual activity has ceased because of (fear of) coital incontinence, successful surgery may also improve a woman's sexual life dramatically.

The main limitation of our study is that it was performed retrospectively. In a prospective study by Pace and Vincentini, an improved sexual function after incontinence surgery was found, particularly in relation to the solution of urinary leakage during intercourse, improving self-confidence and sexual interest (16). Pace used the FSFI to measure sexual function before and after surgery. Two other prospective studies, both by Jha et al., were performed using validated questionnaires (13;14). One study was performed in a group of patients after TVT, the other in a group after TVT and TVT-O. In both studies a significant improvement of sexual function was found with a reduction of coital incontinence. Ghezzi et al. also performed a prospective study

in a small group of 53 patients and 34% reported an improvement of sexual function after TVT of which 94% were cured from coital incontinence (12).

Another limitation of the present study is that we did not use a validated disease-specific sexual function questionnaire that would have provided more in depth information on different aspects of sexual life. We did not look into parameters related to improvement of incontinence which could have amplified our hypothesis. The message of this study is strengthened by the size of the study group.

With this study we confirmed our hypothesis; successful treatment of coital incontinence plays an important role in improvement of sexual function. However, as female sexual function is a complex multidimensional experience, with several biological, emotional, relational and social aspects, we are aware of the possible influence of other factors. SUI is significantly associated with sexual complaints such as loss of libido, regardless of the presence and magnitude of coital incontinence (33;34). However, women who complain of coital incontinence should be informed on the likelihood of improvement of sexual function when they undergo anti-incontinence procedures.

Conclusion

With this study we better defined the impact of incontinence surgery on a woman's sexual function. We demonstrated an improvement in intercourse in 21.3% of all the women and a worsening in 5.9%. There was a significant higher rate of preoperative coital incontinence (86.2%) in women with improved intercourse. These results suggest that coital incontinence is a prognostic factor for sexual function improvement after incontinence surgery. Future research should be performed to confirm this suggestion and try to further explore the role of coital incontinence in sexual function after incontinence surgery.

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Chapter 4

Sexual experiences of men with incontinent partners

(J Sex Med 2010;7:1877-1882)

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Introduction

Urinary incontinence (UI) is a common condition among elderly women. The prevalence of UI in the general population is estimated to be from 14% up to 71.5%. Also, UI has been shown to have detrimental effects on the quality of life in terms of psychological, socio-economical and sexual problems (1). The effect of UI on sexual functioning and sexual satisfaction has been investigated in several studies and all showed impaired sexual function (1-11). However, a positive impact of incontinence surgery has also been described (12-14).

Several factors may contribute to Female Sexual Dysfunction (FSD) in case of urinary incontinency. The psychological consequences; i.e. fear of leakage, are as important as the urine leakage during intercourse (15). The incidence of FSD in women with UI varies between 26 to 47%. More than 50% of the sexually active women with UI have FSD because of urinary leakage and associated symptoms; 25% are incontinent during intercourse (10).

The interactions between a man or woman with sexual dysfunction and their sexual partners are complex. The female partners of men with erectile dysfunction (ED) show a high prevalence of a variety of sexual dysfunction symptoms, such as anxiety (26%), orgasmic difficulty (24%), dyspareunia (18%) and sexual dissatisfaction (34%) (16;17). ED is a shared sexual dysfunction that is distressing for the men who experience the condition but for their partners as well (16-18). Until now, the effects of UI on the sexual functioning of male partners of women with UI have not been studied.

Aim

The objective of this study is to characterize the effects of female UI on sexual function of their male partners. We hypothesize that a women's UI negatively affects the sexual functioning of her male partner.

Materials and Methods

Subjects and Procedures

All new female patients, who presented at an academic outpatient clinic for urological evaluation, and their male partners, were asked to participate in this study. The questionnaires were to be filled out at home and returned using the provided self addressed envelope.

All participants signed an informed consent form and the study protocol had been approved by the local ethics committee. Patient inclusion was performed during a period of 2.5 years. Only fully completed questionnaires of sexually active couples were included for analysis.

Details of the Questionnaires

The questionnaire consisted of two parts. The first part assessed demographic characteristics, medical history and referral indications including the main urological complaint. The second part evaluated sexual function of the women and their partners using the Dutch versions of the Golombok Rust Inventory of Sexual Satisfaction (GRISS) (19;20). The factor structure, internal consistency, and stability of the Dutch adaptation of the GRISS have been found satisfactory (21;22).

The questions of the GRISS are divided in twelve subscales: impotence, premature ejaculation, female anorgasmia, vaginismus, (in)frequency of intercourse, sexual non-communication, male and female dissatisfaction, male and female non-sensuality, and male and female avoidance of sex. The twelve subscales have four items each. In account, 48 of the 56 items (male and female form together) belong to one of the 12 subscales. A high score on a particular item or subscale indicates higher endorsement of the dysfunction or problem being measured. Partners' aggregated scores constitute a profile of the sexual functioning of both partners within their sexual relationship.

Statistical analysis

The patient population was divided into two groups, those with UI and those without, and compared. Subscales of the GRISS of women with UI were compared to the corresponding scales of their partners. Comparisons between proportions were made using chi-square test. Continuous variables were compared using the student's *t*-test and, where appropriate, analysis of variance (ANOVA). Correction for age was performed using the univariate analysis. Data analysis was carried out using SPSS for Windows version 16 (SPSS, Inc., Chicago, IL). P-values < 0.05 were considered statistically significant.

Main Outcome Measures

The primary outcome was the overall sexual function score of the men whose partners had UI. To assess the sexual functioning of both partners in a broad perspective, we also included the specific areas of sexual function (GRISS subscales) as secondary outcome measures.

Results

Of a total of 1383 patients presenting at the urological clinic for the first time, 410 (30%) agreed to participate and signed the informed consent form. We received 326 (23.6%) completed questionnaires. Of these 326 questionnaires, 189 (58.0%) were filled in by sexually active couples and thus used for analysis. The 137 sexually inactive women stated the reason for their inactivity was: 'no partner' (51.1%), 'partner related issues like illness or erectile dysfunction'

Table 1 Demographic characteristics of 189 sexually active women

Demographic characteristic°	With UI (n=81)	Without UI (n=108)	P value
Age			
Years	50.8 ± 11.9	44.6 ±15.0	0.005§
Parity			
Nulliparous	9 (11.1%)	33 (30.5%)	0.001*
Multiparous	72 (88.9%)	75 (69.5%)	
Menstruation			
Regular	23 (28.4%)	51 (47.7%)	0.034*
Irregular	12 (14.8%)	14 (13.1%)	
Postmenopausal (for a few months)	5 (6.2%)	8 (7.5%)	
Postmenopausal (for years)	41 (50.6%)	34 (31.8%)	

°Values are given as mean ± SD or number (%)

§ Statistically significant, One-way ANOVA test

* Statistically significant, chi square test

(13.1%), 'patient related issues' (7.3%), 'a combination of problems' (26.3%), and unknown (2.2%). Furthermore, they were separately asked if the UI was the reason for sexual inactivity, which nine women positively answered. Logically, we received no questionnaires of the male partners of these inactive women.

Of the sexual active couples, 81 women (42.9%) had UI as main urological complaint. 34 of these 81 (44.2%) women had urinary leakage when coughing or laughing (stress UI), 8 (10.4%) women experienced leakage preceded by urgency (urge UI) and 35 (45.5%) women experienced mixed UI. The demographic and reproductive characteristics of all sexual active women are presented in Table 1. Overall, women with UI are older (P=0.005), multiparous (P=0.001) and postmenopausal. (P=0.034)

The mean scores of overall sexual function and specific areas of sexual function are shown in Table 2. We compared sexual function of women with and without UI (Table 2). A high score on a particular item or subscale indicates higher endorsement of the dysfunction or problem being measured. Those with UI had significant higher mean overall sexual dysfunction scores than those without. (6.76 ± 1.93, 5.90 ± 1.83, P=0.02) The women with UI demonstrated more problems in communication (P=0.036) and had more avoidance behavior. (P=0.002) After correction for age the P-value of 0.036 rose to 0.779 in the subscale communication; the others remained statistically significant.

In addition, we compared sexual function of the partners of women with and without UI. (Table 3) Overall, the men with partners without UI showed significant better sexual functioning than the partners of women with UI. (P=0.01) Comparisons of the subscales also demonstrated that partners of women without UI have lower mean scores than partners of women with UI with regard to the infrequency of intercourse and sexual dissatisfaction. They also had fewer problems with erectile function. (P=0.03, P=0.001, P=0.037) Given the correlation between male age

Table 2 Mean scores of the female study group (with UI) and control group (without UI) in overall and specific areas of sexual function

FEMALE PATIENTS		With UI (n=81) Mean ± SD	Without UI (n=108) Mean ± SD	P value (*corrected for age*)
GRISS total	Overall sexual function	6.76 ± 1.93	5.90 ± 1.83	0.02* *(0.049*)*
GRISS subscales	Infrequency	6.42 ± 1.94	5.48 ± 1.97	0.02* *(0.047*)*
	Problems with communication	5.20 ± 1.77	4.69 ± 1.54	0.036* *(0.779)*
	Dissatisfaction	7.92 ± 3.16	7.05 ± 2.94	0.056 *(0.220)*
	Avoidance	6.42 ± 2.49	5.42 ± 1.87	0.002* *(0.013*)*
	Non-sensuality	6.90 ± 3.21	5.71 ± 5.73	0.097 *(0.449)*
	Vaginismus	6.83 ± 3.53	6.05 ± 3.26	0.120 *(0.325)*
	Anorgasmia	11.49 ± 4.59	10.24 ± 4.01	0.051 *(0.083)*

* Statistically significant, One-way ANOVA test
GRISS= Golombok-Rust Inventory of Sexual Function
UI = urinary incontinence

and erectile dysfunction correction for age of the men should be performed. Unfortunately, we have no data on the age of the men. Therefore, we adjusted for the age of the female partner which may be a proxy for age of the male partner. After statistical correction for the age of the female partner, the differences in overall sexual function and the subscale satisfaction remained statistically significant.

To get a broader view on the interaction between women with UI and their partner, we compared overall sexual function and several subscales of the GRISS. The mean scores and P-values are listed in Table 4. Comparison between women with UI and their partners showed no differences with regard to overall sexual functioning and the frequency of intercourse. The women had significant more problems with communication about sexual activity and sensuality than their partners. (P=0.002, P<0.001) Furthermore, they showed more avoidance behaviour with regard to sexual activities than their partners. (P<0.001) There was also a significant difference in degree of satisfaction: the men were less satisfied with their sexual relationship than the women. (P=0.001)

Table 3 Mean scores of the male study group and control group in overall and specific areas of sexual function

MALE PARTNERS		Partner with UI (n=81) Mean ± SD	Partner without UI (n=108) Mean ± SD	P value (*corrected for age*)
GRISS total	Overall sexual function	6.66 ± 1.53	5.95 ± 1.22	0.01* *(0.039*)*
GRISS subscales	Infrequency	6.49 ± 1.96	5.62 ± 2.00	0.03* *(0.169)*
	Problems with communication	4.34 ± 1.77	4.12 ± 1.58	0.378 *(0.899)*
	Dissatisfaction	9.69 ± 3.63	8.08 ± 2.79	0.001* *(0.008*)*
	Avoidance	4.70 ± 1.56	4.52 ± 1.28	0.383 *(0.439)*
	Non-sensuality	5.04 ± 1.41	4.83 ± 1.40	0.310 (0.965)
	Premature ejaculation	9.11 ± 3.46	8.51 ± 2.66	0.183 *(0.473)*
	Erectile dysfunction	6.87 ± 3.23	6.01 ± 2.28	0.037* *(0.492)*

* Statistically significant, One-way ANOVA test
GRISS= Golombok-Rust Inventory of Sexual Function
UI = urinary incontinence

Table 4 Mean scores of overall and specific areas of sexual function of female patients with UI and their male partners

WITH UI		Female (n=81) Mean ± SD	Male partner (n=81) Mean ± SD	P value
GRISS total	Overall sexual function	6.76 ± 1.92	6.66 ± 1.53	0.712
GRISS subscales	Infrequency	6.42 ± 1.94	6.49 ± 1.96	0.805
	Problems with communication	5.20 ± 1.77	4.34 ± 1.77	0.002*
	Dissatisfaction	7.92 ± 3.16	9.69 ± 3.63	0.001*
	Avoidance	6.42 ± 2.49	4.70 ± 1.56	<0.001*
	Non-sensuality	6.90 ± 3.21	5.04 ± 1.41	<0.001*

* Statistically significant, One-way ANOVA test
GRISS= Golombok-Rust Inventory of Sexual Function
UI = urinary incontinence

Discussion

The present study, the first of its type, demonstrates a correlation between the sexual functioning of men and the urinary incontinence of their sexual partner. We found significant differences with regard to the frequency of intercourse, the degree of satisfaction and erectile function. These findings could not be subscribed to differences in age. This study also shows that men, whose partner is incontinent, are less satisfied with their sexual relationship compared to those with a continent partner. Compared to their partners, women with UI experience more difficulties in communicating sexuality and they try to avoid sexual activities. They also have more difficulties with sensuality and their partners are less satisfied with their sexual relationship.

It is generally assumed that ED is a shared sexual dysfunction distressing the men as well as his female partner (16-18). This study shows that FSD in case of UI is distressing for both the involved woman as well as her male partner. This is a very important finding for clinicians in the field of urogynecology. They have to be aware of the fact that not only their female patient, but also her partner may experience sexual problems due to her UI. It is well known that patients tend not to forward their sexual dysfunctions by themselves despite their apparent need for professional assistance (22-25). Therefore, clinicians working in the field of urogynecology should actively ask each patient with UI whether she or her partner has sexual concerns. These women may experience embarrassment, shame, guilt, low self-esteem, frustration and other negative emotions due to their incontinence.

Sexuality is a complex entity with physical, emotional, psychological, cultural, and religious dimensions that differ from person to person. The assessment of sexuality is never simple, particularly when one considers the sensitivity of this area, and how individual changes may affect his or her partner's sexual functioning. Many instruments, including interviews, diaries, and postal questionnaires have been developed and used widespread for sexual function assessment in both men and women. The GRISS is one of those few questionnaires, which has been cross-validated in multiple samples of sexually functional and dysfunctional women. The GRISS questionnaires provides a full picture of overall sexual function in the rather large study groups.

Although we used a validated questionnaire, we had no face to face interviews to inform us about the male partner's individual thoughts and experiences with regard to his partner's UI and his sex life. Such specific inside information could have been very important and should be gathered in future studies. Furthermore, a limitation of the study is the fact that we did not gather information on pelvic organ prolapse for both women with and without UI, which is a frequent condition and is related to UI.

The non-existence of comparable studies means that UI and male sexual functioning needs future research. Such studies will not only advance the knowledge of UI and FSD, but they will also improve our understanding of the dynamic interaction between the male and female in the context of a bi-directional relationship.

With this study we demonstrated a correlation between the sexual functioning of men and the urinary incontinence of their sexual partner. This suggests that female urinary incontinence may negatively affect their partners' sexual function and causes sexual dissatisfaction. However, this possible causal relation has to be confirmed in future research.

Conclusion

We demonstrated that female urinary incontinence correlates with the overall sexual functioning and sexual satisfaction of the male partners. Our data confirmed that sexual dysfunction was common in women with UI. In addition, we found significant differences with regard to different aspects of one's sex life between a woman with UI and her partner.

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Chapter 5

The place of female sexual dysfunction in the urological practice: results of a Dutch survey.

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Introduction

Female sexual dysfunctions (FSDs) are highly prevalent and often underestimated problems in the general community (1). However, FSDs have not yet been studied as extensively as male sexual dysfunction. Improved knowledge on the female pelvic anatomy and recent insights in female sexual physiology helped to classify FSDs more adequately. Today, FSD is a term used to describe various sexual problems, such as low desire or interest, orgasmic difficulties, diminished arousal, and dyspareunia (2;3). Due to the use of different instruments, published prevalence estimates of FSD show a great deal of variation (4). FSD is considered common in the general population, with a quoted prevalence of 43% (1;5;6). In these studies however, distress caused by sexual dysfunction has not been inquired. The prevalence of sexual problems accompanied by personal distress was estimated to be 12-24% from large population-based surveys in the United States (1;3;5).

A number of studies have demonstrated a strong association between pelvic floor disorders, lower urinary tract symptoms, overactive bladder with or without urinary incontinence, and FSD (7-14). The prevalence of FSD in sexual active women attending an urogynecologic outpatient clinic ranges from 48 to 64% (15;16), which is higher than the afore mentioned 43% in the general population. In patients attending an urogynecologic outpatient clinic, FSD is unlikely to be the sole complaint, i.e., the reason for women to consult their urogynecologist. Only seven out of 70 women with FSD presented with this problem at a urogynecology clinic (16). Therefore, women who seek urological care will be of greater risk of having sexual function disorders and urologists should be aware of this potential co-existing problem.

Besides the frequent coexistence of FSD in patients with urological complaints, urological surgery such as (simple/radical) cystectomy, prolapse and incontinence surgery may enhance FSD (17;18). Sexual dysfunction may arise due to nerve or vessel damage and/or alteration of vaginal anatomy. In this respect, the growing interest in the preservation of the neurovascular bundles is an important new topic in oncological pelvic surgery (19). Literature on incontinence surgery is conflicting: some reports suggest a deterioration of sexual function (20-22), some an equivocal effect (23-27), whereas others show improvement (28-34). Whatever the effect may be, the possible effects on sexuality should be discussed both pre- and postoperatively with the patient and her partner.

A web-based survey of 3,807 women aged 18-75 years in the USA indicated that the most important barriers for women to seek help were embarrassment and the idea that physicians would not be able to provide adequate help (35). Only 42% of this cohort sought help from a physician. In our experience, there appear to be two major groups of women suffering from FSD, namely, those who present symptoms and those who prefer not to broach the subject and perhaps hope that the discussion will emerge during the consultation. Therefore, the doctor is the pivot on which discussing FSD hinges and he or she should therefore be proactive and endeavor to identify sexual problems.

Recent surveys among members of the American Urogynecologic Society (AUGS) and the British Society of Urogynecology (BSUG) showed that only a minority screened all their patients for FSD (36;37). Dutch urologists have not yet been surveyed regarding patient assessment of FSD in their practices.

Aims

The purpose of this survey was to investigate whether Dutch urologists and residents address patients' sexual function as part of history taking, to delineate perceived barriers to perform this assessment, and to document current attitudes towards female sexual dysfunction.

Methods

In the autumn of 2007, a questionnaire was mailed to all urologists and residents registered at the Dutch Urologic Association (405). Nearly all Dutch urologists and residents are member of this association (20% female, 80% male). The 17-item questionnaire (appendix) was designed by an urologist/sexologist from our clinic (H.W.E) in order to address FSD-related practices at outpatient clinic visits, beliefs and overall impression of FSD and FSD related to surgery. Five of the 17 questions concerned the topic of taking the history of possible sexual abuse. Sexual abuse is strongly related to urological complaints and sexual dysfunction. Because of its complexity it was decided to present these data separately.

Demographic data included type of practice, medical degree (resident or urologist), gender and age. The survey was accompanied with a letter explaining the objectives of the study. All date were collected anonymously.

We analyzed the data using SPSS release 16 (SPSS Inc., Chicago, Ill). Bivariate associations between demographic information and frequency of FSD screening were calculated using the chi-square procedure and p-values < 0.05 were considered statistically significant.

Ethical approval was not required and thus asked for in this study.

Results

Of the 405 mailed surveys, 190 were completed and returned. From the 215 non-respondents we did not receive a refusal note or notification of unavailability to complete the questionnaire. Four questionnaires were from non-eligible respondents, namely pediatric urologists. Their questionnaires were excluded for analysis. All returned surveys were complete, i.e. more than 80% of all applicable questions were answered. For analysis we used the completed questionnaires of eligible respondents which gave a response rate of 45.9% (186/405). One hundred respondents requested the survey results to be mailed at the end of the study (53.8%).

Table 1: Demographic characteristics of respondents (n=186)

Demographic characteristic	*n (%)*
Age (years)	
20-30	3 (1.6)
31-40	66 (35.5)
41-50	56 (30.0)
51-60	51 (27.4)
>60	8 (4.3)
missing	2 (1.1)
Gender	
Male	154 (82.8)
Female	32 (17.2)
Medical degree	
Urologist	148 (79.6)
Urology resident	38 (20.4)
Type of clinic/practice	
Academic (teaching) hospital	44 (23.7)
District general teaching hospital	54 (29.0)
District general hospital	88 (47.3)

The majority of respondents were urologists (79.6%) and most (65.5%) were between 31-50 years old. Consistent with the distribution within the surveyed population, there were more male respondents (82.8%) than female (17.2%). Forty-seven percent of the respondents worked in a district general hospital, 29% in a district general teaching hospital and 24% in an academic teaching hospital. The demographic characteristics are presented in Table 1.

One of the primary goals of the survey was to assess if urologists and residents address patients' sexual function as part of history taking. Only 10 respondents (5.4%) stated they ask each female patient for her sexual function. In contrast, 81.8% stated they ask for sexual function when a patient has a specific complaint like lower abdominal pain (86.8%), urgency or frequency (77.1%), incontinence (73.6%) and urinary tract infections (66.7%). Among 'other complaints' to ask for female sexual function, the respondents mentioned dyspareunia, pelvic floor dysfunction and neuropathic bladder disorders. (Table 2)

We were also interested in reasons why 176 respondents do not ask each patient for sexual function. 40.3% stated that they do not find it meaningful in urological practice, 22.7% mentioned insufficient knowledge how to ask for FSD, others lack of time (18.2%) or lack of knowledge in therapeutic options if they diagnose FSD (13.6%). Only a minority (10.8%) said they find it difficult to bring up the subject. Other reasons given (12.5%) were 'older patients (especially those without a partner)', 'no relevance to ask for FSD for example when a patient suffers from urinary stone disease' and 'FSD belongs to the field of a gynaecologist'.

There was a significant difference in age of respondents who stated to have insufficient knowledge how to ask for FSD; i.e. respondents aged 40 years and younger (16/65) more often

Table 2: Asking for sexual function (n=186)

Do you ask each patient for sexual function?	n=186	
Yes	10	5.4%
No	176	94.6%
Do you ask for sexual function when a patient has certain urological complaints?	n=176	
Yes	144	81.8%
No	32	18.2%
Which complaints?	n=144	
Lower abdominal pain	125	86.8%
Urgency or frequency	111	77.1%
Incontinence	106	73.6%
Urinary tract infections	96	66.7%
Hematuria	4	2.8%
Other	9	6.2%

feel their insufficient knowledge in asking for FSD as a reason not to ask for sexual function than older colleagues (24/109). (p=0.01)

Another goal of our survey was to document physicians' perception of the prevalence of FSD. Respondents were asked to esteem how many of their patients are experiencing sexual dysfunction. The majority reported less than the estimated 48-64% of patients.(15;16) Of the respondents 37.8% believed less than 10% of their patients suffer from FSD. Prevalences of 11-20, 21-30, 31-40, 41-50 and 51-60% were estimated by 22.8%, 20.6%, 10% and 6.7% respectively. Only 2.2% estimated between 51-60%. No respondents perceive a prevalence of FSD higher than 60%. Nine respondents acceded to have no insight in the frequency of FSD in their patient population whatsoever and therefore did not give a percentage (missing). (Fig. 1) In the group of responders, who thought of a prevalence of at least 30% or higher (n=58), 10.3% asked each patient for sexual function and 84.5% asks for sexual function when a patient had a specific urological problems. Compared to the rest of the group, respondents who believed the frequency of FSD to be at least 30% tended to ask for FSD more often but no statistical significant difference was found (p=0.08). These groups showed no significant difference in asking for sexual function when a patient has a specific urological complaint. (p=0.57)

Prior to a radical cystectomy, the potential effects of surgery on sexual function were discussed with patients by 83.9% of the respondents, by 81.2% prior to a simple cystectomy and by 58.6% prior to incontinence surgery. After surgery patients are asked for changes in sexual function by 47.3%. One hundred and seventy (91.4%) respondents stated that female sexual function should be integrated in post-graduate urological training programs.

Analysis, performed to determine whether certain demographic factors had any impact on frequency of asking for sexual function when a patient has a specific urological complaint, showed no statistical differences in frequency of screening bases on medical degree, type of practice, gender or age. (Table 3)

Figure 1: Physician perceptions of the prevalence of FSD in their patient population

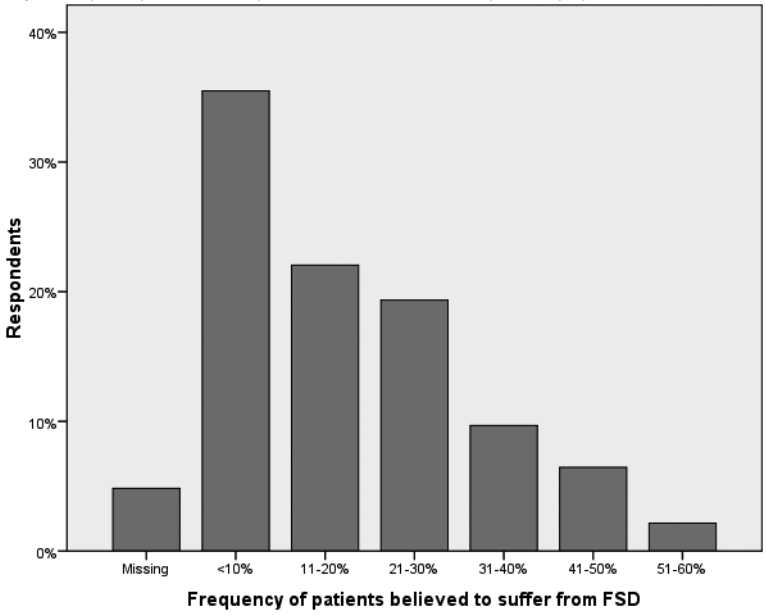

Table 3: Frequency of asking for sexual function when a patient has a specific urological complaint and respondent characteristics.

Demographic characteristics	Ask for sexual function when a patient has a urological complaint		Total	P value
	Yes	No		
Medical degree				
Urologist	126	22	148	1.00
Resident	28	10	38	
Type of practice				
Academic (teaching) hospital	36	8	44	0.98
District general teaching hospital	45	9	54	
District general hospital	73	15	88	
Gender				
Male	127	27	154	1.00
Female	27	5	32	
Age				
< 40 years	56	13	69	0.69
> 40 years	97	18	115	

Discussion

This study was performed to asses the approach of Dutch urologists towards female sexual dysfunction in urological patients. Most urologists do not consistently address female sexual dysfunction. The prevalence of FSD is underestimated and not all urologists address FSD prior and following surgery.

This survey had a response rate of 45.9% which is equal to the previous survey amongst AUGS members but lower than the 67% response in the British survey (36;37). Our response rate is higher than the average, observed in postal questionnaires (38). This may be due to a second preannounced mailing after which the response rate nearly doubled.

This study has some limitations. Firstly, the use of a non-validated questionnaire with dichotomic answers and without cultural components taken into account. Secondly, as non-respondents may have different beliefs, attitudes, and practice patterns than responders, there may be a selection bias. As in all questionnaire studies, there may be a bias in reporting, as the respondents may overestimate frequency of asking for sexual function in their practices. However, attempts were made to reduce such a bias by making the survey anonymous.

Recent surveys among members of the American Urogynecologic Society (AUGS) and among members of the British Society of Urogynecology (BSUG) showed that only a minority screen all patients for FSD (22% and 0% respectively). Lack of time, uncertainty about therapeutic options, and older age of the patient were cited as potential reasons for failing to address sexual complaints as part of routine history (36;37).

Although we did not use the same questionnaire, some comparisons to the American and British surveys can be made. Similar in all three surveys is that only a minority of respondents ask each patients for female sexual (dys)function. When asked for reasons not to address FSD, the majority of the American and British respondents stated lack of time to screen for FSD after surgery (78% and 66%) while in our survey only 18.2% stated lack of time. Another objection given in these surveys was fear of, by asking for FSD, to offend their patients. In our survey, we did not ask for this objection, however respondents did not state this barrier at the 'Other' answers.

When asked for reasons not to ask, female sexual function is thought not to be meaningful in a urological practice, while it is known that there is a strong association between FSD and urological problems. Obviously this is contradictory. Unfortunately the survey did not give us information about why urologists think female sexual function to have no meaning in their practices. One would expect an increased attention to sexual disorders in urologists with special interest in treatment of lower urinary tract disorders but unfortunately we have no data on this issue. Although respondents stated they think female sexual function not to be meaningful, they agree female sexual function should be part of their graduate and post-graduate training.

Even though female sexual function is included as a required topic in the education of urology residents and currently part of graduate and post-graduate training programs, a reason not to ask for sexual function was insufficient knowledge how to ask for FSD, especially for respondents aged 40 years and younger. This illustrates the fact that apparently current training programs are insufficient. Furthermore, even though older urologists have dealt with sexual dysfunction in men for decades, the interest in female sexual function lags behind. Only during the last five years, female sexuality has become a topic in the training of urology residents.

Important in this respect is the underestimation of the frequency of FSD in a urological practice. The majority reported a prevalence far below the estimated prevalence of 48-64%

of patients (15;16). Reasons for this underestimation could be insufficient education or lack of interest in FSD. The group of 58 respondents who estimated a frequency of FSD at least 30% do not ask more often for FSD. So even if a doctor has knowledge of the prevalence of FSD, asking for sexual function it is still not part of the daily routine. Lack of knowledge but also understanding may contribute to many doctors' lack of willingness to deal with the sexual issues.

It is known that urological surgery such as a cystectomy, prolaps and incontinence surgery may enhance FSD (17;18). Prior to a (simple or radical) cystectomy the possible effects on sexual function are discussed with patients by most of the urologists (81.2 and 83.9%). Before incontinence surgery however, only 58.6% discuss potential risks. Perhaps not all urologists are aware that not only surgery such as a cystectomy but also surgery for incontinence may cause FSD. Remarkably, even though most urologists discuss it prior to surgery, only 47.3% ask if changes in sexual function have occurred after surgery. Unfortunately the questionnaire does not provide us the information why urologists do not ask for changes in sexual function after surgery but this topic does need attention. After surgery, patients should be assessed for sexual problems and informed on therapeutic options. In both the FSD, as the surgery related FSD section of the questionnaire, no gender-related differences were found.

The results of this survey show that awareness of FSD is apparently insufficient. There is a need for better implementation of education and training at both undergraduate and postgraduate levels. Education should inform clinicians about the prevalence and the current knowledge of FSD, especially in relation to urological complaints and treatments. Furthermore, training should be based on studies on women's attitudes towards sexuality in relation to the expectations of the physician. Women expect initiatives from physicians in raising the issue of sexual health. They want both routine and more frequent physician inquiry about sexual concerns, as well as a more open, clear, comfortable, and empathic discussion of these issues (39). Physicians should be aware of their patients' needs in this area. Because lack of time is also mentioned as a reason not to ask for sexual function, urologists should be trained in time management strategy. Furthermore, training should aim to teach urologists how to communicate more effectively with patients as this is important in assessment of FSD.(40) Finally, they should be informed about the validated questionnaires which could help them in their assessments of female sexual function.

Conclusion

Overall, many urologists do not consistently ask each female patient for sexual function and underestimate the prevalence of FSD. For the majority of the members of the Dutch Urological Association FSD is not part of routine urological practice. There is, therefore, a need for better implementation of education and training at both undergraduate and postgraduate levels.

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Appendix

I. Female sexual function

1. Do you ask each female patient for sexual function?
   Yes ☐ No ☐
2. Do you ask for sexual function in female patients with specific urological complaints?
   Yes ☐ No ☐
3. If so, which urological complaints?

Hematuria	Yes ☐	No ☐
Incontinence	Yes ☐	No ☐
Urgency and frequency	Yes ☐	No ☐
Lower abdominal pain	Yes ☐	No ☐
Urinary tract infection	Yes ☐	No ☐

   Other, _____

4. A reason not to ask is;

I don't find it meaningful in a urological clinic	Yes ☐	No ☐
Not enough time	Yes ☐	No ☐
I find it difficult to address	Yes ☐	No ☐
I have insufficient knowledge how to ask for FSD	Yes ☐	No ☐
If a patient has FSD, I am unsure about therapeutic options	Yes ☐	No ☐

   Other, _____

5. What percentage of female patients that you see do you believe experience sexual dysfunction? (Please give a percentage)
   _____%

II. Sexual abuse:

6. Do you always ask patients before performing a physical examination for a history of negative sexual experiences (sexual abuse)?
   Yes ☐ No ☐
7. Do you ask patients with specific urological complaints for a history of negative sexual experiences (sexual abuse)?
   Yes ☐ No ☐
8. If so, which urological complaints?

Hematuria	Yes ☐	No ☐
Incontinence	Yes ☐	No ☐
Urgency and frequency	Yes ☐	No ☐
Lower abdominal pain	Yes ☐	No ☐
Urinary tract infection	Yes ☐	No ☐

   Other, _____

9. A reason not to ask is;

I don't find it meaningful in a urological clinic	Yes ☐	No ☐
Not enough time	Yes ☐	No ☐
I find it difficult to address	Yes ☐	No ☐
I do not know what/how to ask	Yes ☐	No ☐
If a patient has a problem, I am unsure about therapeutic options	Yes ☐	No ☐

Other, _____

10. What percentage of female patients that you see do you believe have a history of sexual abuse? (Please give a percentage)

_____%

III. Surgery and female sexual dysfunction

11. Do you address the (possible) effects of surgery on female sexual function prior to the following procedures?

Radical cystectomy	Yes ☐	No ☐
Simple cystectomy	Yes ☐	No ☐
Incontinence surgery	Yes ☐	No ☐

12. Do you ask for the (possible) effects of these surgeries on female sexual function after the procedure? Yes ☐ No ☐

13. Should female sexual function related to urology be integrated in post-graduate training programs? Yes ☐ No ☐

IV. Demographics

14. What is your age? _____ Years

15. What is your gender? Male ☐ Female ☐

16. What is you profession?
    - Urologist ☐
    - Resident urology ☐
    - Paediatric urologist ☐

17. Where do you work?
    - Academic (teaching) hospital ☐
    - District general teaching hospital ☐
    - District general hospital ☐

END

Chapter 6

Female sexual abuse evaluation in the urological practice: results of a Dutch survey.

(J Sex Med 2010;7:1464-1468)

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Introduction

International estimates of the prevalence of sexual abuse are high. Recently, the Committee on Child Abuse and Neglect suggested that each year, approximately 1% of children experience some form of sexual abuse, resulting in the victimization of 12% to 25% of girls and 8% to 10% of boys by 18 years of age (1).

After the first scientific report by Reinhart et al. in 1987 about sexually abused children and urinary tract infections, several authors have found an association between urological symptoms and a history of sexual abuse in adult patients (2-12). Clinicians have limited time with each patient and are responsible for screening for many different disorders and conditions. In practice, inquiry about sexual abuse is not part of routine care, even when clinicians believe that it may be relevant (13;14). Despite the strong association of urologic symptoms and a history of sexual abuse, little to nothing is known about sexual abuse history taking in routine urological practice. This is in sharp contrast to pediatric, gynecological, general physician, gastroenterological and psychiatric practice (1;13-20).

Aims

The purpose of our research was to evaluate the sexual abuse assessment by urologists and their estimation of sexual abuse prevalence in their female patients.

Methods

In the autumn of 2007, a questionnaire was mailed to all urologists and residents registered at the Dutch Urologic Association (N = 405). All of them are member of this association (80% male, 20% female). The 17-item questionnaire, designed by the sexologist from our clinic (H.W.E.), addresses female-sexual-dysfunction-related practices at outpatient clinic visits, beliefs and overall impression of female sexual dysfunction and female sexual dysfunction related to surgery (21). Five of the 17 items concern the topic of taking the history of possible sexual abuse (See Appendix: translated from Dutch).

Demographic data included type of practice, medical degree (resident or urologist), gender, and age. The survey was accompanied with a letter explaining the objectives of the study. We analyzed the data using SPSS release 16 (SPSS Inc., Chicago, IL, USA). Bivariate associations between demographic information and frequency of sexual abuse screening were calculated using the chi-square procedure; $P < 0.05$ was considered statistically significant. Ethical approval was not required and was thus not asked for in this study.

Results

Of the 405 mailed surveys, 190 were returned. None of the returned surveys had a missing page and approximately 80% of all questions were answered. Daily adult urological care was the context of our study, so the questionnaires from pediatric urologists (N = 4) were excluded for analysis. This gave a response rate of 45.9% (186/405).

The majority of respondents were urologists (79.6%), and most of them (65.5%) were between 31 and 50 years old. In correspondence with the m/f ratio in Dutch urology, there were more male respondents (82.8%) than female (17.2%). Forty-seven percent of the respondents worked in a district hospital, 29% in a general teaching hospital, and 24% in a university hospital. A total of 68.8% stated that they always ask their female patients for sexual abuse before doing the physical examination. Overall, 79.3% said to do so when a patient has certain urological complaints: 77.6% in case of lower abdominal pain, 62.1% in urgency or frequency, 41.4% in incontinence, 29.3% in urinary tract infections, 3.4% in hematuria, 3.4% in neurogenic bladder, 1.7% in dyspareunia, and 1.7% in pelvic floor dysfunction.

The arguments for not asking about possible sexual abuse are summarized in Table 1; "not important in urological practice" was mentioned most frequently.

Table 1 Arguments for not inquiring for sexual abuse (n=58)

Argument	n	%
"I don't think it's important in urological practice."	20	34.5%
"I don't know what to do if a patient has experienced sexual abuse."	9	15.5%
"I find it difficult to bring up."	9	15.5%
"I don't have enough time"	6	10.3%
"Other" : sexual abuse history is not relevant for the treatment of kidney stones or colic pain	2	3.4%

Demographic factors had no impact on the frequency of asking about possible sexual abuse (medical degree P = 0.56, type of practice P = 0.46, gender P = 0.21, and age P = 0.62).

The majority (74.3%) of the respondents estimated the frequency of sexual abuse in their urological clinic to be equal or less than 10%. Prevalence rates of 11–20%, 21–30%, 31–40%, and 41–50% were estimated by 7.5%, 3.7%, 1.6%, and 0.5%, respectively. No respondents perceived a prevalence rate higher than 50%. Twenty-three respondents (12.3%) had no insight at all and, therefore, did not give a percentage.

Respondents who estimated the sexual abuse prevalence to be higher than 10% did not ask for sexual abuse history more frequently than those who thought it to be equal to or less than 10% ($P < 0.005$).

Discussion

This study was performed to evaluate the sexual abuse assessment by Dutch urologists and their perception of sexual abuse prevalence in their female patients. To our knowledge, this is the first report on this topic ever. Most respondents (68.8%) consistently inquire about sexual abuse in their patients' history. This is higher compared to other health care providers (13;14;17;20;22-24). (Table 2) A possible explanation of the high percentage of Dutch urologists inquiring about sexual abuse is that the responding urologists overestimate their inquiring. A second explanation can be selection bias, because it is possible that only urologists with an affinity for inquiring abuse answered the questionnaire. It is also possible that urologists, in contrast to other health care providers, are not afraid of intimate questions like sexual abuse, because they also inquire their patients for erectile dysfunction or (coital) incontinence. Nevertheless, with these nuances in mind, it is still a surprisingly high percentage.

This study has some limitations. The first limitation is our use of a non-validated questionnaire. As in most questionnaire studies, there may be a bias in reporting. The respondents may have overestimated the frequency of asking for sexual abuse. However, attempts were made to reduce such bias by making the survey anonymous. The response rate was 45.9%, which is higher than the average in postal questionnaires (25). This may be due to a second pre-announced mailing, after which the response rate nearly doubled. Over 20 years ago, gynecologists argued that a brief sexual inquiry was much more helpful than waiting for the patient's own story about sexual abuse (26). A large cross-sectional, multicenter study of 3,641 females attending five gynecological departments in Denmark, Finland, Iceland, Norway, and Sweden revealed that 92% had not talked to their gynecologist about their history of sexual abuse (27). Fear for unpredictable patient reactions may be an important reason why physicians hardly ask about sexual abuse history (22). However, when asked in a gentle and accurate way, it seldom will lead to unpleasant reactions (28). Asked in a questionnaire before their first visit to an urologist, most female patients mention their negative

Table 2: healthcare providers asking for sexual abuse history

Authors	Type of health care provider	% that asks for sexual abuse	Year of publication
Friedman et al. (13)	Physicians	11%	1992
Walker et al. (24)	General practitioners	4%	1993
Pearse et al. (23)	General practitioners	21%	1994
Maheux et al. (17)	General practitioners	2.3%	1999
Maheux et al. (17)	obstetricians-gynecologists	1.3%	1999
Read et al. (18)	psychiatrists	32.1%	1998
Ilnyckyj et al. (12)	Gastroentorologist inquiering female IBS patients	50%	2002
Perscher et al. (20)	gynecologists	0.5%	2005
This report	**Urologists inquering female patients**	**68.8%**	**2010**

experiences (29). This implies that sexual abuse survivors think it is important information for their urologist.

It is important for urologist to address this issue with patients because a urological physical examination almost often implies an inspection and palpation of the genitals. This is in contrast to a primary care physician, who also examines less private body parts such as an ear or a shoulder.

The importance of discussing abuse before performing a gyneco-urological examination is clear. Survivors of sexual abuse rate their experiences with gynecological care more negatively than controls, they have more negative feelings, and report more discomfort at almost every stage of the gynecological examination. They also report more trauma-like responses during the gynecological examination, including overwhelming emotions, intrusive or unwanted thoughts, memories, and feelings of body detachment (18;19;30;31). Physicians should realize that any kind of uro-gynecological examination may trigger a flashback of abuse and retraumatize these females (32).

In published literature, urge incontinence and dysfunctional voiding are mentioned most frequently as urological symptoms correlated to sexual abuse history (2;6;10-12). A pelvic floor dysfunction can be the link between sexual abuse history and urological symptoms. Sexual abuse history is more often found in patients with multiple pelvic floor complaints (4). Pelvic floor dysfunction is correlated to urological complaints like frequency, urge incontinence, and dysfunctional voiding. Therefore, sexual abuse can give pelvic floor dysfunction, which can cause urological complaints.

Most respondents in our survey think the prevalence rate of females with a history of sexual abuse to be equal or less than 10%. In the Netherlands, the prevalence rates of sexual abuse vary from 10.9% to 23.5% (Table 3).

Table 3: Prevalence of sexual abuse among females in The Netherlands

Authors	Dutch research population	Sexual abused number	Total number	Prevalence	Year of publication
Draijer et al. (33)	Females 20-40 years	248	1054	23.5%	1990
Lankveld et al. (34)	Non-oncologic gynecology patients	50	325	15.4%	1996
Van der Hulst et al. (35)	Low-risk pregnant women (non-clinical)	70	625	11.2%	2006
Lamers-Winkelman (36)	11-18 years old scholars	108 *	989 *	10.9% *	2007
Beck et al. (4)	Female patients at a academic pelvic floor center	42	185	22.7%	2009

* 7,9% (146/1845) for 872 boys and 989 girls combined. This survey mentions a three to four time higher prevalence among girls, but no gender specific data is given. Recalculation of a 3 times higher prevalence for 108 out of 989 girls versus 36 out of 872 boys gives an estimated prevalence of 10,9% for girls only.

Victims of sexual abuse possibly avoid urological care; therefore, at a urological clinic, the prevalence of females with a history of sexual abuse may be lower than in the populations mentioned in the table. Further investigations of the impact of sexual abuse at daily urological care are mandatory.

Conclusion

Nearly 70% of the Dutch urologists ask their female patients about their sexual abuse history. They estimate the frequency of sexual abuse in a urological clinic to be equal to or less than 10%.

Appendix

I. Sexual abuse:

6. Do you always ask patients before performing a physical examination for a history of negative sexual experiences (sexual abuse)?
   Yes ☐ No ☐
7. Do you ask patients with specific urological complaints for a history of negative sexual experiences (sexual abuse)?
   Yes ☐ No ☐
8. If so, which urological complaints?

Hematuria	Yes ☐	No ☐
Incontinence	Yes ☐	No ☐
Urgency and frequency	Yes ☐	No ☐
Lower abdominal pain	Yes ☐	No ☐
Urinary tract infection	Yes ☐	No ☐

   Other, _____

9. A reason not to ask is;

I don't find it meaningful in a urological clinic	Yes ☐	No ☐
Not enough time	Yes ☐	No ☐
I find it difficult to address	Yes ☐	No ☐
I do not know what/how to ask	Yes ☐	No ☐
If a patient has a problem, I am unsure about therapeutic options	Yes ☐	No ☐

   Other, _____

10. What percentage of female patients that you see do you believe have a history of sexual abuse? (Please give a percentage)
    _____%

II. Demographics

11. What is your age?	_____ Years	
12. What is your gender?	Male ☐	Female ☐
13. What is you profession?	Urologist	☐
	Resident urology	☐
	Paediatric urologist	☐
14. Where do you work?	Academic (teaching) hospital	☐
	District general teaching hospital	☐
	District general hospital	☐

END

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Chapter 7

How do continence nurses address sexual function and a history of sexual abuse in daily practice?

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Introduction

Sexual function (SF) involves a complex interaction of emotions, body image and intact physical responses. Urinary incontinence may have a negative impact on various aspects of SF. In females, several studies have demonstrated a strong association between pelvic floor disorders, lower urinary tract symptoms, overactive bladder with or without urinary incontinence, and sexual dysfunction (1-7). In fact, sexual dysfunction is a common, underestimated, and untreated complaint in women with urologic disorders while treatments such as pelvic floor rehabilitation for urinary incontinence may improve SF (8;9). Furthermore, besides the possible negative impact of vaginal/pelvic surgery on SF, incontinence following vulvar, cervical, or surveillance for bladder cancer has a negative impact on female SF (10-13).

In males, urinary incontinence following prostate surgery is a problem with regard to SF. The incidence of incontinence varies from one percent after transurethral resection to twenty-five percent after radical prostatectomy (14). However, overall, erectile dysfunction and premature ejaculation are the most common problems in males (15-17).

In general, males and females who seek urological care will be at relatively high risk of having problems with SF. In our view, care providers should be properly aware of possible co-existing sexual problems.

Several authors have reported a correlation between urinary tract symptoms and a history of sexual abuse (SA) in adults (18-23). This correlation meets several criteria suggesting a causal relationship (21). In treating patients with urinary symptoms, care providers should also consider the possible involvement of SA. In practice, questions about SF and possible SA in the past are not part of routine history taking, even though clinicians believe knowledge about any incidence of SF or SA may contribute to the success of their treatments (24-26).

Currently, an increasing number of Dutch hospitals have assigned nurse practitioners and physician assistants with various levels of competence and experience to take over certain aspects of patient care. Within their areas of competency, and with appropriate training and supervision, they can provide medical care similar in quality to that of physicians. In the Netherlands, many urologists work closely with certified and registered continence nurses. They have advanced knowledge and skills regarding bladder dysfunction, incontinence, bladder catheterization, patient education and preventive care. These nurses play an important role in helping patients to understand and manage their urinary incontinence and to improve their quality of life.

Currently, such nurses use a patient-centered model and do not focus primarily on illness management (cure). Within such a model, nursing practice should also involve the assessment of sexual health issues (27-29). Research has confirmed the importance of nurses considering the monitoring and managing of common post-operative effects such as erectile dysfunction in men after prostatectomy (30;31).

Since continence nurses are involved in assessing sexual problems, respondents were asked about their perception of sexuality. The purpose of this survey was to investigate whether Dutch continence nurses address patients' SF and SA, to delineate perceived barriers to performing this assessment and to document current attitudes towards these issues.

Methods

At the Astra Tech Congress for Continence Nursing (The Hague, the Netherlands, November 13th, 2009), all participating nurses were asked to complete a 19-item questionnaire. This questionnaire (appendix) was designed by the urologist/sexologist at our clinic (H.W.E). It addressed SF-related practices at outpatient clinic visits, attitudes, beliefs and overall impressions of male and female sexual functioning (SF), including sexual abuse (SA).

Demographic data included type of practice, patient population, gender and age. The survey was accompanied by a cover letter explaining the objectives of the study. All data were collected anonymously.

The Medical Ethics Committee was consulted before starting this study to verify whether ethical approval was necessary. As the study did not concern any information recorded by the investigator in such a manner that subjects can be identified, directly or through identifiers linked to the subjects, and it did not involve any compromise of the study participants' integrity, the Committee declared that no formal ethical approval was needed. Furthermore, they waived the requirement to obtain a signed consent form for all subjects.

Statistical analysis

We analyzed the data using SPSS release 17 (SPSS Inc., Chicago, IL, USA). Comparisons between proportions were made using the chi-square test. Continuous variables were compared using the student's *t*-test. P-values < 0.05 were considered statistically significant.

Results

At the annual congress, all 190 attending nurses were asked to participate in this study. A total of 93 nurses completed the questionnaire (response rate 48.9%). All surveys returned were complete, i.e. more than 80% of all applicable questions were answered. The majority of the nurses surveyed (85.9%) worked in a district general hospital, 5.4% in a university hospital and the remaining 8.7% in rehabilitation centers. Their mean age was 47 years, with a standard deviation of 8. In line with the male/female ratio in Dutch continence nursing, there were more female (96.7%) than male (3.3%) respondents. For more than half the respondents (57.3%), the male/female ratio within their patient populations was evenly divided.

Female sexual function

One of the primary goals of our survey was to assess whether Dutch continence nurses address patients' SF as part of history taking. Of the respondents, 11.8% never asked female patients about SF; 37.6% asked only rarely; 44.1% asked often and 6.5% always asked about SF (Table 1). Nearly half the respondents who screened rarely or not at all (n=46) stated they had insufficient knowledge about SF to ask appropriately about this issue (47.8%). A minority (n=8) differentiated possible questions about SF based on the patient's age and the type of surgery they had undergone.

Table 1 Asking about female sexual function

How frequently do you ask your female patients about sexual function?	n=93	
Never	11	11.8%
Rarely	35	37.6%
Often	41	44.1%
Always	6	6.5%
Reasons not to ask (or to ask rarely) about sexual function:	n=46	
I have insufficient knowledge about how to ask adequately about sexual function	22	47.8%
I assume the urologist has asked about it	18	39.1%
I find the subject difficult to bring up	13	28.3%
If there is a problem, I have insufficient knowledge of therapeutic options	8	17.4%
I do not have enough time	5	10.9%
I know the urologist asks about it	1	2.2%
Other, namely	8	17.4%
How do you ask about sexual function? I ask 1 or 2 questions about:	n=47	
Incontinence during sexual activity	44	93.6%
Sexual activity	29	61.7%
Dyspareunia	28	59.6%
Incontinence during orgasm	6	12.8%
Libido	5	10.6%
Arousal/lubrication	5	10.6%
Orgasm	1	2.1%
I ask other questions, namely..	2	4.2%

The 47 respondents who asked their female patients often or always about SF focused their questions on incontinence during sexual activity (93.6 %), sexual activity itself (61.7 %) and dyspareunia (59.6 %).Two respondents explained that they asked their patients open-ended questions to explore whether they were willing to discuss sexual issues.

Male sexual function

Of the respondents, 13.2% never asked their male patients about SF, 46.2% only rarely, 36.3% often and 4.3% always (Table 2). Of the nurses who never or only rarely asked patients about SF (nearly 50% of the total), the majority either assumed the urologist had already done so (48.1%) or felt they had insufficient knowledge of how to ask appropriately about SF (38.9%). Of the 14

Table 2 Asking about male sexual function

How frequently do you ask your male patients about sexual function?	n=91 (2 missing)	
Never	12	13.2%
Rarely	42	46.2%
Often	33	36.3%
Always	4	4.3%
Reasons not to ask (or to ask rarely) about sexual function:	n=54	
I assume the urologist has asked about it	26	48.1%
I have insufficient knowledge about how to ask adequately about sexual function	21	38.9%
I find the subject difficult to bring up	13	24.1%
If there is a problem, I have insufficient knowledge of therapeutic options	6	11.1%
I do not have enough time	4	7.4%
Other	14	25.9%
How do you ask about sexual function? I ask 1 or 2 questions about:	n=37	
Erectile dysfunction	32	86.5%
Sexual activity	25	67.6%
Ejaculation	13	35.1%
Incontinence during sexual activity	17	45.9%
Libido	7	18.9%
Incontinence during orgasm	5	13.5%

respondents who responded 'other', 6 stated that they were confident the urologist had already addressed SF. Others reported that in their daily practice asking about SF depended on specific patient characteristics such as age and the type of surgery the patient had undergone.

The 37 respondents who often or always asked about male SF focused on erectile dysfunction (86.5 %), sexual activity itself (67.6%) and incontinence during sexual activity (45.9%).

Sexual Abuse

Of the respondents, 28% never asked their patients about SA, 49.5% asked only rarely, 19.4% stated that they asked 'often' and 3.2% 'always'. The arguments given by the 72 respondents as to why they never asked or asked only rarely are summarized in Table 6 with "insufficient knowledge about how to appropriately ask about SA" being mentioned most frequently (41.7%). Other respondents (22.2%) indicated that specific nonverbal signals from the patients (e.g., poor eye contact, fidgeting, soft voice, or reluctance to speak about the topic) prompted them to ask about SA (Table 3).

Attitudes/beliefs

Screening for sexual dysfunction was considered to be 'quite important' to 'very important' by the majority of nurses (65.2% and 31.5%). Not all respondents indicated that they believed screening for a history of SA to be important; 11.1% regarded screening for SA as 'somewhat important' and one respondent did not find it important at all. Education on sexual issues was considered to be 'quite important' to 'very important' by the majority of nurses (45.2% and 53.8%).

These opinions on SF and SA were given in the context of asking about sexuality and abuse (Table 4). Although asking about SF in general was stated to be (34 'quite' and 8 'very') important, these 42 nurses did not ask or only rarely asked about female SF. (p=0.04) The same

Table 3 Asking about a history of sexual abuse

How frequently do you ask your patients about sexual abuse?	n=93	
Never	26	28%
Rarely	46	49.5%
Often	18	19.4%
Always	3	3.2%
Reasons not to ask (or to ask rarely) about a history of sexual abuse:	n=72	
I have insufficient knowledge about how to ask adequately about a history of sexual abuse	30	41.7%
I find the subject difficult to bring up	16	22.2%
I assume the urologist has asked about it	14	19.4%
If there is a problem, I have insufficient knowledge of therapeutic options	8	11.1%
I do not think it is important in a urological practice	6	8.3%
I do not have enough time	4	5.6%
Other	16	22.2%

Table 4 Asking about and opinion on sexual function and sexual abuse

How important is it to screen patients for sexual dysfunction? (n=92, 1 missing)							P Value
		Very important	Quite important	Somewhat important	Not important	Total	
How frequently do you ask your **female** patients about sexual function?	Never Rarely	8	34	3	0	45	0.040*
	Often Always	21	26	0	0	47	
	Total	29	60	3	0	92	
How important is it to screen patients about sexual dysfunction? (n=90, 3 missing)							P Value
		Very important	Quite important	Somewhat important	Not important	Total	
How frequently do you ask your **male** patients about sexual function?	Never Rarely	10	40	3	0	53	0.042*
	Often Always	18	19	0	0	37	
	Total	28	59	3	0	90	
How important is it to screen patients for a history of sexual abuse? (n=90, 3 missing)							P Value
		Very important	Quite important	Somewhat important	Not important	Total	
How frequently do you ask your patients about sexual abuse?	Never Rarely	16	42	10	1	69	0.006
	Often Always	14	7	0	0	21	
	Total	30	49	10	1	90	

* Statistically significant, chi square test

Table 5 Age of respondents and reasons not to ask.

Reasons not to ask about **female** sexual function:		Age (years)			
		< = 40	> 40	Total	P value
I find it difficult to bring up	Yes	8	6	14	0.003*
	No	13	65	78	
	Total	21	71	92	
If there is a problem, I have insufficient knowledge of therapeutic options	Yes	7	2	9	0.000*
	No	14	69	83	
	Total	21	71	92	
Reasons not to ask about **male** sexual function:		Age (years)			
		< = 40	> 40	Total	P value
I find it difficult to bring up	Yes	8	5	13	0.001*
	No	13	66	79	
	Total	21	71	92	
If there is a problem, I have insufficient knowledge of therapeutic options	Yes	4	2	6	0.023*
	No	17	69	86	
	Total	21	71	92	

* Statistically significant, chi square test

applied for male SF; 50 nurses either did not ask at all or asked only rarely about male SF, even though they stated that it was important to ask about this issue (40 'quite important' and 10 'very important'). (p=0.042) Fifty-eight nurses asked only rarely or never asked at all about SA, although they considered it important (42 'quite important' and 16 'very important'). (p=0.006)

Compared to their older and probably more experienced colleagues, nurses younger than 40 years of age experienced more difficulties in raising the subject of both male and female SF (p=0.001 and p=0,003 respectively). Furthermore, they more often indicated having insufficient knowledge about therapeutic options for both male and female sexual problems (p=0.023 and p=0.000 respectively) (Table 5).

Discussion

The present study evaluates the beliefs, attitudes and practices of Dutch urological continence nurses towards SF and SA in their patient populations. Although they acknowledge the importance of SF, about half the continence nurses do not ask about this issue. Important barriers are insufficient knowledge both about how to address sexual problems and about possible therapeutic options. Furthermore, continence nurses often assumed that other health care providers are responsible for addressing sexual issues, a premise that has been confirmed in previous studies (32-35).

Physicians, including urologists, do not consistently ask about sexual function and admitted not being sufficiently competent in dealing with either male or female sexual dysfunction (24;36-38). This may indicate that a urological patient is given no opportunity to openly discuss

possible sexual problems. It is, therefore, important that urologists and attending nurses agree on who is responsible for addressing sexual health. Only 6 of the 93 respondents indicated that this was properly discussed within their practices. This miscommunication between different health care providers on who is responsible for discussing sexual issues has been detected in previous studies (10;39). Furthermore, evaluation from a patient's point of view showed that most patients thought discussing sexual concerns with nurses was appropriate, and all subjects thought that physicians should discuss sexual concerns with clients (40;41). Physicians and nurses have to be on the same page in addressing sexual functioning in urological clinics, particularly when sexual dysfunction is a known side effect of the treatment/surgery being undertaken by the patient (male or female).

Most nurses asked their female patients about urinary incontinence during sexual activity (93.6%), whereas others asked about sexual activity in general (61.7%) and dyspareunia (59.6%). Male patients were asked about erectile dysfunction (86.5%), as this condition is known to be prevalent among elderly men. Although we used a non-validated questionnaire with dichotomic answers, we still have insufficient information about the extent to which nurses include emotional factors and discuss the psychological distress of sexual problems and/or the impact on the patient's sexual life, intimate relationships, and/or overall quality of life.

This study has a number of limitations. The first of these is the use of a non-validated questionnaire. First, the study used a survey questionnaire for which content validity and reliability were not previously established. Hence, the reliability of the results must be interpreted in light of this limitation. Unfortunately, validated instruments that evaluate nurses' practices and beliefs do not exist. However, the questionnaire used in this study was able to achieve the objectives of the study. Future research should be performed using validated instruments to confirm the results of this survey. As in all questionnaire studies, there is the risk of a bias in reporting, as the respondents may overestimate the frequency of asking about SF and SA. We attempted to reduce this potential bias by making the survey anonymous. Furthermore, no account was taken of socio-cultural factors relating to either the patients or the nurses. These factors can also play an important role in the assessment of sexual problems.

The response rate of 48.9% can be explained by the active recruitment at the Continence Nursing congress. Nearly all Dutch continence nurses attended this congress, so the sample can probably be considered representative for the total population of nurses educated in and certified for continence nursing. However, this does not apply to nurses in general.

The results demonstrate that demographic characteristics may influence nurses' willingness to ask about SF. Younger nurses more often experienced difficulties in bringing up sexual problems, and attributed this in part to their lack of knowledge about therapeutic possibilities. Both young and older nurses have received the same educational program, so age may be related to length of clinical experience within urological care or general life experiences. Another factor might be fear of stereotyping. Research among nurses has revealed that nurses' reluctance to ask about sexual issues is partially influenced by the public image of young nurses being seen as a sex object (28).

Although SF and SA are thought to be important issues about which to ask, urological nurses do not ask about it or ask about it only rarely. This is contradictory and may, as such, be due to the lack of awareness, education and training. Nurses may want to ask about SF but do not know how. Some intrinsic and extrinsic factors may explain the discrepancy between not asking about sexual function and yet finding it important. A study among Greek nurses highlights some intrinsic factors such as gender and age differences between nurse and patient (35). Both nurse and patient may be uncomfortable with starting a discussion on sexuality because of these differences. Other intrinsic factors are personality characteristics and familiarity between nurse and patient. Work load, lack of time and privacy are other possible extrinsic factors mentioned by the nurses as influencing whether or not sexual issues are raised. Apart from these factors, lack of knowledge was recognized and the need was stressed for education in both (patho)physiological issues and communication skills (35).

Currently, sexual health care is included in the training program of Dutch continence nurses. After two lectures on urinary incontinence and SF, another two hours are spent on learning how to talk about sex. Apparently this education program is insufficient. Some nurses may interpret sexuality rather narrowly as related to sex and sexual relations and may, therefore, not be aware of the wider considerations that need to be made in relation to the general and sexual quality of life when caring for people suffering from urological diseases. Continence nurses, in particular, who are responsible for the management of medical aids and appliances for urinary complaints (i.e. pads/catheters), should also be aware of the fact that these aids can have a negative impact on individuals' sexual and emotional well-being. In addition, the education program should recognize the nurses' personal reasons for their reluctance to talk about sexuality. Nurses should be encouraged to examine their own attitudes, to gain insight into their own behavior and to develop skills that will enable them to learn to avoid potential pitfalls. Furthermore, they should be informed that questionnaires, such as the PelFIs and the Golombok Rust Inventory for Sexual Satisfaction, have been proven to be effective tools in detecting sexual problems and a history of SA (42-45). The use of these structured tools can be helpful in arriving at an assessment, especially for those who have specific difficulties with asking about sexual difficulties and abuse.

Conclusion

In urological care, the issues of sexual function and sexual abuse are important, but they are often difficult to discuss, and apparently many Dutch incontinence nurses consider themselves unable to talk about these issues, or feel uncomfortable doing so. However, it is important for urological patients to have an adviser who has enough time and knowledge to listen to them, and who understands their feelings and worries about sexual function. Accordingly, continence nurses should be able to understand and deal with patients' concerns, give them information

and, if necessary, refer them to a qualified sex therapist for further support, advice and treatment. In addition, more extensive education on sexual care should be implemented in the training program of continence nurses.

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Appendix

I. Female sexual function

1. How often do you ask your female patients about sexual function?
   - Never ☐ -> continue with question 2
   - Rarely ☐ -> continue with question 2
   - Often ☐ -> continue with question 3
   - Always ☐ -> continue with question 3
2. You ask your female patients never or rarely about sexual function.
   What are your reasons for not asking? (Multiple answers possible)
   - I do not think it is important in a urological practice ☐
   - I do not have enough time ☐
   - I find the subject difficult to bring up ☐
   - I assume the urologist has asked about it ☐
   - I have insufficient knowledge about how to ask appropriately about sexual function ☐
   - If there is a problem, I have insufficient knowledge of therapeutic options ☐
   - I know the urologist asks about it ☐
   - Other, _____
3. You ask your female patients often or always about sexual function. How do you ask about sexual function? (Multiple answers possible) I ask 1 or 2 questions about;
   - Sexual activity ☐
   - Incontinence during sexual activity ☐
   - Incontinence during orgasm ☐
   - Dyspareunia ☐
   - Libido ☐
   - Arousal/lubrication ☐
   - Orgasm ☐
   - I ask other questions, namely, _____
4. What percentage of your female patients do you believe experience sexual dysfunction? (Please give a percentage) _____%

II. Male sexual function

5. How often do you ask your male patients about sexual function?
   - Never ☐ -> continue with question 6
   - Rarely ☐ -> continue with question 6
   - Often ☐ -> continue with question 7
   - Always ☐ -> continue with question 7

6. You ask your male patients never or rarely about sexual function. What are your reasons for not asking? (Multiple answers possible)
   - I do not think it is important in a urological practice ☐
   - I do not have enough time ☐
   - I find the subject difficult to bring up ☐
   - I assume the urologist has asked about it ☐
   - I have insufficient knowledge about how to ask appropriately about sexual function ☐
   - If there is a problem, I have insufficient knowledge of therapeutic options ☐
   - I know the urologist asks about it ☐
   - Other, _____
7. You ask your male patients often or always about sexual function. How do you ask about sexual function? (Multiple answers possible) I ask 1 or 2 questions about;
   - Sexual activity ☐
   - Incontinence during sexual activity ☐
   - Incontinence during orgasm ☐
   - Erectile dysfunction ☐
   - Libido ☐
   - Ejaculation ☐
   - I ask other questions, namely, _____
8. What percentage of your male patients do you believe experience sexual dysfunction? (Please give a percentage) _____%

III. Sexual abuse:

9. How often do you ask your patients about a history of sexual abuse?
   - Never ☐ -> continue with question 6
   - Rarely ☐ -> continue with question 6
   - Often ☐ -> continue with question 7
   - Always ☐ -> continue with question 7
10. You ask your patients never or rarely about a history of sexual abuse. What are your reasons for not asking? (Multiple answers possible)
    - I do not think it is important in a urological practice ☐
    - I do not have enough time ☐
    - I find the subject difficult to bring up ☐
    - I assume the urologist has asked about it ☐
    - I have insufficient knowledge about how to ask appropriately about sexual function ☐
    - If there is a problem, I have insufficient knowledge of therapeutic options ☐
    - I know the urologist asks about it ☐
    - Other, _____

11. You ask your patients often or always about a history of sexual abuse. What are your reasons for not asking:

_____

IV. Opinion

12. How important is it to screen patients for sexual dysfunction?
    - Not important ☐
    - Somewhat important ☐
    - Quite important ☐
    - Very important ☐
13. How important is it to screen patients for a history of sexual abuse?
    - Not important ☐
    - Somewhat important ☐
    - Quite important ☐
    - Very important ☐
14. How important is it for you to be educated on sexological issues?
    - Not important ☐
    - Somewhat important ☐
    - Quite important ☐
    - Very important ☐

V. Demographics

15. What is your age? _____ Years
16. What is your gender?
    - Male ☐
    - Female ☐
17. Where do you work?
    - Academic hospital ☐
    - District general hospital ☐
    - Rehabilitation institution ☐
18. Your patient population consists of
    - _____% men
    - _____% women

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Chapter 8

Summary, future perspectives and conclusions

Summary

In ***Chapter 1***, an overview is given on the intriguing relation between UI and female sexual function. This relation is addressed from an anatomical, clinical and health care point of view. The question was raised whether female sexual health care should be provided to women with urinary incontinence (UI).

Vaginal sling procedures may have a negative effect on sexual function due to damage to vascular and/or neural genital structures. Even though autonomic innervation of the clitoris plays an important role female sexual function, studies on the neuroanatomy of the clitoris focus only on the dorsal nerve of the clitoris (DNC). The autonomic pathway and its relationship to the clitoral bodies, urethra and vagina have not been addressed in detail. In ***Chapter 2*** the neuro-anatomy of the clitoris, both somatic and autonomic, are reinvestigated and described to evaluate the potential risk of nerve damage during vaginal sling procedures.

Serially sectioned and histochemically stained foetal pelves were studied and three-dimensional reconstructions of the neuro-anatomy of the clitoris were prepared. Furthermore, two adult female hemipelvi were dissected, after the TVT and TVT-O procedure had been performed, to demonstrate the course of the DNC and the autonomic nerves from the IHP in relation to the slings. The results of this study showed that, given the course the DNC inferior to the inferior pubic ramus, it is at risk for iatrogenic injury after placement of a TVT-O. Furthermore, the autonomic innervation of the vaginal wall is disrupted by the TVT procedure, which could lead to altered lubrication-swelling response. Although preliminary results are shown, significant progress has been made in the field of female sexual anatomy and its representation.

Little is known about the impact of surgery for stress urinary incontinence (SUI) on female sexual function and available results are conflicting. The study in ***Chapter 3*** aimed to clarify the impact of surgery for SUI on female sexual function. Data, collected from two studies evaluating sexual function in 136 sexually active women after placement of the TVT, the TVT-O or placement of the transobturator suburethral (TOT) tape, was analysed. A non-validated sexual questionnaire developed by Lemack, translated into Dutch, was mailed to all patients 3-12 months after the procedure. Compared with preoperative responses no significant changes postsurgical regarding frequency of sexual intercourse or satisfaction of sexual intercourse were observed, although a significant postoperative decrease in urinary coital incontinence ($p=<0.001$) was found. Postoperatively, 29 women (21.3%) reported improved sexual intercourse and 8 women (5.9%) complained of a worsening. There was a significant higher rate of preoperative coital incontinence (86.2% women with coital incontinence) in the group of women who reported improved intercourse. ($p=0.01$) From this chapter, it can be concluded that women with coital incontinence show a significant higher improvement in sexual function after surgery for SUI compared to women without coital incontinence. This suggests that improvement in coital

incontinence results in improvement of sexual function. Therefore, coital incontinence is a prognostic factor for improvement of sexual function following incontinence surgery.

Several studies show that UI impairs women's sexual functioning and sexual satisfaction. However, there is no scientific knowledge about the effects of UI on sexual functioning of the male partners. In ***Chapter 4***, the sexual functioning, measured by a validated questionnaire, of both female patients with UI and their male partners is described. A total of 189 sexually active couples completed the questionnaires. 81 (42.9%) of the women had UI as main urological complaint. Differences were found between women with UI and those without. Women with UI have a lower overall sexual function (p=0.02), lower frequency of intercourse (p=0.02), more problems with communication (p=0.036) and more often show avoidance with regard to sexual activity. (p=0.002) Men with partners with UI showed a diminished overall sexual function (6.66 ± 1.53) compared to men with women without UI. (5.95 ± 1.22, p=0.001) Furthermore, comparison of subscales also demonstrate a lower frequency of intercourse (5.62 ± 2.00, 6.49 ± 1.96), less satisfaction (8.08 ± 2.79, 9.69 ± 3.63) and more erectile problems (6.01 ± 2.28, 6.87 ± 3.23) in men with partners with UI. (p=0.03, p=0.001, p=0.037) From these results it can be concluded that female UI correlates with their partners' overall sexual functioning and sexual satisfaction. In addition, significant differences were found with regard to satisfaction with one's sex life of a woman with UI and her partner.

There is a strong association between urological complaints and female sexual dysfunction (FSD). In this chapter, the results of a survey study are described in ***Chapter 5***, which evaluates how Dutch urologists address FSD in their daily practice. A total of 186 complete surveys were returned. Of these 186, 10 respondents (5.5%) stated they ask each female patient for sexual function, 87.1% stated they ask for sexual function when a patient complaints about lower abdominal pain (87.2%), incontinence (75.8%), urgency or frequency (70.5%) or urinary tract infections (65.8%). Many respondents (40.3%) did not think FSD is meaningful in a urological practice. The majority of respondents (91%) underestimated the frequency of FSD in a urological clinic. Respondents who believed the frequency of FSD to be at least 30% tended to ask more often for sexual function than the rest of the group (p=0.08). This chapter shows that for the majority of the members of the Dutch Urological Association FSD is not part of routine urological practice. There is, therefore, a need for better education and training at both undergraduate and postgraduate levels.

Chapter 6 elaborates on chapter 5 and also evaluates the practices and believes of urologists, evaluated in a survey study. It is not known whether urologists are aware of the fact that there is a strong association between urological complaints and a history of sexual abuse (SA), especially in females, in their daily practice. A total of 68.8% respondents stated that they always ask their female patients about sexual abuse before doing the physical examination. Overall, 79.3% said to do so when a patient has certain urological complaints: 77.6% in case of lower abdominal

pain, 62.1% in urgency or frequency, 41.4% in incontinence, 29.3% in urinary tract infections, and 3.4% in hematuria. The majority of the respondents (74.3%) estimated the frequency of SA in their urological clinic to be equal or less than 10%. To conclude, nearly 70% of the responding Dutch urologists and residents asked their female patients about possible SA.

Chapter 7 is an evaluation of the practices of health care providers; how continence nurses deal with sexuality and abuse in their daily practice. Of the 93 surveyed nurses, 11.8% did not ask their female patients about sexual function; 37.6% asked only rarely; 44.1% asked often and 6.5% always asked. Sexual functioning in males was not evaluated by the majority of the nurses (13.2% never, and 46.2% rarely). A minority of continence nurses asked males about sexual functioning (36.3% often and 4.3% always). Within their patient population, both male and female, 28% of the nurses never asked about SA and 49.5% asked only rarely.

Important reasons for not asking were insufficient knowledge of how to adequately ask males (38.9%) and females (47.8%) about sexual problems, and because nurses assumed the urologist had addressed this issue (48.1% asking males, 39.1% asking females). Particularly younger nurses found it difficult to raise both male and female sexual issues. ($p=0.001$ and $p=0.003$ respectively). Screening for sexual dysfunction was stated to be important by almost all nurses (65.2% 'quite important', and 31.5% 'very important').

The results of this survey demonstrate that Dutch urological incontinence nurses acknowledge the importance of sexual problems in their patient population, but consider asking about this issue not part of their routine care. The main reasons for not asking, according to the nurses' responses, were that they had insufficient knowledge and assumed the urologist had already asked about sexual problems.

Future perspectives

In chapter 2 both somatic and autonomic pathways of the clitoris were described in detail and thereby, significant progress has been made in the field of female sexual anatomy and its representation. This may facilitate further research in the related fields of female sexual health and education and can be used by surgeons in the field of urogynecology. Furthermore, the topographic relation of vaginal slings to the important critical female genital structure, the clitoris, has been illustrated and described for the first time. Future (clinical) research should be performed to confirm these results and to investigate the consequences of injury to the clitoral nerves on the clitoral sexual response and female sexual functioning.

Chapter 3 was specifically designed to investigate the relevance of coital incontinence in the sexual function improvement following slings for stress urinary incontinence (1). Although the study had some biases, it is relevant and innovating and demonstrates that the most significant prognostic factor in the improvement of sexual function of these patients was the cure of coital

incontinence. What was described about coital incontinence can be just the tip of the iceberg: further larger prospective studies on this issue will be hopefully help to understand the real prevalence, the impact on quality of life, the pathophysiology, and the cure rate of this urinary and sexual symptom.

It is probable that several factors contribute to the FSDs of women who are incontinent, and that the psychological consequences of this distressing condition are as important if not more so, than coital incontinence itself. Studies investigating urge incontinence and sexuality suggest that women under 65 report being incontinent during intercourse at higher rates than women over age 65 (2-4). This finding may be related to more frequent or more vigorous activity among the younger age group or may indicate that younger women are often more troubled by urge urinary incontinence, which is harder to control during sex than stress urinary incontinence (2-4). Reasons for avoiding sexual intercourse in women with urinary incontinence include wetness at night, leakage during intercourse, embarrassment, and depression (5).

Longstanding urinary symptoms and sexual problems are, however, a source of appreciable morbidity and once established can become incorporated into an individual's lifestyle and personality. Therefore, the symptoms of FSD including coital incontinence should be investigated as fully as possible. Although the link between SF and pelvic floor disorders such as urinary incontinence has been established, the question remains whether awareness of this relationship has increased throughout the field of urogynecology. Urogynecologists are in a unique position to address SF as their work involves the care of the pelvic floor anatomy and function. Indeed, patients may be expecting or hoping SF issues become uncovered in conjunction with their visit (6). Despite this, the results in this thesis (chapters 5 and 6) suggest that both urologists and supporting nurses still have a long way to go to increase interest and attention to this issue. More consideration of these factors throughout the training process, increased attention to continuing education at conferences, and further promotion by national organizations will help to improve the awareness of this important matter. In addition, there is a need for collaborative work between urology, sex therapy, and urogynecology to focus clinical care and research efforts and to ensure appropriate care for their patients.

Conclusions

Why should the urologist play a role in managing FSD? Literature has pointed out several conditions of peculiar urological interest in which women's sexual health and FSD play a major role (4;7-16). In this scenario the urologist should play an active role with regards to FSD related to UI and LUTS, CPP, pelvic surgery for incontinence or malignancies.

This thesis underlines the significant role of the urologist in the management of female sexual dysfunctions, mainly in women with urologic disorders. Evaluation of the patient's partner and the impact of urological surgical procedures on sexual function have also been stressed.

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Chapter 9

Dutch summary / Nederlandse samenvatting

Met de introductie van de anticonceptiepil vond in Nederland in de jaren '70 een belangrijke culturele omwenteling plaats, ook wel bekend als de seksuele revolutie. Hierbij werden seksuele repressies en taboes in een rap tempo doorbroken. Dit resulteerde in een herwaardering van seksualiteit als menselijke basisbehoefte en een radicale breuk met de heersende religieuze zedenwetten. De keuzevrijheid van het seksueel geëmancipeerde individu kwam centraal te staan en seksualiteit werd een bespreekbaar onderwerp. Ook de introductie van de erectiepil Sildenafil, beter bekend als Viagra, eind jaren negentig bracht een seksuele revolutie teweeg. Erectieproblematiek was een maatschappelijk relevant en bespreekbare aandoening geworden. Sindsdien zijn zowel behandeling als preventie van seksuele disfunctie bij mannen onderwerp van menig wetenschappelijk onderzoek. Een karakteristiek voorbeeld zijn de zenuwsparende prostaatoperaties.

De seksuele bevrijdingsstrijd wordt als voltooid beschouwd maar de medische en wetenschappelijke aandacht voor vrouwen met seksuele problemen is nog gering. Seksuele disfunctie bij de vrouw is echter een frequent voorkomend probleem, ruim 43% van Amerikaanse vrouwen lijdt aan een seksuele functiestoornis. In relatie tot dit proefschrift is van belang dat urogynaecologische aandoeningen een negatief effect blijken te hebben op het seksueel welzijn van vrouwen.

In het ***eerste hoofdstuk***, wordt het onderwerp van dit proefschrift geïntroduceerd, de relatie tussen klachten van urine incontinentie en het vrouwelijk seksueel functioneren. Deze relatie wordt vanuit verschillende perspectieven benaderd. De centrale vraag in dit proefschrift is of standaard bij vrouwen met klachten van urine incontinentie aandacht geschonken moet worden aan seksualiteit. Het doel van de in dit proefschrift beschreven studies was om een antwoord te kunnen geven op deze vraag, vanuit een anatomisch/functioneel en klinisch oogpunt.

De clitoris speelt een belangrijke rol in het seksueel functioneren van de vrouw. Door de eeuwen heen werd de clitoris beschouwd als een mysterieus orgaan maar in 1998 kwam daar een eind aan toen de Australische urologe O'Connell nieuwe inzichten over de clitoris na het verrichten van kadaverstudies publiceerde. Haar studies maakten voor het eerst de clitorale anatomie inzichtelijk. De zenuwvoorziening van de clitoris werd echter enkel globaal en schematisch beschreven. Gedetailleerde kennis van deze zenuwvoorziening is van belang is om zenuwschade en daardoor seksuele disfunctie te voorkomen bij chirurgische procedures. ***Hoofdstuk twee*** beschrijft een anatomische studie van zowel foetale als volwassen bekkens, welke is verricht om het risico van schade aan de zenuwvoorziening van de clitoris te bepalen tijdens de Tensionfree Vaginal Tape (TVT) en Transobturator (TVT-O) procedures. Een driedimensionale reconstructie van de foetale (neuro-) anatomie van de clitoris toont zowel de autonome als somatische zenuwen van de clitoris in detail. Opvallende bevindingen zijn dat de autonome voorziening van de clitoris nauw gerelateerd is aan de somatische zenuwvoorziening en dat

deze somatische zenuwen vlak langs de ramus inferior van het os pubis richting de glans van de clitoris lopen. Dissectie in een volwassen bekken toonde aan dat, gelet op het verloop van de somatische dorsale zenuw van de clitoris aan de binnenzijde van de ramus inferior van het os pubis, deze mogelijk beschadigd kan worden tijdens plaatsing van de TVT-O. Tijdens plaatsing van deze band wordt namelijk met de naald de ramus inferior aangehaakt, waarna de band om dit benige deel van het bekken wordt geplaatst. Andere belangrijke bevindingen zijn dat de autonome innervatie van de clitoris kan worden verstoord door de TVT procedure, hetgeen zou kunnen leiden tot een veranderde zwelling en lubricatie respons bij seksuele opwinding.

Er is weinig bekend over de gevolgen van de operatieve ingrepen voor stressincontinentie op vrouwelijke seksuele functioneren. De beperkte literatuur laat tegenstrijdige resultaten zien. In ***hoofdstuk drie*** wordt een studie beschreven welke de gevolgen van incontinentiechirurgie op het seksueel functioneren evalueert. Het seksueel functioneren van vrouwen na plaatsing van vaginale bandjes werd geanalyseerd met behulp van gevalideerde vragenlijsten. Vrouwen met incontinentie tijdens gemeenschap blijken meer verbetering in seksuele functie te hebben na chirurgie voor stressincontinentie dan vrouwen zonder incontinentie tijdens gemeenschap. Deze resultaten suggereren dat succesvolle behandeling van incontinentie tijdens gemeenschap bijdraagt in een verbetering van de seksuele functie.

Het is bekend dat vrouwelijk seksueel functioneren negatief beïnvloed wordt door klachten van urineverlies. Tot op heden is de invloed van incontinentieklachten van vrouwen op het seksuele functioneren van hun mannelijke partners niet geëvalueerd. In de studie van ***hoofdstuk vier*** werd het seksueel functioneren van mannelijke partners van vrouwen met incontinentie onderzocht, met behulp van de Golombok Rust vragenlijst over seksuele tevredenheid. De resultaten van deze studie tonen dat het seksueel functioneren van mannen met vrouwelijke partners met incontinentie is verstoord. In het bijzonder werden bij deze groep mannen een lagere frequentie van gemeenschap, minder tevredenheid over het seksuele leven en meer erectiestoornissen geobserveerd.

Zowel ***hoofdstuk vijf*** als ***hoofdstuk zes*** zijn gebaseerd op een enquête onder Nederlandse urologen. Met de enquêtes werd geëvalueerd hoe zij onderwerpen als vrouwelijke seksueel functioneren en seksueel misbruik in de urologische praktijk integreren. Uit deze evaluatie blijkt dat urologen niet consequent bij de vrouwelijke patiënten naar het seksueel functioneren vragen en dat zij de prevalentie van problemen op seksueel gebied in hun patiëntenpopulatie onderschatten. De belangrijkste reden om er niet naar te vragen bleek dat ze het niet zinvol vinden in een urologische praktijk. Verder bleken 'onvoldoende kennis hoe naar seksualiteit te vragen' en 'gebrek aan tijd' belangrijke redenen te zijn.

De urologen schatten de frequentie van een verleden met seksueel misbruik gelijk aan of lager dan 10% terwijl studies hebben aangetoond dat deze frequentie (met name in

urogynaelogische patiëntenpopulaties) veelal hoger ligt. Bijna 70% van de participerende urologen blijkt, voorafgaand aan lichamelijk onderzoek, vrouwelijke patiënten naar een verleden met seksueel misbruik te vragen.

Hoofdstuk zeven betreft een evaluatie onder Nederlandse continentieverpleegkundigen. Deze gespecialiseerde verpleegkundigen leveren zorg aan de incontinentie patiënt en zijn opgeleid om niet alleen aandacht te besteden aan de praktische zaken maar ook aan kwaliteit van leven. Deze studie werd verricht om inzicht te krijgen in hoe zij in de dagelijkse praktijk omgaan met onderwerpen als seksueel functioneren en een verleden van seksueel misbruik. Belangrijke obstakels om deze onderwerpen aan te snijden, bleken onvoldoende kennis van seksuele problematiek en therapeutische opties. Vooral jonge verpleegkundigen blijken moeite te hebben met het bespreken van seksuele kwesties met zowel mannelijke als vrouwelijke patiënten. De verpleegkundigen erkennen het belang van een evaluatie van het seksueel functioneren van de patiënt maar geven aan dat het geen onderdeel is van hun huidige zorgverlening.

In ***hoofdstuk acht*** biedt een Engelstalige samenvatting en toekomst perspectieven. Tevens wordt dit proefschrift afgesloten met een eindconclusie. Dit proefschrift benadrukt de belangrijke rol van de zorgverleners, urologen en ondersteunend personeel, in de zorg voor vrouwelijke seksuele functioneren in relatie tot seksueel disfunctioneren.

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«Dagge bedankt zijt» da witte»
(Bergs: heel hartelijk bedankt)

Milou

Curriculum Vitae

The author of this thesis, Milou Dieuwertje Bekker, was born on July the 26th, 1983, in Bergen op Zoom, the Netherlands. In this town, she grew up with her two older sisters and brother. After graduation in 2001 from secondary school at the ' Regionale Scholengemeenschap 't Rijks' in Bergen op Zoom, she started training at the Medical Faculty of the University of Leiden. She joined the student society 'Leidse Studenten Vereniging Minerva' and was actively engaged in several committees and social activities. During the years at University, she worked as a nurse at the Intensive Care of the department of thoracic surgery and later as an allocation coordinator at the Eurotransplant International Foundation in Leiden. As a student, she conducted research for the Female Cancer Programme in Paramaribo, Surinam (Prof. Dr. A.A.W. Peters) in 2006, were she learned the 'no spang' way of life. After her two-year internships she was convinced that she wanted to become an urologist.

In 2008, she obtained her medical degree and started working as a resident not in training (ANIOS) at the department of urology of the Leiden University Medical Center (former head: Prof. J. Zwartendijk). During this period she conducted research on sexual function in patients with bladder cancer with Dr. M.N.M. van der Aa and Dr. H.W. Elzevier. This project brought a lot of inspiration and in addition to the period of residency she was offered a position as a research fellow for two years. Her research involved female sexual function in relation to urinary incontinence and was presented at national and international meetings and rewarded with several honors and funding. The results of this research are presented in the current thesis.

In January 2011 she started her residency in general surgery at the MC Haaglanden in The Hague (Mentor: Dr. J.C.A. de Mol van Otterloo). Her urological training will start in 2013 in the Leiden region; the Leiden University Medical Center (LUMC) (head: Prof. R.C.M. Pelger and mentor: Prof. A.A.B. Lycklama à Nijeholt) and the Haga Hospital (mentor: Drs. F.M.J.A. Froeling).

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List of abbreviations

CPP	chronic pelvic pain
CRL	crown-rump length
DNC	dorsal nerve of the clitoris
FSD	female sexual dysfunction
IHP	inferior hypogastric plexus
IPR	ischiopubic ramus
LUTS	lower urinary tract symptoms
NO	nitric oxide
OAB	overactive bladder
PN	pudendal nerve
QoL	quality of life
SA	sexual abuse
SUI	stress urinary incontinence
TOT	transobturator tape ('outside-in')
TVT	tensionfree vaginal tape
TVT-O	tensionfree vaginal tape obturator ('inside-out')
UI	urinary incontinence
UUI	urge urinary incontinence
3D	three-dimensional