A Holistic View of Urinary Stress Incontinence in Women

Anna-Lena Berglund
ABSTRACT

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Anna-Lena Berglund, Department of Obstetrics and Gynecology, Umeå University, S-901 85 Umeå, Sweden.

The present study group consists of 45 women with genuine stress incontinence who were selected for surgical treatment and randomized either to retropubic urethrocystopexy (n=30) or pubococcygeal repair (n=15). The preoperative assessment included medical history, gynecological examination, urine analysis and culture, residual urine, pad test, frequency-continence charts, water urethrocystoscopy, continence test and cystometry with analysis of micturition. Moreover, five semistructured interviews were performed with the women and two with their partner. The following questionnaires were used measuring a) personality characteristics: Karolinska Scales of Personality (KSP), Eysenck Personality Inventory (EPI), b) depression: Beck Depression Inventory (BDI) and c) social support: Interview Schedule for Social Interaction (ISSI).

The results have shown that there was no difference in the subjective cure rate between the two surgical methods (73% vs. 80 % respectively). The bladder volume had increased in both groups and the intravesical pressure of the bladder filled to maximum had increased in the pubococcygeal repair group. Other urodynamic variables were unchanged by the operation. Pad tests have demonstrated that 67 % of the women in the urethrocystopexy group and 47 % in the pubococcygeal repair group ceased to leak urine. Postoperatively, 63 % of the women in the urethrocystopexy group needed high doses of analgesics compared with only 33 % in the pubococcygeal repair group. Among the women experiencing severe to very severe pain dysphoric subjects were overrepresented. Postoperative residual urine was a minor nursing problem in both groups.

Women with SUI of long duration scored significantly higher than controls on the KSP scales of somatic anxiety, psychic anxiety, psychasthenia, suspicion and on the EPI lie-scale. There was no significant difference in sexual activity before and after surgery. One or two sexual dysfunctions within the desire, excitement, orgasmic and resolution phase were reported by the majority of women both before and after surgical intervention.

The cured women reported a higher level of overall activities before surgery than the improved (i.e. not cured) women, whereas post surgery both the cured and the improved women obtained about the same level of activities. Regarding social support, no differences between the cured or improved women occurred as concerns attachment. The cured women showed a higher degree of adequacy of social integration compared with the improved women.

In order to delineate predictive factors for the surgical outcome the following variables were investigated: age of patient, duration of urine leakage, parity, personality, psychological and social factors. The following predictors of the outcome of surgical treatment emerged: duration of stress incontinence, neuroticism and age of patient.

The results of the present study indicate the necessity of a multidisciplinary approach to the treatment and nursing of women with SUI.

Key words: Stress urinary incontinence, surgical treatment, urodynamics, pad test, nursing, personality characteristics, leisure time, spouse relationship, sexuality, social network, predictors, outcome.
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The results of the present study indicate the necessity of a multidisciplinary approach to the treatment and nursing of women with SUI.

Key words: Stress urinary incontinence, surgical treatment, urodynamics, pad test, nursing, personality characteristics, leisure time, spouse relationship, sexuality, social network, predictors, outcome.
This thesis is based on the following papers referred to in the text by their Roman numerals.


INTRODUCTION

Urinary incontinence (UI) is a relatively common health problem among women. The term urinary incontinence (UI) is used to describe a condition when involuntary urinary leakage exists. The International Continence Society (ICS) has defined UI as a condition when involuntary loss of urine represents a social or hygienic problem and is objectively demonstrable (1). Despite the fact that UI is a common symptom in women and of an unpleasant and distressing nature, only a small number of these women seek medical care. Since UI can be regarded as a hidden handicap reliable prevalence figures are difficult to obtain. The prevalences of UI, reported in several studies both in Scandinavia and in some other places in the world differ due to the type of study, population, definition of urinary incontinence and research methodology applied and are accordingly, difficult to compare. When reviewing the literature there is considerable evidence supporting a higher prevalence of UI with increasing age. However, there are divergent opinions regarding the pattern of this increase (2-6). From different studies, the figures of the women reporting some degree of urinary symptoms or urine leakage are ranging from 8 - 50 % . Two investigations have given prevalence figures of up to 50 % of all women (7, 8). The prevalence of UI increases in women after the menopause to approximately 15 - 20 % in Scandinavia (4, 9). Since the number of women over 40 years of age is increasing, the prevalence for UI is expected to increase proportionally. Consequently, UI is expected to constitute a common health problem among women (10, 11). Presently, it is still unclear whether the increased prevalence of UI after menopause is due to related hormonal changes or just part of the ageing process (12).

The most common types of incontinence are stress urinary incontinence (SUI), urge incontinence, and mixed type. Yamell et al. found a prevalence of 45 % UI in women in aged 18 years and more, (22 % SUI, 10 % urge incontinence and 14 % mixed type) (13). SUI, as the most common type of female incontinence in the age group of 25 - 65 years, is defined as urinary leakage caused by a sudden increase of the intra-abdominal pressure, e.g. due to physical stress, coughing, bending or lifting heavy objects, without evidence of bladder contractions and/or unstable urethra. Although many factors seem to be involved in the pathogenesis of SUI the most important are sphincter dysfunction and a deficient transmission of intra-abdominal pressure to the proximal urethra, which in turn is caused by an insufficient pelvic floor. There are numerous predisposing factors for this condition, i.e. complicated deliveries, menopause, obesity, previous gynecological operations for incontinence, or vaginal prolapse (14-17). Recent histomorphological studies of the pelvic floor have demonstrated that, in some women, abnormal collagen types are responsible for vaginal prolapse and SUI (18-22). The term stress incontinence was originally coined by Holland in 1928 (23), but already 1914 Kelly had described a form of urinary incontinence following some unusual physical exercise: "an affection beginning in middle life, most common in multiparae. It begins as a rule with slight leakage, which gradually grows worse, leading to complete incontinence with all its unfortunate and repellent sequelae. It is not cured by any known means, and although numerous operations have been devised no one has been pre-eminentely successful" (24).
Since many symptoms from the urinary tract can closely resemble SUI, its definition becomes crucial when the medical history and the results of the physical examination are being considered (3).

A standardized program of investigations was recommended by ICS (25, 26) and the clinical assessment of the patients in the present study was performed in line with these recommendations. The medical history should comprise questions concerning neurological dysfunctions, congenital abnormalities, previous urinary infections and major gynecological surgery. Furthermore, information should be obtained about medication with known or possible effects onto the urinary tract. The medical history should also include assessment of menstrual, sexual and bowel function and obstetric history. A gynecological examination and investigation of a descending vaginal wall (cystocele, urethrocele, rectocele) or descending uterus is valuable. An objective quantification of urine loss and a frequency/volume chart are recommended (25, 26). Different schedules of pad test are described in the literature. ICS and some other authors are recommending a 1-hour test (25-31). On the other hand some authors consider 2-hours (32), 24-hours (33) or 48-hours pad tests as most suitable (34, 35). Urethrocystoscopy should be performed to exclude abnormal conditions in the bladder. Continence test is also recommended to be performed with the woman in the lithotomy position and the bladder filled with increasing volumes (250, 300, 350, 400 ml) of physiological saline. The patient is asked to cough vigorously and the volume leaking from the bladder is recorded. However, the medical history may not sufficiently reflect the pathophysiology of the individual patient's lower urinary tract dysfunction. In order to overcome these shortcomings an objective evaluation of the bladder and urethra function is necessary. ICS defines cystometry as a method for the assessment of detrusor activity, bladder sensation, capacity and compliance (25, 26). Several urodynamic techniques which allow simultaneous measurement of intra-abdominal, intravesical, and intra-urethral pressure at rest and stress have generated a considerable amount of data which has been used to elucidate the mechanism of SUI (36). Bjerle reported a relationship between perivesical, intravesical and intragastric pressure (37). Kujansuu et al. described a method for simultaneous urethrocystometry in order to objectively classify the degree of SUI (38). Hilton and Mayne suggested a dual channel cystometry for simultaneous pressure/flow voiding studies and urethral pressure profile measurements at rest and during stress by means of microtransducer catheters (39). Öbrink and Bunne reported a technique for simultaneous urethrocystometry with a thin dacron catheter containing two sensor areas 6 cm apart. Via a microtransducer and amplifiers the urethral pressure, the bladder pressure and the (urethral closure pressure) can be recorded (40).

Residual urine (defined as the volume of fluid remaining in the bladder immediately following the completion of micturition) is commonly assessed at the outpatient clinic (by catheterization or ultrasound) or when urethrocystoscopy or cystometry is performed.

**Psychosocial consequences of urinary leakage**

Notwithstanding the fact that UI was defined by Bates et al. 1979, (1) as a condition where involuntary loss of urine becomes a social or hygienic problem and is objectively demonstrable, there are still limited data and research documenting the psychosocial impairments resulting from being incontinent (41, 42).
The prevailing attitude in our society is that a grown-up person should be continent. In all cultures there are rules and norms established in early childhood, concerning suitable behaviour when urinating. Since those rules are deeply rooted among people an incontinent person often feels embarrassed and desperate when unexpected UI occurs (41, 43).

Contrary to the obvious openness amongst today's people regarding the discussion of personal matters, both in the media and among each other, the issue of urinary leakage is still taboo. The lack of openness concerning UI might, at least in part, explain the reluctance among women to consult the medical profession for their problems. Those affected frequently feel alone with their problems and feel too embarrassed to discuss them openly with their doctor (10, 44). Most incontinent people are hiding their problems from society, from their families and friends. Some seem to deny incontinence even for themselves, because of shame. In some cases the woman may blame somebody or something else for the "puddle". It may be so unacceptable to them to admit the problem that they become unaware of it. Since this reflects a severe psychological conflict between reality and an individual's self-image, it may take a long time and much effort to gain the patient's confidence and to restore her self-concept before she can admit the problem. Some incontinent women appear very anxious and even depressed. The women can be highly distressed by their incontinence and more or less hesitant about any intervention. Some women become apathetic, being convinced of its irreversible nature. Finally, they assume they have learned to accept it. Some further contributing factors to the women's passive attitude concerning treatment might be their assumptions of their incontinence as self-inflicted due to neglect of pelvic floor exercises (45), a normal condition after childbirths (10, 44) and impossible to treat adequately (46). Not before the psychosocial consequences are getting highly pronounced, treatment is sought (43, 46).

For the health-care professionals it is important to know to what extent the SUI impairs the daily life of the patient.

Because SUI is a common distressing symptom among women in working age, a period when social life is most active, it causes great discomfort, shame, loss of self-esteem and social withdrawal (41, 42, 47-50). SUI is also influencing the women's daily life and in this way negatively impacts onto the women's quality of life, as described in the literature (43, 50, 51). However, these studies are hampered by the selection of elderly subjects.

Many incontinent people isolate themselves and refrain from previous social activities, which in turn exerts a special strain on relationships, e.g. with spouse, children and friends. These problems can reach such a magnitude that they result in marital discord. Consequently, it becomes necessary to study the interaction between the individual woman and her social environment as a determinant of good health (52, 53).

Sexological aspects

In spite of the high prevalence of UI, there are relatively few studies on the effect of UI on sexuality in general and sexual function, in particular. Since the bladder base and urethra are closely situated to the vagina it is obvious that sexual activity might cause urinary dysfunction which in turn might result in sexual problems. UI and sexual problems can be related in various
ways, e.g. the leakage causing sexual dysfunction per se or being used by the women as a pretext for avoiding sexual activities (41, 54-56). In a study by Sutherst et al. (57), 46% of the women had reported adversely affected sexual relations because of urinary dysfunction, which is in line with MacAulay et al. (56) findings of a reduced sexual interest among SUI women. Some of the shortcomings of previous studies on sexual and psychosocial problems are related to retrospective data and lack of considering dyadic relationships (41, 54-56, 58). Hilton (59) as well as Clark et al. (60) found urine leakage to be common in connection with intercourse. Weber et al. (61) pointed out inadequate descriptions of sexual problems in many studies of UI which also have failed to consider possible confounding factors such as age. Previous studies have reported that prevalence of UI increases with age (2, 5, 9) and that sexual activity declines (62, 63).

Historical overview of surgical treatment of SUI

The earliest attempt of surgically curing UI symptoms has been reported by Baker-Brown in 1864 who suggested an artificial channel by bladder puncture in which a catheter could be inserted for discharging urine (64). Surgical procedures for cure of UI were also suggested by Pawlik in 1883, describing a narrowing of the urethra. Later on French and German surgeons described a large number of vaginal procedures for the same purpose. Giordano, 1907, described a sling method using m.gracilis (65). In 1913 Kelly introduced a new surgical method aimed at improving the sphincter function by fixing the para-urethral tissue below the lower surface of the urethra in order to lift and support its proximal segment (24). Kennedy modified the method by suturing a further row of sutures in the pelvic fascia below the urethra and thereby providing a better support of the urethra (66). In 1942, Aldridge described a method using the rectus fascia to construct a sling around the urethra in order to support it during stress situations (67). Another type of sling operation, described by Ingelman-Sundberg 1947, used the anterior parts of pubococcygeus muscle which were sutured interiorly to the urethra after separation. The advantage of this method is that it not only offers passive support to the urethra but also facilitates an active lift of the urethra (68). Not before 1949, Marshall-Marchetti-Krantz, suggested an abdominal vesicourethral suspension by attaching the para-urethral tissue to the symphysis (69). In 1958, Burch modified the Marshall-Marchetti-Krantz operation by using Cooper's ligaments as a point of urethrovesical fixing (70, 71). In 1960 Lapides, presented a method by which the urethra was fixed in an elongated position by sutures through the anterior wall of the urethra and through the above-situated periostium of the pubis and rectus fascia. Later on, he modified this technique by approximating the urethrovesical region to the above-situated rectus fascia without any sutures being taken through the periostium of pubis. The purpose of the method was to increase the urethral length (72, 73). Since the beginning of the century over 150 different operations have been developed for the treatment of SUI (74). For a long time the patient's own opinion has constituted the main outcome criterion, which has been pointed out as an unsatisfactory evaluation in an editorial in Lancet 1977 (75). As concerns the selection of patients for surgical treatment of SUI, Hilton raised the following issues: the skills and knowledge of the surgeon, the choice of appropriate operative technique and the urodynamic findings (74).
Pre-and postoperative nursing

After a detailed analysis of the incontinence problem before treatment the nurse has to consider how to solve it, and how to support the patient in order to optimize coping. In this process the nurse has to utilize the information from the patient in a more comprehensive way when planning pre- and postoperative care. When using the nursing process a systematic approach for care of incontinent women is facilitated. In the nursing process five important components of care have been delineated: assessment, problem identification, planning, intervention and evaluation (76, 77). When planning an effective and adequate care for the patient concerning e.g. pain relief or voiding problems, the nurse has to collect appropriate information to identify the problem, to plan and to implement the intervention, which finally has to be evaluated and, if necessary, modified (76-78).

In her work with the patient pre- and postoperatively, this way of problem-solving is a basic tool for the nurse. It has to be pointed out that the components in the nursing process are not mutually exclusive, rather they overlap each other, in terms of that each part provides information for the other, sometimes resulting in a revision of the previous step.

Coping and caring

According to Lazarus and Folkman 1984 coping behaviour can be classified into two categories a) problem-oriented coping behaviour focusing on the problem to be solved or contributing to the improvement of the regulation of actions. The aim of this behaviour is to avoid negative outcome and to prevent emotional stress; b) emotion-oriented coping behaviour which serves to reduce stress in face of adversity by means of intrapsychic processes and which primarily influences the evaluation process.

During the whole life cycle, each individual is confronted with problematic situations and life changes, which have to be coped with at a cognitive level (79, 80).

A chronic condition such as SUI represents such a problematic situation. When planning the course of investigation treatment and caring of a SUI woman it is important to know her coping resources and coping style.

Since SUI is considered as a dysfunction and not as a disease, it is important for the doctor and the nurse to obtain a better understanding of the psychological stress of the condition itself (81). Usually, SUI is treated by exercise of the pelvic floor (82) and/or surgery (83). Surgery is a stressful life event per se, even under ideal conditions, comprising both physiological and psychological stress. It is important to note that a surgical treatment, as a physical trauma, can imply major physiological stress (84, 85). For a long time surgeons and nurses have recognized that surgical patients in rather similar conditions differ widely as concerns the course of their postoperative recovery. It has been shown that the preoperative preparation is of importance for the physiological coping after surgery (86). Carnevali found that most patients, preoperatively fear pain, the unknown, death, destruction of body image, loss of control and separation from their familiar environment (87). Clarke reported that psychological preparation before an operation improved the patient's coping skills postoperatively. Obviously, preoperative information can be helpful for the nurse to identify coping problems and to
develop coping strategies (88). There are few studies on surgical patients which demonstrate that patients received and understood the information concerning the planned intervention and prognosis. Various studies on the effectiveness of doctor-patient communication showed that many of the patients did not understand the information provided, they forgot much of it and they were dissatisfied with the amount and type of information given (89).
AIMS OF THE STUDY

The aims of the present prospective study were as follows:

- To evaluate the urodynamic condition in women before operation for SUI and to compare the findings before and one year after retropubic urethrocystopexy and pubococcygeal repair, respectively.

- To describe the personality characteristics of SUI women and to elucidate the possible impact of such a chronic condition onto the personality of the patient.

- To assess the methods (subjective and objective) applied for the investigation of SUI and to compare the results of two different surgical methods; one performed abdominally and the other vaginally. Furthermore, to study the postoperative nursing regarding bladder drainage and pain relief.

- To investigate the sexual condition during the sexual response cycle and to compare it before and one year after surgical treatment for SUI.

- To study the life situation of SUI women before and one year after surgical treatment in terms of working ability and job satisfaction, leisure activities, social network, spouse relationship and sexual life.

- To delineate predictive factors of the outcome of surgical treatment of SUI.
MATERIALS AND METHODS

Subjects

During a period of two years 162 women, suffering from urinary incontinence, attended the outpatient clinic at the Department of Gynecology, University Hospital of Umeå. Totally, 105 women (65%) were diagnosed on the basis of their medical history as stress urinary incontinent at the first consultation, (Figure 1).

Figure 1. Distribution and selection of urinary incontinent women attending the outpatient clinic during a period of two years.

![Flowchart diagram](image-url)
A detailed investigation was performed regarding the nature and severity of the symptoms, and the duration of the urinary incontinence. From this population 45 women were recruited for participation in the study. These women were subjected either to retropubic urethrocystopexy (n=30) or to pubococcygeal repair (n=15). Data regarding age, weight, height, parity is given in Table 1.

Table 1. Some characteristics of the SUI women.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>50</td>
<td>6.6</td>
<td>34 - 62</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>163</td>
<td>6.4</td>
<td>149 - 179</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>66.7</td>
<td>12.3</td>
<td>46 - 110</td>
</tr>
<tr>
<td>Parity</td>
<td>2.6</td>
<td>1.1</td>
<td>0 - 6</td>
</tr>
<tr>
<td>Birth-weight (kg)</td>
<td>3.7</td>
<td>0.4</td>
<td>2.6 - 4.8</td>
</tr>
</tbody>
</table>

The women had been suffering from stress incontinence for many years before consulting the Department of Gynecology: 20 women between 1 to 5 years, 12 women between 6 to 10 years and 13 women more than 10 years, (mean 7.5, SD 4.4, range 1 - 23 years). At the time of the first gynecological examination 20 women were postmenopausal and 3 were perimenopausal and the rest were premenopausal (n=22). One year later the 3 perimenopausal women had become postmenopausal. All postmenopausal women (n=23) and those premenopausal with climacteric symptoms (n=4) had been treated by estrogen at least one month prior to surgery and during the following year. Five women had been hysterectomized due fibromyoma of uteri and/or menorrhagia. Forty-one women were married, three were divorced and one was widowed. Thirty-five of the women had attended compulsory school, 4 women upper secondary school and 6 women had obtained an university degree. Forty-two women were employed, two had sick pension and one part-time pension.

Excluded from the study were women who had previously been operated for urinary incontinence, those presenting another gynecological disease necessitating immediate surgical treatment and women with other severe somatic diseases, e.g. diabetes mellitus, multiple sclerosis, heart failure, chronic kidney disease and psychiatric disorders.

The reference group consisted of 50 women consulting a gynecology clinic for a routine gynecological health check-up. They were all continent, had no current gynecological disease and no other severe somatic or psychiatric disease. Their mean age was 48 years (SD 7.4, range 34 - 63). Forty-five women were married, two were divorced and three were widowed.

Forty spouses to the SUI women could be asked by letter to participate in the study. Thirty-eight husbands agreed (95 % response rate). The mean age of the husbands was 54 years (SD 9.3, range 38 - 70). These husbands were interviewed by phone before their partner underwent surgery.
Methods for investigation of SUI

The general design of the present study is illustrated in Figure 2.

Visit I
3 month before surgery
- Medical history
- Gynecological examination
- Residual urine, Urine analysis
- Pad test (2 h), Frequency-continence charts
- Psychosocial consequences (interview)
- Prescription for oestrogen
- Instruction of pelvic floor exercises

Visit II
Preoperative assessment
- Urethrocystoscopy
- Continence test
- Cystometry with micturition analysis
- Beck Depression Inventory (BDI)
- Sexuality and partner relationship (interview)

Visit III
Hospital stay
- Preoperative information
- Data regarding nursing care
- Karolinska Scales of Personality Inventory (KSP)
- Eysenck Personality Inventory (EPI)
- Interview Schedule for Social Interaction (ISSI)
- Occupational and leisure activity features (interview)
- Postoperative information

Visit IV
3 month after surgical treatment
- Gynecological examination
- Residual urine, Urine analysis
- Control of pelvic floor muscles

Visit V
1 year after surgical treatment
- Gynecological examination
- Residual urine, Urine analysis
- Pad test (2 h), Frequency-continence chart
- Cystometry with micturition analysis
- Control of pelvic floor muscles
- Eysenck Personality Inventory (EPI)
- Beck Depression Inventory (BDI)
- Psychosocial consequences (interview)
- Occupational and leisure activity features (interview)
- Sexuality and partner relationship (interview)
The medical history and gynecological examination was conducted in connection with the visit at the out-patient clinic of the department. A careful gynecological history was taken including the number of pregnancies and deliveries to check for any possible relationship between the onset of the urinary incontinence and childbirth. Thereafter, the women underwent gynecological examination with special respect to the magnitude of urethrocele, cystocele and rectocele, the size of the uterus and occurrence of ovarian cysts. The patients had varying degrees of cystocele, but none had protruded beyond the vaginal introitus as investigated by a Valsalva manoeuvre in the lithotomy position. Furthermore, the assessment was completed by residual urine, urine analysis and culture. Instructions for pad test and frequency-continence charts were given at this occasion. Finally, water urethrocystoscopy, continence test and cystometry with analysis of micturition were performed preoperatively. Cystometry with analysis of micturition was performed at the Department of Clinical Physiology. The technique of cystometry is as follows: with the patient in a supine position, three thin Teflon catheters (PE 160) are introduced suprapubically after injection of an analgesic agent. Two of the catheters are advanced into the bladder: one for saline infusion during cystometry and one for recording pressures during cystometry and micturition. The third catheter is placed with its tip just outside the interior bladder wall to achieve a pool of liquid around the tip, then the catheter is continuously perfused with saline at a rate of 3 ml/h (CFS intraflow, Salt Lake City). The patients are then examined in a sitting position, intravesical and perivesical pressures are recorded during filling the bladder with physiological saline and during voiding. The volume of saline infused, and the urine flow are recorded. A detailed description of the method is given elsewhere (37).

A two hours pad test was taken on two occasions: firstly during a day with minimal physical exercise and secondly, during a day when physical exercise was maximal according to the women's own judgement. The total leakage of urine on each occasion was recorded.

All women were examined by a physiotherapist concerning the function of their pubococcygeal muscles and they were instructed to pelvic floor exercises three month before surgical treatment (Study I, III).

Surgical procedures

Retropubic urethrocystopexy was done with a two-component fibrin sealant (Tisseel®). The woman was placed in the lithotomy position. A suprapubic transverse or longitudinal incision was made in the skin, subcutaneous tissue, and the rectus fascia. The rectus muscle was divided in the midline. The bladder was dissected from the symphysis pubis and the Retzius’ cavity was exposed to facilitate the identification of the urethra and the bladder neck. A no. 14 or 16 Foley catheter was inserted via the urethra into the bladder and left in situ during operation.

The urethrovesical junction was lifted towards the symphysis pubis by means of a dissecting sponge and clamp introduced into the vagina. The vaginal fascia was then divided from above by means of another dissecting sponge. One absorbent suture (2/0 polyglactin 910, Vicryl®) was placed laterally on each side of the proximal urethra almost through the full layer of the paravaginal fascia and vaginal wall and then passed through the pubic periosteum. By pulling
the sutures it was possible to test if the proximal urethra had been raised sufficiently. Two more sutures were applied to approximate the bladder neck to the rectus fascia. The Tisseel® was applied on the urethrovesical area which was then pressed by the surgeon for 3 minutes transvaginally and transabdominally against the retropubic periosteum to secure the sealing. The sealant (Tisseel® with rapid solidification) was applied by a special device (Duploject) and 2 ml were sufficient in most cases. A suction drain was always placed in the retropubic space (69, 90, 91). The bladder was drained with a suprapubic catheter (no. 14 or 16 Foley) which was clamped during daytime, and the patient was encouraged to micturate as normal every 3 or 4 h. The catheter was drained every 3 h or after each micturition, and removed when the residual urine was less than 100 ml.

Pubococygeal repair was performed with the woman placed in the lithotomy position. An arc incision was made in the introitus of the vagina below the external urethral meatus. The anterior vaginal wall was detached free from the urethra and from the bladder up to the cervix with small dissecting sponges. The pubocervical fascia was then laid bare and sutured in the midline with intermittent absorbent sutures (2/0 polyglactin 910, Vicryl®). To prevent future development of a cystocele, the last suture was also attached to the cervix if it could be performed without too much strain. Continence was tested with increasing volumes of saline (250, 300, 350 and 400 ml). Then the woman was asked to cough if she had been operated under epidural or spinal anesthesia. The pubococygeal muscles were dissected and divided completely, just below the center part. The anterior parts were then sutured under the bladder neck and the proximal part of the urethra, forming a muscle sling. The bulbocavernosus muscles were sutured in the midline without division, in order to support the distal part of urethra. The anterior vaginal wall was sutured at the introitus, a suprapubic catheter (no. 14 or 16 Foley) was inserted, and vaginal tamponade applied (68, 92). The catheter was clamped during daytime, and drained every 3 h or after every micturition. Finally it was removed when the residual urine was less than 100 ml.

Interviews

Five interviews were performed with the women. All the interviews were conducted at hospital in a comfortable and undisturbed setting and by the same investigator (A-L B). Initially, a standardized questionnaire covering age, marital status, number of children, education, economy, was completed. Subsequently, the questions were specifically focused on the following items:
- self-confidence, social life during the last two years before treatment, partner relationship, social network, occupational factors, and leisure activities including hobbies.
- moreover questions regarding pre- and postoperative information, nursing care, sexual life were covered (Study III, IV, V).

The interviews were semistructured and based on own clinical experiences at the Department of Obstetrics and Gynecology, from previous studies at the Department of Physical Medicine and Rehabilitation, Department of Clinical Sexology and Department of Occupational Medicine, University Hospital of Northern Sweden. In order to check the acceptance and comprehension, a pilot study was carried out in 10 SUI women.
The spouses were interviewed by telephone concerning aspects of social life, partner relationship and leisure activities including hobbies and sexual life. Thirty-eight spouses were interviewed before their partner underwent surgery. During the course of the study the necessity of a one year follow-up interview became obvious. Since too much time had passed, only 22 of the husbands were approached and all agreed to a second interview (Study V).

**Questionnaires**

**Beck's Depression Inventory**

The Beck Depression Inventory (BDI) was used to assess the level of depressive symptomatology in the SUI sample. The BDI is a widely used measure of depression which contains 21 items that assess a variety of depressive symptoms and features that the individual reports currently experiencing. Validity and reliability data on the BDI are extensive (93, 94). This inventory was administered to each woman at the second and the fifth interview (Study III, VI).

**Eysenck Personality Inventory**

The women completed the Eysenck Personality Inventory (EPI), Form A to evaluate their personality structure. The EPI measures two different personality dimensions: "Neuroticism", which is an expression of the tendency of emotional lability and anxiety reactions of various kinds, and "Extraversion" measuring outward directness and impulsiveness, in terms of being a sociable person with many friends, being impulsive, carefree and easy-going. The inventory covers also a 'lie'-scale, in order to identify subjects with a 'desirability response set' (95, 96). The EPI was administered during the women's stay at hospital, preoperatively and during the second follow-up, i.e. one year after surgery (Study II, III, VI).

**Karolinska Scales of Personality**

The personality characteristics of the probands were further assessed by means of the Karolinska Scales of Personality (KSP), developed by Schalling and co-workers (97-99). The KSP is a self-report questionnaire including 135 items each to be answered on a four-step Likert-type basis, grouped into 15 subscales and covering three main areas of personality:
1) Anxiety scales: measuring psychic anxiety, somatic anxiety and muscular tension;
2) Extraversion-related scales (impulsiveness and monotony avoidance); and
3) Aggression-hostility scales (reflecting indirect and verbal aggression, suspicion and guilt). Furthermore, there are scales measuring psychasthenia, detachment and social desirability. The KSP has been previously used, among others, in psychiatric inpatients and in chronic pain patients (100-102).

The anxiety-related scales: The somatic anxiety scale concerns autonomic disturbances, restlessness and panic attacks. The muscular tension scale comprises items for muscular tenseness, stiffness and inability to relax. The psychic anxiety scale is related to feelings of
worry, anticipation, sensitivity and lack of ability to speak up and to assert oneself in social situations. The somatic anxiety scale and the muscular tension scale comprise nervous tension and distress. The psychic anxiety scale, the psychasthenia scale and the inhibition of aggression scale deal with cognitive-social anxiety.

The hostility-related scales: The suspicion scale assesses feelings of being suspicious, hostility projected onto others, distrust of people's motives. The guilt scale represents items of being remorseful and ashamed for bad thoughts.

The aggression-related scales: The indirect aggression scale is related to actions of sulking and slamming doors when angry. The verbal aggression scale comprises aggressive feelings, such as getting into arguments and telling people off when annoyed. The irritability scale is about feelings of being irritable and lacking patience.

A number of studies have verified the original assumptions by the authors of the KSP (100-102). As concerns the stability of measurement, it has been proved that the KSP is measuring characteristics which are fairly independent of the state of the subject (i.e. trait-dependent) with the exception of scales referring to aspects of anxiety which proved to be less stable and more state-dependent (99-101). The inventory was completed once during the patients' stay at hospital (Study II, VI).

Interview Schedule for Social Interaction

Social support was assessed by the Interview Schedule for Social Interaction (ISSI). The present instrument is the abbreviated form of a comprehensive 50-item interview schedule. Since the ISSI in its original form requires considerable time, and therefore is not suitable for large studies, Undén et al. (53) provided a short version with as good psychometric properties as the original version (53, 103). Their 13-items interview schedule is measuring the availability and perceived adequacy of a wide range of social contacts and relationships (e.g. with professionals, confidants). The following four subscales are used: availability of social integration (AVSI), adequacy of social integration (ADSI), availability of attachment (AVAT) and adequacy of attachment (ADAT) (103). The inventory was completed once during stay at hospital. (Study V, VI)

All women completed the personality inventories KSP, EPI, the depression inventory BDI and the inventory regarding social support (ISSI) at hospital where detailed instructions could be given.

The questionnaires (KSP, EPI and ISSI) for the reference group were handed out after the subjects' gynecological health check-up, completed within a few days and returned to the investigator A-L B.

Ethical committee approval was obtained for this study and all women gave informed consent.
Statistical methods

Statistical calculations were performed on a Macintosh computer using the SYSTAT® statistical programme. The significance of differences between valuables before and after operation within the groups of retropubic urethrocystopexy and pubococcygeal repair, was tested by Wilcoxon's signed rank test (I - II - V) (104, 105). Comparison of two groups was performed by Wilcoxon rank sum test (I - II - V) (105, 106). Chi-square analyses were used to test for differences before and one year after surgical treatment and for comparison of frequencies between groups of data (II - IV - V) (105). Fisher's exact probability test was used for small groups (IV - V) (105). Differences between groups were tested by nonparametric Mann Whitney U-test or Kruskall- Wallis (IV - V - VI) (104). Comparisons between the various groups were made by Student's paired t-test and independent t-test, respectively (III - IV - VI) (105, 106). The importance of specific characteristics for the prediction of treatment outcome was tested by means of stepwise logistic regression analysis using SPSS (Statistical Package for the Social Sciences I Windows Program Package Release 6.0), (107). Probabilities of less than 0.05 were accepted as significant.
RESULTS

_Urodynamics in women with stress incontinence (Study I)._ 

In order to evaluate the urodynamic findings before and one year after surgical treatment of SUI, 22 women selected for retropubic urethrocystopexy operated by one experienced surgeon and 14 women for pubococcygeal repair operated by the same surgeon (9 women) and another experienced surgeon (5 women) were compared. The preoperative urodynamic investigation and continence test revealed urine leakage in 89 % versus 87 % of the cases (Table II).

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<th>Test performed</th>
<th>Before surgery</th>
<th>After surgery</th>
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<td>Retropubic urethrocystopexy</td>
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★ = Not performed
The pad test, however, showed that all women leaked urine before operation. One year after surgery, 77% of the women in the urethrocystopexy group and 79% in the pubococcygeal repair group reported continence and 23% versus 21% reported an improvement. However, pad test, showed that 59% of the women in the urethrocystopexy group and 43% in the pubococcygeal repair group still leaked urine one year after surgery. A comparison was made between the two operative methods with respect to the postoperative urodynamic variables. The only significant difference was that intravesical pressure of the completely filled bladder was higher in the pubococcygeal repair group (p < 0.001) compared to the urethrocystopexy group. Additionally, the urodynamic measurements before and one year after operation showed an increase in bladder volume (p=0.02) in both groups. The intravesical pressure in bladder, filled to maximum, had significantly increased (p=0.03) in the pubococcygeal repair group one year after surgery. Other urodynamic variables remained unchanged by the operation.

**Personality characteristics of stress incontinent women (Study II).**

Personality traits in the 45 women were assessed by means of two inventories (KSP and EPI) and compared with a reference group of 50 healthy and continent women. The SUI women were grouped according to duration of their urinary leakage. When comparing the scores for the KSP, incontinent women with longer duration (≥ 5 years) showed significantly higher degrees of somatic anxiety, psychic anxiety, psychasthenia and suspicion than women with shorter duration (< 5 years). A comparison of the whole group of SUI women (n=45) with the reference group (n=50) showed significantly higher degrees of somatic anxiety, psychic anxiety, muscular tension, psychasthenia and suspicion. As concerns the EPI, the only significant difference was found for a higher score on the "lie" scale in incontinent women, compared to the reference group.

**Pre- and post-surgical nursing of stress incontinent women (Study III).**

The 45 SUI women randomized either to retropubic urethrocystopexy or pubococcygeal repair were subjectively and objectively evaluated. Table II shows the methods used for evaluation. One year after surgery no significant difference in subjective cure rate was found between the two surgical methods (73% vs. 80% respectively). According to pad test 67% of the women in the urethrocystopexy group and 47% in the pubococcygeal repair group had ceased to leak urine. The bladder volume had increased and the micturition frequency had decreased significantly in both groups one year after surgery. In table III the mean duration of catheterization post-surgery and residual urine volume pre- and post-surgery are illustrated. Only one woman in the urethrocystopexy group was discharged with a suprapubic catheter in situ due to voiding difficulties and large residual volumes. The majority of the women had less than 80 ml residual urine at discharge. One year after operation all women in the urethrocystopexy and 13 women in the pubococcygeal repair group had residual urine volumes of less than 30 ml (Table III).
Table III. Days of suprapubic catheterization after surgery and residual urine before and after retropubic urethrocytostomy and pubococcygeal repair.

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<th>Res. urine 3 months follow up</th>
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$\uparrow$ = Left the hospital with suprapubic catheter
Obviously residual urine was not a major nursing problem in women undergoing surgical treatment of SUI by either of the surgical techniques used in this study. The majority of the women (63%) suffered from severe to very severe postoperative pain in the urethrocystopexy group and 33% of the women in the pubococcygeal repair group. Among the group of women who experienced severe to very severe postoperative pain, dysphoria was significantly (p<0.05) overrepresented. In addition, a tendency of neuroticism (p=0.06) was observed in this group of women. Two women (7%) in the urethrocystopexy group and 7 women (47%) in the pubococcygeal repair group suffered from urinary infections during their stay at hospital. Two women in the urethrocystopexy group presented infections in the abdominal wall wound and one woman in the pubococcygeal repair group had sepsis. The median postoperative stay at hospital for the urethrocystopexy group was 6 days and for the pubococcygeal repair group 11 days.

**Sexological characteristics of stress incontinent women (Study IV).**

Forty-four women willing to co-operate in the interview regarding sexual activity, sexual function and satisfaction before and after surgical treatment joint this study. There were no significant differences between coital frequencies before and one year after surgery. The women's sexual activity was expressed as frequencies of one to two times/monthly or weekly. One month before five out of 40 women and one year after surgery seven out of 38 women (2 women less due to sexual dysfunction in their partners) reported no sexual dysfunctions. One or two sexual dysfunctions were reported by the majority of the women both before and one year after surgical treatment. The occurrence of sexual dysfunctions one month prior to surgery and one year after was as follows: Concerning desire phase, twelve women experienced hypoactive sexual desire before surgery, five improved. However, significantly (p<0.001) fewer (8) were dysfunctional one year after the surgical intervention. A common dysfunction pre-surgery was found during the excitement phase in terms of inhibited (low) vaginal lubrication which was reported by 22 of the coital active women. It should be noted that one year after surgery 10 of these 22 women reported improved vaginal lubrication. On the other hand, 7 new cases of decreased lubrication emerged. There was a significant (p<0.001) increase after surgery in problems during orgasm phase; 21 of the total sample reported orgasmic dysfunction at this time, compared with 17 before intervention. In fact, only two regained orgasm whereas 6 new cases of orgasmic dysfunction occurred. Dyspareunia can occur both in the excitement and in the orgasm phase as well as in the resolution phase. In this study, dyspareunia was reported during the excitement and the resolution phases (but not in the orgasm phase) by 13 of the coitally active women before surgery. Seven of these women recovered while five of those without dyspareunia before surgery had obtained this dysfunction one year later. The level of sexual satisfaction was significantly associated exclusively with frequency of intercourse one year after surgery (p<0.001). Fourteen dysphoric women reported a significantly (p=0.005) inhibited vaginal lubrication before surgery. Neither the size of urinary leakage nor the duration of the urinary incontinence were associated with any of the sexual parameters under investigation. Twelve (27%) women had noted leakage during intercourse. Pelvic floor exercises had no obvious effect onto sexual life among two thirds of the women.
**Social adjustment and spouse relationships of stress incontinent women (Study V)**

The 45 women with SUI were classified according to their subjective evaluation of the surgical outcome. Thirty-four women were classified as cured (Group A) and 11 women as improved (Group B). Thirty-eight husbands were interviewed by phone before surgical treatment. When grouping according to the success rate of the operation 15 partners of women from group A and 7 partners of women from group B were interviewed twice both before and one year after their wife's surgical treatment. The interviews with the women were focused on social life, partner relationship, education, occupational factors, social network (ISSI) and leisure activities. In the interview with spouses some of these issues have been addressed.

A significantly (<0.05) shorter duration of SUI was experienced by Group A women compared with group B. All women enjoyed their work and nearly half (46 %) worked full-time. Leakage-related problems when performing specific tasks were reported both by group A and B before surgery. Group A reported one year later a significant (p<0.001) decrease of their presurgical impediments. Before surgery group A reported a significantly (p<0.01) higher level than group B concerning passive activities. One year after surgery group A women increased significantly their total level of activities (p<0.001), whereas the increase in group B was close to significance (p=0.07). Fifty-three per cent of group A women and 73 % of group B women reported a decrease in joint activities after onset of urinary leakage, which was not in accordance with their partner's experience (27 % vs. 43 %). These inconsistencies within the couples were highly significant (p<0.001). Group B women reported a significantly lower degree of availability of social integration (p<0.01) prior to surgery compared with the reference group, which is in line with a tendency of lack of adequacy of social integration in group B women (p=0.06). Additionally, group A women demonstrated a significantly higher degree of adequacy of social integration prior to surgery compared with group B women (p<0.05). This was verified by a significantly higher support (p<0.01) and assistance from the nearby in group A women. About 75 % of the couples in both groups reported good relations both at first and at follow-up interview. The majority of the couples were satisfied with sexual life and could openly talk about sexual matters both before and one year after surgical treatment. Sixty per cent of the men and every third woman reported an increase in sexual desire one year after the women's operation. However, the frequency of intercourse did not change in any group. Some sexual dysfunctions such as orgasmic ability in the men and decreased lubrication in the women occurred in couples of group B, where more postmenopausal women and more elderly men were found.
Predictive factors of the outcome of surgery of stress incontinent women (Study VI).

The outcome of the surgical treatment in stress incontinent women was evaluated both subjectively and objectively. There was an 80 % concordance between subjective and objective methods used for evaluation of the surgical treatment. According to specific predefined criteria three groups emerged, and the women were classified as cured or improved (i.e. not cured), as follows: Group A) Subjectively cured or improved. The improved women's leakage was smaller and the frequency of leakage episodes lower than before surgery. Group B) Objectively cured or improved. The limits of leakage for cured were 0 ml and for improved ≥ 4 ml, when physical exercise was maximal. Group C) Objectively cured or improved. The limits of leakage for cured were ≤ 2 ml (according to Walsh's and Mills' suggestion) (28) and for improved ≥ 3 ml, when physical exercise was maximal. The cured women in all three groups were significantly (p<0.05) younger than the improved women. A significantly shorter duration of urine leakage was found in the women who had been cured in the three classified groups (group A and B p<0.05 and group C p<0.01).

In order to measure depression and personality traits, BDI, KSP and EPI were used. The improved (i.e. not cured) women in group A showed a significantly higher score (p<0.05) of neuroticism and a lower score (p<0.01) of extraversion before surgery. Similar results were observed on the neuroticism scale in group B and C. In addition, a significant difference in neuroticism was found between the cured and improved women in group B and C (p<0.01 and p<0.05, respectively). One year after operation the cured women in group C showed a significant decrease (p<0.05) in neuroticism. The improved women in group A expressed significantly higher degrees of somatic anxiety (p<0.01), psychic anxiety (p< 0.001), psychasthenia (p<0.001) and suspicion (p< 0.05) according to KSP scales compared to the reference group.

A significantly lower score was found on the BDI-scale in the cured compared with the improved women in group C both before and one year after surgery (p<0.05).

Social support was assessed by means of the ISSI in both the patient group and the reference group of 50 women.

According to the ISSI scales the improved women (i.e. not cured) reported a significantly lower (p<0.01) degree of availability of social integration (AVSI) compared to the reference group.

Additionally, the degree of adequacy (ADSI) was significantly lower (p<0.05) among the improved women compared to the cured women.

A final model was formed with a model chi-square of 20.738, df 3, p<0.0001 in a stepwise logistic regression analysis with cured versus improved women as the dependent variable. The variables which emerged as predictors were: duration of SUI, neuroticism and age. The model classified 35 women (77.8 %) as cured or improved with a sensitivity of 85.2 % and a specificity of 66.7 %. The appearance of duration of SUI and the degree of neuroticism predicted the outcome of surgical treatment to 80 %. However, age contributed nonsignificantly to the model (-2.2 %).
GENERAL DISCUSSION

Each of the forty-five women participating in the present prospective study was characterized by a long history of stress incontinence before investigation and surgical treatment.

Evaluation of surgical treatment

Despite of the large number of surgical procedures for SUI described in the literature there is none which can be regarded as satisfactory for all cases (74). An accurate assessment of the postoperative results is difficult and may sometimes reflect the differences between the ways different procedures are performed rather than a superior result of a new surgical technique. In this study, 45 women with SUI were treated by either of the two surgical methods performed as routine at our Department during the time of the selection of probands, i.e. retropubic urethrocystopexy and pubococcygeal repair.

Since SUI is a symptom and not a disease, a correct diagnosis of the condition is even more necessary for its proper treatment (74). In this respect, many methods for its assessment, such as different pad tests and urodynamic investigations are described. (27, 30, 34, 35, 37, 39).

Our findings showed no difference in the subjective cure rate between two groups of women with stress incontinence treated either by retropubic urethrocystopexy or pubococcygeal repair. The present results demonstrate that the pad test is a more accurate method for the objective evaluation of urine leakage compared with urodynamic testing or the continence test. The value of the pad test as a simple and economical method to objectively evaluate surgical outcome of SUI was also suggested by Walsh and Mills (28). In an editorial in Lancet 1977 it was criticized to use exclusively the patient's judgement as the main measure in the evaluation of surgical outcome (75).

A high frequency of micturition, especially during day-time, had become a common habit in all the SUI women before surgery, probably to prevent urine leakage. When studying a healthy female population Larsson et al. (108) found a mean micturition frequency of 5.8 per day during leisure days. In our study, however, the mean micturition frequency was found to be 7.1 per day, presurgery. Many other authors seem to accept a diurnal frequency of seven micturitions and possibly one additional nocturnal voiding as normal. In our sample, the micturition frequency was significantly lower (mean 5.2) one year after surgery in both the urethrocystopexy and pubococcygeal repair group as compared to presurgery.

Not surprisingly, the improved (i.e. not cured) women were satisfied with the surgical outcome as well, due to a reduction of number of leakage which in turn decreased the patients' micturition frequency. Despite of some sporadic urinary leakages after surgery the women used daily pads to a lesser extent than before.

The majority of the women in both groups had obtained an increased bladder volume one year after surgery. However, no significant correlation between the bladder volume capacity and the micturition frequency was found one year after surgery.

In the present study, the urodynamic investigation one year after the operation showed that the intravesical pressure of the completely filled bladder had increased significantly in the
General discussion

It was also significantly higher in women after pubococcygeal repair compared with women after retropubic urethrocystopexy. A possible explanation of this finding might be that the bladder volume tended to be larger and the compliance lower after operation in this group. When comparing the urodynamic variables before and one year after surgical treatment a significant increase was found in bladder volume in both groups. This increase could be explained by the fact that most of the women had become clinically continent after the operation. Consequently, they did not need to empty their bladder as frequently as before the operation in order to prevent incontinence. The functional length of the urethra was not affected by either operation. This finding is in agreement with previous investigations concerning both retropubic urethrocystopexy and pubococcygeal repair (40, 109). The intravesical pressure in bladder filled to maximum, maximal urine flow rate, and urethral conductance were unchanged in both groups one year after operation. These findings suggest that lifting of the urethra either abdominally or vaginally does not influence bladder function or micturition. The exact mechanisms by which urinary continence is maintained or terminated have, so far, not been explained adequately. Genuine stress incontinence implies an anatomical defect causing displacement of the urethrovesical angle and proximal urethra to a position in which the stress forces causing urinary incontinence are differently distributed between bladder and urethra. The pressure transmission ratio, which shows the unequal distribution of increased pressure to the bladder and the urethra, could theoretically explain the pathophysiology of SUI. The surgical correction of SUI (which is assumed to repose the urethrovesical junction and proximal urethra above the pelvic diaphragm) is associated with an increase in pressure transmission ratio (109). No urodynamic changes of clinical importance after either surgical method could be observed.

Despite the fact that urodynamic methods have been established as a "golden standard" (38, 40, 109, 110-112) in the assessment of SUI, alternative methods in the diagnosis of urine leakage and in the evaluation of surgical outcome should be considered (110). Recently, Larsson stated "there are good reasons to consider the value of the simple methods. Patient history and frequency/volume charts together with other simple tools of investigation, such as pad tests, may come to play a major role in the future investigation of patients with urinary incontinence" (113). In the present study four women were not willing to have further urodynamic investigations because the initial one was experienced as painful and unpleasant. Pad test is a more accurate and simple test than urodynamic investigation for the evaluation of the outcome of surgical treatment. In view of several technical and practical problems related to urodynamic investigation and its unpleasant impact onto the patient its usefulness in SUI, pre- and postoperatively, has to be discussed.

Postoperative voiding dysfunction after surgery for SUI has been described previously, e.g. the inability to resume spontaneous voiding following pelvic surgery (74, 114, 115). After surgery for SUI this complication is seen in up to 50% of the cases (115-118). Surgical treatment for SUI increases urethral resistance and no simple preoperative test can detect patients at risk for postoperative voiding difficulties (117). Abdominal urethrocystopexy and pubococcygeal repair can cause postoperative edema of the bladder neck and urethra. In the present study a suprapubic bladder drainage technique was consistently used in both surgical procedures. This technique allows bladder drainage without obstruction or irritation of the bladder neck. Successful voiding and low residual urine are indications to remove the
catheter. Another advantage is that the care of the catheter and the measurement of the residual urine is facilitated for the nurse (119-121). The results of the present study include a lower number of median days of catheterization in the urethrocystopexy group (5 days) compared to the pubococcygeal repair group (8 days). Moreover, a lower incidence of bacteriuria in the urethrocystopexy group postoperatively compared with the pubococcygeal repair group emerged. The women presenting large residual urine volumes had been given instructions for bladder regime and triple-voiding. Among the women in the urethrocystopexy group the residual urine at the one year follow-up after surgery was within normal limits. Two women in the pubococcygeal repair group presented surprisingly high residual urine volumes at one year follow-up. However, these women had not shown bacteriuria during the follow-up year. The outcome of surgery for 45 women of SUI, subjectively evaluated, yielded a success rate of 73 % in the urethrocystopexy group and 80 % in the pubococcygeal group. The remaining women regarded themselves as improved (27 % versus 20 %). Cure rates between 30 % (122) and 100% (123) have been reported in the literature. However, which aspects of the procedures are determining success or failure are still poorly understood (74).

Postoperative care and pain relief in nursing

The results of the present study indicate that the women in the urethrocystopexy group were more often in need of high doses of analgesics. Although the exact mechanisms for the transmission and perception of pain are not known, neurophysiological and psychological research has resulted in pain theories. For the nurse who takes care of a patient with pain, these theories offer specific pain-relieving methods. According to McCaffery the patient has various rights with regards to pain: a) the right to decide on the duration and the intensity of pain she is able to tolerate b) to be informed of all available methods of pain control and to choose her method of preference c) to prefer to live with pain (124). Although numerous theories exist, three should be mentioned briefly: 1) the gate-control theory, originally proposed in 1965 (125, 126), 2) the endorphins and non-opiod pathways identified in the middle of 1970, and describing the body's internally narcotic-like substances called endorphins (126, 127) and 3) the multiple opioid receptor theory (126, 128-131). Further details about the three methods are given elsewhere (78, 124, 126). Thus, results from endorphin research have helped the doctors and nurses to understand that pain perception and consequently, the need for analgesia can vary significantly between individuals.

The role of personality characteristics in experience of pain

Evidence is accumulating on the benefits of psychologically preparing patients for surgical procedures (84, 132, 133) in terms of a reduction of medication and shortened hospitalization (86). Pain is a very complex condition characterized by an interaction of biochemical, psychological and social factors (134). There is a widespread misconception among doctors and nurses who assume that they rather than the patients themselves are the authority concerning the patients' pain (78, 124). Careful information about the operation and postoperative care and possibilities of pain-relief give the patient a sense of control, resulting in a decrease of anxiety or depression which in turn might influence the experience of pain.
Wallace found in a study of women undergoing minor gynecological surgery that an informative booklet resulted in postoperatively fewer worries and more rapid recovery, (86). One aspect which should be discussed in this context is coping, underlining the necessity for the nurse to obtain in her encounter the patient's coping resources, as a prerequisite for the planning of postoperative care and pain-relief (81, 84). Lazarus defined coping as constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person, (79, 80). From this point of view it becomes obvious that the experience of SUI during many years causes stress. However, it is not clear from our results why such a problem is kept secret during a long time without consulting a doctor. There is a wide variability in how individuals are able to adapt to various stressful conditions (132, 133). The results of the present study indicate that in women with SUI their condition has resulted in higher degrees of somatic anxiety, psychic anxiety, psychasthenia and suspicion when compared with their healthy counterparts. Bygren described somatic needs related to certain personality characteristics which in turn determine help-seeking behaviour (135). The results from our study point to the importance of personality characteristics in the experience of postoperative pain. Our results indicate that a low degree of depression reflected by low levels of dysphoria and neuroticism represented important factors for the experience of postoperative pain together with the type of surgical method. The nurses' attitudes towards pain relief are of importance when discussing such issues with the woman postoperatively since pain experience is highly individual. Consequently, the treatment of pain and the postoperative care have to be individualized.

Sexual impact of SUI and partner relationship

It is obvious that SUI exerts an impact on women in different ways. In our sample 27 % of the women reported urine leakage during sexual activity. There was no association between leakage and particular phases of the response cycle, which is in line with results from previous studies (59, 60). Twenty-five per cent of the women in our study reported that penetration caused leakage which was confirmed by only three of their partners. In two studies a decrease in sexual problems and improved sexual life after surgery was found (55, 136). In the present study, we found a high frequency of sexual dysfunctions both before and one year after surgical treatment. Nevertheless, the level of sexual satisfaction was high, indicating the importance to study the dynamics of the partnership in general and sexual expressions of intimacy in particular in order to gain a better understanding of the etiology and persistence of sexual problems. No significant differences were found between the two different surgical methods regarding their effect on sexual activity, function and satisfaction. After surgery regained continence promoted vaginal lubrication and sexual desire, whereas the frequency of intercourse did not change in the couples. The high occurrence of sexual dysfunctions is in accordance with some other reports (41, 54, 55, 58). Vaginal dryness was a common complaint before surgery in this study. Weber et al. found in a group of UI women age as influencing the sexual function (61). In our study decreased lubrication exerted a rather small effect on sexual activity both before and after surgery. Vaginal surgery is now and then associated with postoperative dyspareunia. In our study an instruction was given for the women to have coitus postoperatively when they feel for it, however, not within 3 weeks compared with Iosif recommending 4 - 6 weeks (55). Women at risk for developing problems
with sexuality are those with poor social support, complicating psychiatric or somatic problems and a history of sexual dysfunctioning in the couple (137-139). The majority of the women in our study lived in long-standing and stable relationships. The ability to show emotional warmth, attachment and understanding for each other did not change significantly during the follow-up period. This obvious positive atmosphere in the relationships might compensate shortcomings in sexual life. Surgical method per se did not influence sexual function/dysfunction (140). Depending on age, social situation, psychological status and a variety of other factors women may have alternative priorities to sexual life.

**Social factors and the role of social support**

The majority of the women reported stable family relationships. Eighty per cent of the women were living with the same partner more than ten years. All women had children resulting in a parity rate which was higher compared to national rates of the corresponding period (141). No differences could be found concerning employment status, well-being at work or psychologically stressful work. The limited number of studies concerning the impact of urine leakage onto work makes a comparison of negative consequences impossible (43, 47). Some social complications have been pointed out by Wrist-Lam et al. (47) comparing sports, other non-intimate activities, hygienic problems, sleep disturbances etc. The fact that all women had changed or reduced their leisure activities to be more passive illustrates the dignity of the problem, which in our study became obvious by the lower level of joint activities among the couples before surgery. However, one year after surgery, the women's total level of leisure activities had increased. The cured group of women experienced a higher level of active activities after surgery, whereas the improved (i.e. not cured) group of women had increased both types of activities.

Lack of social support is regarded as a major risk factor for neurotic symptoms (103). The women of our sample presented all a long duration of SUI. In such a chronic condition as SUI social support becomes crucial. In our study the improved women (i.e. not cured) were characterized by a lower level of social integration in terms of loneliness, which indicates an additional vulnerability factor for those women. Furthermore, these women expressed a need to discuss personal matters with persons outside the family. However, subjects who had more personal resources were more likely to rely on active coping and less likely to use avoidance coping (142).

**Predictors of the outcome of surgical treatment**

One way to evaluate the success rate of surgery is based on the women's own judgement, which not always is reliable due to perceptional differences between patients. This rather unsatisfactory evaluation has been highlighted in an editorial in Lancet 1977 (75). In the last years different pad tests have been used for the evaluation of surgical treatment (27, 28, 34, 35). The fact that perspiration can differ between individuals has to be taken into account when using pad test (28). The women in this study were classified and evaluated in three different groups using subjective and objective method yielding an 80 % concordance rate. The cured
women in all three groups were significantly younger and had shorter duration of SUI than the improved women. Age as confounding fact or influence for the outcome of surgery has also been reported by others (143, 144). In our study, women with a long duration of SUI scored higher on the KSP scales of somatic anxiety, psychic anxiety, psychasthenia and suspicion. The improved (i.e. not cured) women after surgical treatment showed a higher score of neuroticism and a lower score of extraversion. On the ISSI scales the improved women reported a lower degree of availability of social integration than the reference group and a lower degree of adequacy of social integration than the cured women. The findings obtained with the KSP point to the importance of personality factors in chronic conditions as SUI. The cured women scored higher on the extraversion scale and lower on the neuroticism scale compared to improved women (i.e. not cured). The role of mental factors for the outcome of surgical treatment is sporadically discussed in the literature (145, 146). In a stepwise logistic regression analysis of our data with cured versus improved women as the dependent variable three important predictors for the outcome of surgical treatment emerged, a) duration of SUI, b) neuroticism, and c) age of patient. The younger women with short duration of SUI seem to have a greater chance to be cured than the older women with long duration. However, this finding should not prevent the doctor from surgical treatment of elderly women since in our group of improved women (i.e. not cured), comprising older women with longer duration, an improvement of quality of life after surgical treatment was reported as well. Interestingly, irrespective of becoming completely continent or improved, the women were satisfied with the outcome of surgical treatment.

Since the proportion of elderly people in the population is increasing, the number of stress incontinent women is expected to increase steadily. Todays people have higher expectations concerning well-being and quality of life. Consequently, these issues must be taken into account when planning for the treatment of women with SUI. The results of our study highlight the psychosocial aspects of SUI and point to the necessity of a multidisciplinary approach to this common health problems.
CONCLUSIONS

The present prospective study regarding the investigation and surgical treatment of women with SUI has yielded the following results:

- No difference in the subjective cure rate between two groups of women treated either by retropubic urethrocystopexy or pubococcygeal repair occurred.

- Pad test is a more accurate test for the objective evaluation of urine leakage preoperatively than urodynamic testing or continence test.

- No urodynamic changes of clinical importance after either surgical technique occurred.

- The bladder volume increased one year after surgery in both the urethrocystopexy and the pubococcygeal repair group.

- Postoperative residual urine is a minor nursing problem after urethrocystopexy or pubococcygeal repair.

- The experience of postoperative pain seems to be related both to personality characteristics and type of surgical technique.

- Women with stress urinary incontinence scored significantly higher than controls on personality aspects such as somatic anxiety, psychic anxiety, psychasthenia and suspicion and on a "lie- scale".

- Women with longer duration of SUI showed higher degrees of somatic anxiety, psychic anxiety, psychasthenia and suspicion than women with short duration.

- One or two sexual dysfunctions within the desire, excitement, orgasmic and resolution phase were reported by the majority of women with SUI both before and after surgical treatment.

- There were no significant differences in sexual activity of women with SUI before and after urethrocystopexy or pubococcygeal repair.

- Neither the magnitude of urine leakage nor the duration of SUI influenced the sexual experiences, whereas continence after surgery promoted sexual desire and vaginal lubrication.

- Subjectively cured women were usually younger than improved women, had a shorter duration of SUI and reported a higher level of overall leisure activities before surgery than improved (i.e. not cured) women.
Subjectively cured women showed a higher degree of adequacy of social integration than improved. Subjectively improved (i.e. not cured) women reported a lower degree of availability of social integration compared with a healthy reference group.

Predictors of the outcome of the surgical treatment were the duration of SUI, the degree of neuroticism and the age of patient.
ACKNOWLEDGEMENTS

This work was carried out at the Department of Obstetrics and Gynecology, University of Umeå. I would very much like to express my sincere gratitude to my supervisors, colleagues, relatives and friends who have contributed, assisted and have been supportive and understanding throughout this work and in particular to:

Othon Lalos, Associate Professor at the Department of Obstetrics and Gynecology being my supervisor and friend, for generous advice and help in all respects, for his support, his excellent scientific teaching, for stimulating discussions and constructive criticism pulling me through this work. I am grateful for his warm concern and for communicating me his talents in the noble art of writing scientific papers.

Martin Eisemann, Associate Professor at the Department of Psychiatry, Unit of Medical Psychology, my co-supervisor for friendship who supported me in every way throughout these studies with never failing glow. His stimulating and constructive criticism of the manuscripts has been invaluable. Martin, thank you also for the linguistic revision of most of the manuscripts.

Ann Lalos, Ph.D. at the Department of Obstetrics and Gynecology my co-supervisor for friendship and valuable collaboration in the psychosocial field. Thank you for believing in my capacity to carry it out and for nice and relaxing chats during the years.

Kerstin S Fugl-Meyer, Associate Professor at the Department of Clinical Sexology, my co-supervisor for friendship, stimulating and clarifying discussions about female and male sexuality.

Per Bjerle, Associate Professor at the Department of Clinical Physiology for his generosity and ingenuity and kind support when providing me with cystometric data.

Ingemar Joelsson, Professor Emeritus at the Department of Obstetrics and Gynecology, for inviting me as a doctoral student and for kind support.

Torbjörn Bäckström, Professor and head of the Department of Obstetrics and Gynecology for making me believe in the project and helping me to carry it through.

Stig Uhlin and Bo Segerstedt for significant statistical advice, generous computer help and encouragement. Janne Hentschel for his invaluable statistical supervision and for explaining statistical methods in simple ways.

Mona Andersson and the staff at the Department of Gynecology for friendship and companionship in daily-work during the patients' hospital stay.

Ullika Kellerth, Ingrid Hansson-Mild and the whole staff at the outpatient clinic for tender care of me and my patients.
Gabrielle Rosendahl, for kind support and skilful instructions of pelvic floor exercises in all my patients before surgical treatment.

Maud Nordenstam-Haghjo, for her excellent secretarial assistance, final lay-out and revision of my thesis. Birgitta Backman for her kindness and support during the years.

Inga-Britt Bränholm and Margareta Lindberg for sharing practical assistance in Macintosh computer programmes and for support and stimulating discussions.

In memory of my brother-in-law Roland Dahl for linguistic revision and Mats Långström for Macintosh computer assistance.

Professor Axel Fugl-Meyer for opening up the Department of Physical Medicine and Rehabilitation when I needed a workplace in the initial phase of the study.

Berit Nilsson, Department of Occupational Medicine for providing some of their questionnaires.

Most of all, I would like to thank my husband Leif for never-failing support, patience and love during the years. My beloved children Ola and Ulrika who have closely accompanied me along the road and always been so patient and shown me love and affection. Thank you Inger for sisterly love.

Last but not least, I wish to express my gratitude to all the patients who participated in the study and gave me their views of living with stress incontinence, from which I learnt so much.

This study was financially supported by grants from Faculty of Medicine and Kempe foundation, Umeå University, Västerbotten County Council, Joint Committee of the Northern Health Region of Sweden and by the "National association of nurses in surgical and medical care".
REFERENCES


