

# Pubovaginal Cutaneous Fascial Sling Procedure for Stress Urinary Incontinence: 10 Years' Experience

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## Key Words

Pubovaginal sling · Urinary incontinence · Long-term results

## Abstract

**Objectives:** There is a considerable lack of consensus regarding indications and long-term efficacy of the many techniques for treating urinary stress incontinence. We report the long-term results of a modified pubovaginal sling procedure. **Methods:** From 1989 to 1998, 129 consecutive patients underwent a pubovaginal sling by two urologists. 86 of the subjects (67%) replied to a questionnaire designed to assess the outcome of the procedure and the subjective satisfaction with the operative result. During surgery we performed a modified sling procedure using a cutaneous strip strengthened by rectus fascia and placed with almost no tension. Special care was taken not to lacerate or damage but support the urethral musculature. We routinely did an anterior vaginoplasty, and posterior vaginoplasty if necessary. **Results:** Mean patient age was 56.8 years, mean follow-up 39 months, mean parity 2.1, previous surgery 0.4. Improvement rates were determined as follows ('Are you satisfied with the operation?'): Significantly reduced incontinence (i.e. 50–100% improvement) was found in 65.2%, slight reduction (10–40% improvement) in 15.2%, no change in

17.4% and worsening in 2.2% of all 103 cases. The majority of all complications were wound infections. **Conclusion:** Despite the considerable failure rate, the substantial improvement in the quality of life of almost two thirds of the patients during a 3-year follow-up recommends a pubovaginal sling as a treatment option for urinary incontinence.

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## Introduction

Suspension surgery has been designed to correct a well-known anatomical problem of hypermobility of the vesicourethral junction that especially occurs on increases in intra-abdominal pressure and consecutively leads to urinary loss. Especially if cystocele formation occurs, sling surgery appears to be of advantage [1].

By getting experienced in applying different surgical techniques and observing their complications as well as reviewing the vast amount of published data (just) on different techniques, we developed a modified sling procedure that follows several principles according to the complex nature of female incontinence: (1) We combine anterior colporrhaphy with sling suspension, (2) avoid direct contact of but try to support the proximal urethra, (3) use partly elastic and static sling components (corium and fas-

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cia), (4) avoid static but use 'dynamic' sling fixation (recus muscle and not pubic bone or Cooper's ligament), (5) use exclusively autologous sling material, and (6) avoid any sling tension during tying [2].

## Materials and Methods

From 1989 to 1998, 129 consecutive patients underwent a pubo-vaginal sling by two urologists. 86 of the subjects (67%) replied to a questionnaire designed to assess the outcome of the procedure and the subjective satisfaction with the operative result. We performed a retrospective chart analysis on each patient and used a modified mailed questionnaire that is based on those used by other investigators for the evaluation of incontinence and quality of life after incontinence procedures [3–8].

The questionnaire included questions that query the amount and type of leakage, the presence of irritative and obstructive symptoms and the degree of bother from any of those symptoms. To increase reliability of resulting answers, we repeatedly asked similar questions trying to approach one issue from different sides.

### *Preoperative Evaluation*

Preoperative evaluation included history, physical examination, video urodynamics, lateral cystogram, post-void residual volume measurement, pad score and voiding diary. History was taken with an emphasis on gynecological history and previous incontinence surgery. We examined patients in the lithotomy position with filled bladder (200 ml) and asked them to strain and cough to check for incontinence as well as signs of genital prolapse (cystocele, rectocele). Video urodynamics were performed by infusing contrast media into the bladder through a 6-, 8- or 10-Charr urethral catheter at 20 ml/min. Abdominal pressure was recorded through a 10-Charr rectal catheter. Sphincter activity was monitored by using cutaneous electrodes placed on the perineum. The bladder was evaluated for morphology, compliance, uninhibited detrusor contractions, leakage and vesicoureteral reflux. No effort was made to determine leak point and urethral closure pressure.

For patients presenting with uninhibited detrusor contractions, anticholinergic medication was given and they were scheduled for sling surgery only if instability improved substantially. All patients with neurogenic incontinence were excluded. Lateral cystograms were taken at rest and when straining to visualize the degree of mobility of the vesicourethral junction and the morphology of bladder and cystocele. The indication to operate on incontinent patients relied mainly on history, pad score, cough test and lateral cystogram. Mainly patients who presented with advanced stages of pelvic floor dislocation and cystocele formation were operated (negative selection).

### *Surgical Technique*

Preoperatively, disinfectious genital soap washings were done by the patient, intravenous antibiotics were given and the suprapubic area was shaved. The patient was placed in the dorsal lithotomy position.

The sling is harvested by making a transverse suprapubic incision beginning medially and slightly below the spina iliaca anterior superior in the size of 20 × 1.5 cm. Subcutaneous tissue and the epidermis is removed leaving the chorium as the elastic part of the sling. A similar sized strip consisting of the inferior leaf of the rectus fascia is

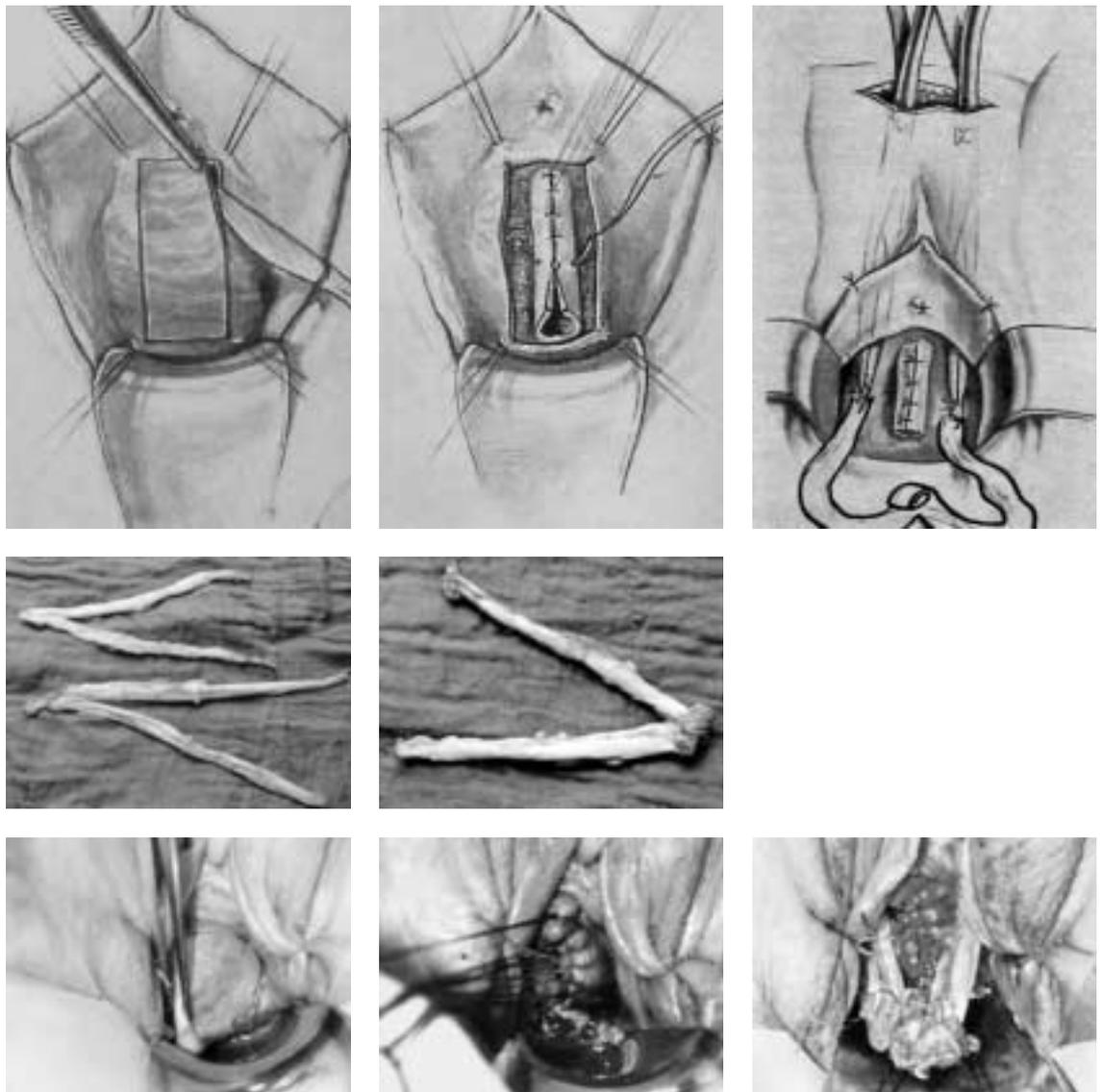
then harvested and the lateral thirds of the wound closed by suturing fascia, subcutaneous tissue and cutis after gently mobilizing the retropubic space. Following that, both strips are longitudinally incised for approximately 16–17 cm and laid on top of each other resulting in a rein-like sling. The common end of this rein is formed into a roll. The fascial and cutaneous part of the sling is stitched together. After that, a Foley catheter is inserted and the bladder is drained followed by a rectangle-shaped incision overlying the proximal urethra. The vaginal epithelium is sharply dissected off the underlying periurethral fascia forming a longitudinal roll and thereby exposing the dislocated pelvic floor muscles. At the lateral margin of the periurethral fascia, an entrance into the retropubic space is made using curved scissors gently advancing it laterally and slightly upward to create the correct tissue plane. A long curved clamp is manually guided from the abdomen, through the retropubic space, under the pubis into the vaginal incision. The sling ends are grasped by the clamp and pulled up into the abdominal incision. At the level of the bladder neck the sling roll is sutured to the previously longitudinally formed roll of vaginal epithelium supporting and elevating the bladder neck (fig. 1). The vaginal incision is closed with absorbable sutures; in case of a cystocele a standard anterior colporrhaphy is performed. The sling ends are brought up pararectally and tied loosely together over the rectus muscles with almost no tension after a suprapubic tube has been placed. If a posterior vaginal repair is needed this procedure is then performed. The abdominal incision is closed, the Foley catheter removed and a vaginal pack is placed for 1 day. Postoperatively, patients were managed with a voiding diary and residual urine measurements.

## Results

Mean patient age was 56.8 years, mean follow-up 39 months, mean parity 2.1, previous surgery 0.4, preoperative pad score 3.5, postoperative pad score 1.4.

All patients were diagnosed for stress urinary incontinence. We observed detrusor instability in 15 of 129 patients who all improved on anticholinergic medication preoperatively. These questions were asked to all patients who gave the following answers (very occasionally, patients marked two answers although not allowed):

When giving only two options to answer whether the patient is dry at all times or leaks (even a very small amount of) urine, a quite disappointing rate of 26.1% of all women only (question 4) appears to be cured after a mean follow-up of more than 3 years. This seems to be confirmed by 28.3% of all women treated (question 7) who do not need any pad protection from urine leakage although question 8 (answer f) and question 5 suggest the cure rate to be even less (19.6 and 21.7%) than that. On the other hand, 58.7% of all patients (question 6) do not use pads or wear them for safety only. This nicely corresponds to 60.8% of patients using 0–2 pads (question 7), to 65.2% reporting 50–100% improvement (question 14),



**Fig. 1.** The vaginal epithelium is sharply dissected off the underlying periurethral fascia forming a longitudinal roll. The sling ends are grasped by the clamp and pulled up into the abdominal incision. At the level of the bladder neck the sling roll is sutured to the previously longitudinally formed roll of vaginal epithelium supporting and elevating the bladder neck.

to 63% who are satisfied or completely satisfied (question 20), 58.7% who would recommend this type of surgery to others (question 22) and to 71.7% of all women questioned who describe their situation as 'better' if they were asked to compare the present situation to that before surgery.

In summary, only 25% of all women are cured when asking 3 years postoperatively and applying rigid criteria for success, however, more than 60% are satisfied with the outcome of surgery after that time period.

## Discussion

Our pubovaginal sling success rate is obviously lower than that reported by others applying a similar technique as well as questionnaire-based study: Haab et al. revealed a cure rate of 46% and satisfactory result in 81% after a mean follow-up of 4 years in patients presenting with intrinsic sphincter insufficiency. Hassouna et al. [6] reported on a cure rate of 49.3% and a satisfaction rate of 86.3% with a mean follow-up of 3.4 years [7]. Additional-

ly, Chaikin et al. [8] revealed a high cure rate of 67% in 84 out of 251 patients and found a cure/improvement rate of over 90%. Reasons explaining these differences are not clear since our operative technique differs marginally compared to the above-mentioned studies. However, Hutchings et al. [9] recently also found substantially lower cure rates for suspension surgery (34% for colposuspension) after a follow-up of only 12 months. They conclude that their results (also) were 'not as good as reported in textbooks' and recommended larger randomized trials.

The most common complication of the procedure seems to be delayed wound healing: More than 50% of our patients (question 16) recall having suffered from this (mostly quickly resolving) complication, and in the long term a majority of 70% is satisfied or almost satisfied (question 20) – even more with the cosmetic result (question 24–78.3%). We observed a significant decrease of wound infections after avoiding suprapubic tube placement. However, for reasons not understood, many studies do not observe wound-healing problems postoperatively at all, which is surprising since procedures involving both the pelvic and vaginal region carry an increased risk of infection.

In this study, most incontinence recurrences have been observed within 1 year (question 18) as have others. These surgical failures of stress incontinence procedures are most likely due to determining the right sling tension which is subjective. However, we did not see prolonged urinary retention in this study (questions 10 and 19).

By considering failure rate as anything worse than 50% improvement (question 14), our failure rate turned out to be 35%. This rigid criteria for non-success correlates to a 28.3% rate of patients who describe their present situation as 'the same or worse' if compared to that before surgery (question 23). Again, this failure rate appears to be higher than comparable results of similar studies [3–10]. By looking at the type of postoperative incontinence, question 8 suggests a stress-like type of 50%, mixed type of 28.3% and pure urge incontinence rate of 8.7%, which is comparable to what was found by others [3–10] although higher urge incontinence rates may be observed [4].

In summary, using a questionnaire we found comparably low 'true' cure rates but an encouraging 70% patient satisfaction after 3 years in subjects who are approximately 60 years old and who were incontinent for years and who mostly put on weight postoperatively. We need to accept that in severely incontinent women, sling surgery is associated with a considerably high failure rate. Despite that, the substantial improvement in the quality of life of

almost two thirds of the patients during a 3-year follow-up recommends a pubovaginal sling as a treatment option for urinary incontinence – especially in cases of advanced pelvic floor dislocation. However, in less advanced cases it appears to be reasonable to consider less invasive procedures: TVT alone or in combination with additional procedures obviously is an option.

#### A. Questions referring to the time before the operation

1. How long were you incontinent before the operation?
 

a) Weeks	10.8%	
b) Months	13%	
c) Years	63%	No answer 13.2%
2. Did you undergo surgical incontinence procedures before you were treated at the Department of Urology in Jena?
 

a) Yes	28.3%	(once 87%, twice 13%)
b) No	71.7%	
3. How many children have you given birth to?
 

a) 1	19.6%
b) 2	56.5%
c) 3	15.2%
d) More than 3	8.7%

#### B. Questions concerning the present

4. Do you experience (unexpected) urinary loss (medical term incontinence)?
 

a) Yes	73.9%
b) No, I am completely dry at all times	26.1%
5. How much urine do you leak now?
 

a) None	21.7%
b) Few drops	17.4%
c) Mild	41.3%
d) Severe	19.6%
6. Do you now wear any protection from urine leakage (pads and so forth)?
 

a) Yes	41.3%
b) Yes just to be safe since I reckon on possible urinary loss	30.4%
c) No	28.3%
7. If you are wearing pads, how many do you use in a day?
 

a) None	28.3%
b) 0–1	8.6%
c) 1–2	23.9%
d) 2–3	15.2%
e) 3–4	15.2%
f) 4–5	4.4%
g) 5–6	4.4%
h) 6–7	0%
i) More than 7	0%

8. If you do now leak urine, how does it usually occur?
- a) Mostly with coughing, sneezing, straining or heavy lifting 32.6%
  - b) When walking or getting up 17.4%
  - c) Usually not with physical activity but urge occurs suddenly before it can be controlled – so it becomes hard to reach the toilet 8.7%
  - d) Leakage of urine occurs in all of the situations described 28.3%
  - e) Not sure when urine leakage occurs 10.9%
  - f) No urine leakage occurs 19.6%
9. How often do you urinate during the day?
- a) More often than once every 1 h 8.7%
  - b) Every 1–2 h 39.1%
  - c) Every 3–4 h 43.5%
  - d) Less often than once every 4 h 9.7%
10. Do you currently use a catheter to empty your bladder?
- a) Yes 0%
  - b) No 100%
  - c) Occasionally 0%
11. If you are having intercourse, is it painful?
- a) Yes 17.4%
  - b) Sometimes 10.9%
  - c) No 26.1%
  - d) No, but I experience urine leakage during sexual intercourse 6.5%
12. Do you have to strain before voiding?
- a) Always 0%
  - b) Sometimes 26.1%
  - c) Never 73.9%
13. How many times per night do you wake from sleep to urinate?
- a) Not at all 10.9%
  - b) Once 47.8%
  - c) Twice 23.9%
  - d) Three times per night 13.4%
  - e) More than three times per night 0% No answer 4.0%

### C. Look back

14. How much improved is your urine leakage compared to before the sling surgery?

		%	% cumulative
a) 100%	Better	21.7	
b) 90%	Better	12.2	33.9
c) 80%	Better	16.2	50.1
d) 70%	Better	6.5	56.5
e) 60%	Better	4.3	60.9
f) 50%	Better	4.3	65.2
g) 40%	Better	2.2	67.4
h) 30%	Better	4.3	71.1
i) 20%	Better	6.5	78.2
j) 10%	Better	2.2	80.4
k) Same		17.4	
l) Worse than before sling surgery		2.2	

15. Did you have recurrent urinary tract infections after the operation?
- a) Yes 28.3%
  - b) No 71.7%
16. Have you had other complications like delayed wound healing (exudation and/or pus from the wound)?
- a) No 44.5%
  - b) Yes, for 1–2 weeks 10.9%
  - c) Yes, for 2–4 weeks 16.4%
  - d) Yes, for 1–2 months 15.2%
  - e) Yes, for 2–4 months 13.0%
17. When was the suprapubic tube removed?
- a) After about 1 week 26.1%
  - b) After about 2 weeks 34.8%
  - c) After more than 2 weeks 23.9%
  - d) I can't remember 15.2%
18. If you have not remained completely dry when did incontinence return?
- a) 1–6 months 34.8%
  - b) 6–12 months 10.9%
  - c) 1–2 years 4.3%
  - d) 2–3 years 0%
  - e) 3–4 years 2.4%
  - f) More than 4 years 2.0%
19. Did you experience some difficulties when emptying the bladder after the operation?
- a) No 84.8%
  - b) Yes 10.3% No answer 4.9%
- If yes, how long did it last?
- a) About 1 week 45.6%
  - b) About 1 month 30.4%
  - c) About 6 months 2.2%
  - d) More than 6 months 0% No answer 21.8%
20. Overall, how satisfied are you with the results of your surgery?
- a) Completely satisfied without reservation 23.9%
  - b) Satisfied 39.1%
  - c) Almost satisfied 8.7%
  - d) Not satisfied 28.3%

21. Knowing what you now know, would you have this type of surgery again?
- a) Yes 52.5%
  - b) No 17.4%
  - c) I am not sure 26.1% No answer 4.0%
22. Would you recommend the surgery to others?
- a) Yes 58.7%
  - b) No 17.4%
  - c) I am not sure 17.4% No answer 6.5%
23. How would you describe your present situation compared to that before surgery?
- a) Better 71.7%
  - b) Same 23.9%
  - c) Worse 4.4%

24. Are you satisfied with the cosmetic result of the operation?
- a) Completely satisfied without reservation 43.5%
  - b) Satisfied 34.8%
  - c) Almost satisfied 8.7%
  - d) Not satisfied 6.5% No answer 6.5%
25. Have you had any surgical procedure for recurrent incontinence after you underwent surgery in Jena?
- a) Yes 15.2%
  - b) No 82.6% No answer 2.2%

26. Have you noticed body weight changes since you were operated in Jena?

Time at surgery		Present	
Normal body weight	41.3%	Normal body weight	28.3%
Overweight	58.7%	Overweight	71.7%
Underweight		Underweight	

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## Editorial Comment

### Pubovaginal Cutaneous Fascial Sling Procedure: Is It an Advantageous Surgical Option?

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In this study the authors report their experience with the proposal of a pubovaginal cutaneous fascial sling procedure for the treatment of female stress urinary incontinence (SUI). In this study in particular, the surgical technique, that seems to be laborious and more time-consuming than a traditional autologous sling, shows no encouraging results because almost one third of the patients only report to be dry at all times and because in several cases the principal complication is characterized by the appearance of wound infection.

Currently, long-term data suggest that sling procedures with autologous material produce a cure rate of approximately 80% and an improvement rate of 90% [1]. At this

point it is obligatory to consider the possible functional causes of not satisfying outcomes obtained by the cutaneous fascial sling technique and finally to analyze if the proposal of this procedure is advantageous in comparison with other slings using autologous materials. In relation to the first point, it seems to be evident that the analysis of the functional outcome could be helped if clear and well-informed preoperative urodynamic data were reported in this paper. In fact, traditionally, slings have been used in women who underwent one or more previously failed incontinence operations and have poor urethral sphincter function. In particular, the purpose of urodynamics in patients with SUI is especially represented by the possibil-

ity to diagnose the type of stress incontinence and to ensure that the patient has a reasonable and safe bladder capacity. The diagnosis of SUI is best made with measurement of abdominal leak point pressure (ALPP). Recently on this subject some authors suggested that the preoperative ALPP may represent a significant and easily quantifiable predictor of successful outcome [2]. Using this parameter, a 93% success rate was achieved in patients who underwent anterior vaginal wall sling with an ALPP of  $\geq 50$  cm H<sub>2</sub>O. In this paper the authors did not verify the urethral sphincter function by urethral pressure profilometry and by ALPP and therefore it is not possible to identify the real functional cause of failures due to pubovaginal cutaneous fascial sling procedure.

In relation to the surgical technique there are several points that should be stressed. First of all, this operation is not invasive and it should be performed only for mixed type II/III SUI in patients with pure type III SUI as generally suggested for the pubovaginal sling procedure. Secondly, the placement of the sling on a suture line of the previously longitudinally formed roll of vaginal epithelium could be a factor in developing severe local infection

while a vaginal shortening due the resection of vaginal wall may cause sexual disturbances during intercourse as in any case reported from 17.4% of patients interviewed by questionnaire. Finally, it is not clear how the amount of tissue positioned in the suburethral space acts to support the bladder neck. Indeed if the longitudinally formed roll of vaginal epithelium works suspending and elevating the bladder neck, why do 10–41 % of patients reveal to be affected by mild or severe SUI in the follow-up period? At this point it seems to be evident that the results reported by pubovaginal cutaneous fascial sling are not comparable with those described in the literature by others using a traditional pubovaginal sling with rectus fascia or fascia lata and that this operation calls for an important retrospective functional evaluation to improve the outcome.

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