

# Complications of sub-urethral sling procedures

## Powikłania operacji wszczepienia taśm podcewkowych

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### Abstract

*Approximately one-third of the female population has been estimated to suffer from stress urinary incontinence. Surgical management of this disorder has been an area of ongoing innovation since the beginning of the 20th century. Better understanding of the underlying patomechanisms resulted in the invention of suburethral sling, that proved to be very effective in terms of the cure rates. The introduction of sling techniques also caused a considerable reduction of the rates of intra- and postoperative complications of incontinence treatment. Unfortunately, modern anti-incontinence surgery continues to be associated with a high risk of both, perioperative morbidity and long-term adverse outcomes, even with the recently introduced single-incision techniques. The article focuses on intra- and postoperative complications of sling techniques in anti-incontinence surgery. Both, common and rare adverse outcomes are widely discussed.*

Key words: **complications / stress urinary incontinence / suburethral slings /**

### Streszczenie

*Szacuje się, że ok. jedna trzecia populacji dorosłych kobiet choruje na wysiłkowe nietrzymanie moczu. Od początku dwudziestego wieku stosuje się coraz nowocześniejsze techniki leczenia operacyjnego tej patologii. Zrozumienie patomechanizmów wywołujących nietrzymanie moczu doprowadziło do wynalezienia taśmy podcewkowej, która okazała się bardzo skuteczną metodą leczenia. Wprowadzenie technik slingowych znacząco zmniejszyło także odsetki powikłań śród- i pooperacyjnych leczenia wysiłkowego nietrzymania moczu. Niestety, te nowoczesne metody nadal związane są z dużym ryzykiem wystąpienia zarówno komplikacji okołoperacyjnych, jak i działań niepożądanych występujących odległe, nawet w przypadku niedawno wprowadzonych taśm wszczepianych przy zastosowaniu minimalnego nacięcia (tzw. mini-slings). W artykule skupiono się na śród- i pooperacyjnych powikłaniach operacji wszczepienia taśmy podcewkowej jako metody leczenia wysiłkowego nietrzymania moczu. Szeroko przedyskutowano zarówno powikłania częste, jak i te rzadko występujące.*

Słowa kluczowe: **powikłania / wysiłkowe nietrzymanie moczu / taśmy podcewkowe /**

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Otrzymano: 09.10.2013  
Zaakceptowano do druku: 20.01.2014

Stress urinary incontinence (SUI) is defined as unintentional leakage of urine on exertion. The epidemiology of SUI varies depending on the studied population. Many authors reported an incidence of stress incontinence reaching 29%, which is similar to the Polish and WHO statistics [1, 2]. A Chinese research, interesting due to a very large sample-study (20.000 responders), showed that the incidence of urinary incontinence among women was over 30% [3]. However, there also exist reports showing a lower incidence of SUI (12% -19% in Pakistani and Mexican reports) [4, 5].

There are numerous risk factors associated with SUI. Age, weight, parity and mode of delivery are particularly important [6]. The older the population and the longer the life expectancy, the higher the prevalence of SUI. The number of vaginal deliveries correlates positively with the risk of both SUI and overactive bladder (OAB) [7]. A similar link has been proven with increased body mass. In a noteworthy study in which risk factors of SUI among nuns were analyzed, increased BMI was shown to be the factor most strongly associated with SUI risk after eliminating the influence of labor [8, 9].

SUI as a pathology was first described at the beginning of the 20<sup>th</sup> century [10]. During the next fifty years many anti-incontinence surgical procedures were developed. Some of them proved to be very effective (i.e. the Burch colposuspension). Still, a high rate of perioperative morbidity was an incentive to seek new interventions.

The modern sling techniques stem from the integral theory of female urinary incontinence, introduced at the beginning of the 90's [11].

In 1993, Petros and Ulmsten described a novel technique of surgical management of SUI- retropubic insertion of the tension-free vaginal tape (TVT) [12].

A few years later, modifications of the TVT were invented - the transobturator route: outside-in and inside-out technique was introduced [13, 14].

The next step in surgical anti-incontinence techniques was the introduction of minimally-invasive midurethral sling (SIMS - single-incision mini slings). It is a polypropylene tape inserted through a single vaginal incision and attached to the pelvic fascia ("U-type" fixation) or the obturator fascia ("H-type", hammock position) [15].

## Complications of anti-incontinence surgery

Suburethral slings have become the golden standard in the management of SUI. They are commonly recognized as the safest and most effective treatment method. Still, they are not completely free of complications.

The complications can be divided into intra- and post-operative ones, with some very long-term outcomes.

### Bleeding and hematoma

Bleeding and hematoma in the dissected tissues are most common intraoperative complications. A meta-analysis conducted by Kuuva showed an incidence of retropubic hematoma after TVT procedure to be 1.9% [16].

In a meta-analysis performed in 2012, which included 20 randomized controlled trials comparing the two approaches, the TVT-O was associated with a relative risk of hematoma decreased by 63% [3]. Similar outcomes, proving a higher risk of hematoma

with the retropubic approach, were obtained by authors of a meta-analysis of 33 randomized studies confirmed in further analysis, including six other studies [17, 18].

When TVT and TVT-Secur® ("U-type") were compared, no difference in the rates of significant bleeding was found [19]. Serious hemorrhagic complications were also sporadically reported during insertion of the mini sling [20].

### Urinary bladder perforation

Injury of the bladder is one of the most significant complications of anti-incontinence techniques. It is estimated that it occurs in about 4% of retropubic sling insertions [16, 21].

The transobturator tapes, which were to minimize the rates of bladder injury, truly proved to limit the risk [22]. In a meta-analysis performed by Latthe, it was estimated that the risk is minimal in case of the transobturator techniques (OR 0.12; 95% CI 0.05-0.33) [23].

Barber also proved that this complication occurred less often in the transobturator method when compared to the retropubic [24]. In an analysis conducted by Rechberger, comparing retropubic and transobturator slings, the rate of bladder penetration in the retropubic approach was 6.5%, whereas no such event was noted in the transobturator route [25].

### Postoperative voiding dysfunction

Voiding dysfunction after treatment of SUI encompasses a wide spectrum of problems, from minor voiding difficulty, through increased postvoid residual urine volume, to postoperative urinary retention.

In a meta-analysis by Kuuva, voiding dysfunction was the most common complication of the retropubic sling procedure – mild symptoms were manifested by 7.6%, whereas complete urinary retention – by 2.3% of the patients [16]. In another study, significant urinary retention occurred within 3 months in about 10% of patients after retropubic sling. Major retention affected 2.6% patients [26].

In the previously cited meta-analysis it was shown that the odds ratio (transobturator tapes vs. retropubic tapes) for this complication was 0.55 (95% CI 0.31-0.98) [23]. In a research comparing the midurethral transobturator sling (TVT-O) with a mini sling (TVT- Secur®), no statistically significant difference with regard to this complication was proved [27, 28].

Certainly, the modern technique is associated with a lower risk of voiding dysfunction than traditional methods (i.e. Burch colposuspension) [29].

### OAB

De novo urgency is one of the complications that contribute to the perception of the postoperative effect. Its incidence varies depending on the type of sling.

In a research investigating both, efficacy and adverse effects of the TVT-O procedure, 5 years post-surgery the rate of subjective and objective cure was 90%, but de novo OAB occurred in 24% of the patients [30].

In a study analyzing 276 patients who were treated with retropubic (TVT, Sparc) and transobturator tapes (Monarc), a significantly higher rate of OAB was found in the case of retropubic tapes (33% for TVT, 17% for Sparc) vs. 8% in Monarc tape [31].

Serati conducted a 10-year prospective observation of patients treated with the TVT. OAB was found in 30.1% of patients 3 months post-surgery and in 18.9% 10 years post-surgery. In 43.8%, urgency did not resolve on antimuscarinic treatment [32].

The introduction of mini slings was aimed at improving the safety of sling procedures. Whereas the incidence of bladder perforation decreased, the risk of de novo urgency proved to be only slightly lower than in the case of traditional slings. In a research by Cornu, the incidence of failure was 42% and the rate of de novo OAB reached 10% [33].

According to some authors, age is one of the risk factors for a development of OAB after sling insertion. In a study comparing the outcomes and complications of TVT-O in women of various age, the risk of OAB was almost 12% in patients over 70 years old and only 4.7% in younger women [34].

It is raised that the incidence of urgency is still lower after slings than after other anti-incontinence procedures (i.e. colposuspension) [35].

### Postoperative pain

Pain after anti-incontinence surgery is associated with damage to muscles, nerve ends or forming of postoperative hematomas. In the latter case, pain is usually temporary. Otherwise, however, it causes a permanent handicap and dissatisfaction with the treatment.

Postoperative pain varies depending on the type of sling inserted. In the meta-analyses performed by Latthe and Barber it was emphasized that the risk of postoperative pain was significantly higher after inserting the transobturator tapes when compared to the retropubic method (OR 8.28; 95% CI 2.7-25.4) [23, 24]. In the study conducted by Kuuva, pain was observed only in 0.3% of women who had undergone the TVT procedure [36].

Currently, most authors agree that pain is caused by damage to the adductor muscles and irritation of the obturator nerve branches, hence it is associated with the necessity to pass through the obturator foramen [37].

Because of the relatively high rate of postoperative pain after the transobturator procedure, certain modifications of the method, aimed at diminishing this adverse effect, are being sought [38]. Pain manifesting as dyspareunia occurred less often after insertion of the mini slings when compared to the standard tapes (0-5%) [39].

### Vaginal erosion of the sling

Another adverse outcome that may occur after sling insertion is its vaginal erosion. One of the higher incidences was observed by Yamada, who associated it with the type of the material (ObTape) [40]. In this research, vaginal extrusion occurred in 13% of patients. The result caused withdrawal of the sling.

In a research that investigated vaginal wall reconstruction with sling preservation, it was estimated that erosion occurred in 0.2% of patients after TOT [41]. In the meta-analysis of 1500 surgeries, the incidence of erosion and defect healing of the vaginal wall was 0.7% [16].

In the meta-analysis conducted by Latthe, the authors indicated that the transobturator approach conferred a higher risk of vaginal exposure of the sling than the retropubic technique

(OR 1.96; 95% CI 0.87-4.39) [23]. In a study comparing IVS-02 and IVS -04, the incidence of sling erosion was alike in the two techniques (2.5% of cases) [25].

### Unsatisfactory treatment results

The most important aspect of anti-incontinence surgery is its effectiveness. It is now commonly agreed that recurrent SUI is a complication of anti-incontinence surgery. After eliminating technical aspects, sometimes the cause of failure remains unknown.

The success rates of SUI treatment are high and, according to the majority of reports, the effects persist for many years. In a prospective observational study concerning the effectiveness of the TVT it was shown that the 7-year objective cure rate was 89.8%, whereas the subjective cure rate was 82.4% [42].

Unfortunately, not all researches indicate such a high success rate in the long-term. In an observational study comparing the effectiveness of retropubic and transobturator slings 5 years post-surgery, the objective cure rate was more than 70%, whereas only 60% of women were satisfied with the result of the operation. The discrepancy was caused not only by incomplete effect, but also by postoperative complications [43].

In the previously mentioned meta-analysis, confronting the transobturator and retropubic sling, no statistically significant differences were observed in the cure rates (OR 0.85; 95% CI 0.60-1.21) [23]. Similar outcomes were obtained by Rechberger [25].

Most of the analyses, however, show minor differences in post-surgery cure rates, depending on the surgical technique. When the two types of transobturator approaches are compared, it seems that the "in-out" system allows for a slightly higher cure rate and reduced risk of complications, that are mainly attributable to the more excessive dissection of tissues in the "out-in" system [22].

Improved safety of sling procedures, owing to the introduction of mini slings, was unfortunately obtained at the expense of therapeutic efficacy. According to most authors, subjective cure rate was 69-89% [44, 45], and the objective success rate was even lower (52 and 84%) [46].

Trials are made to improve the success rates of surgical techniques, mainly by modifying the procedures in order to obtain higher success rates [47]. Still, some patients remain dissatisfied with the improvement of life comfort after management of urinary incontinence.

### Rare complications

One of the rare intra-operative complications of retropubic sling procedure is bowel perforation. One of such cases was described in a woman with pre-existing undiagnosed inguinal hernia [48, 49].

Similar complication, in which double bowel perforation was accompanied by bladder injury, was reported by Danish researchers. In this case, visceral damage resulted in serious hemodynamic disturbances [50].

Another rare complication is an abscess in the operated region. It may develop in the retropubic space as well as the abdominal wall, i.e. abscess of the fascia and rectus abdominis muscle that occurred after retropubic sling insertion or in the region of the obturator foramen and thigh paraurethral sulcus

after inserting TOT [51, 53].

Other rare complications that are worth mentioning include a myofibroblastic tumor of the urinary tract following a TVT in a woman suffering from neurofibromatosis [54] and osteomyelitis following TVT-O [55].

## Summary

The complications of sling procedures are frequent - they occur in up to 40% of cases. Minor voiding difficulties that resolve with expectant management, transient pain and intra-operative issues of minimal clinical significance constitute the majority of them. However, some of those complications, including chronic pain, detrusor instability or insufficient therapeutic effect, may become indications for surgical re-intervention.

Taking the abovementioned problems into consideration, it seems to be of major importance to improve diagnostic techniques, including ultrasound examinations in different presentations, and to propose optimal treatment, including conservative management.

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## Źródło finansowania:

Praca nie była finansowana przez żadną instytucję naukowo-badawczą, stowarzyszenie ani inny podmiot, autorzy nie otrzymali żadnego grantu.

## Konflikt interesów:

Autorzy nie zgłaszają konfliktu interesów oraz nie otrzymali żadnego wynagrodzenia związanego z powstawaniem pracy.

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Georg Fabian et al. *Complications of sub-urethral sling procedures.*

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