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The impact of post-urethroplasty erectile dysfunction on the quality of life and treatment satisfaction

Adam Kałużny, Jakub Krukowski, Mikołaj Frankiewicz, Marcin Matuszewski

Medical University of Gdańsk, Department of Urology, Gdańsk, Poland

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Corresponding author
Adam Kałużny
Medical University of Gdańsk
Department of Urology
17 Smoluchowskiego Street
80-214 Gdańsk, Poland
phone: 48 583 493 160
akaluzny@gumed.edu.pl

Introduction The aim of this article was to assess the influence of sexual disorders after urethroplasty on patient's quality of life (QoL) and satisfaction of treatment.

Material and methods We studied 106 sexually active patients who underwent urethroplasty due to urethral stricture. Patients completed the Urethral Stricture Surgery – Patient Reported Outcome Measure (USS – PROM) and International Index of Erectile Function (IIEF-5) questionnaires before and after the treatment. Spearman rank correlations were used for correlation analyses. Multiple linear regression and ordinal logistic regression analyses were used for evaluating the influence of lower urinary tract symptoms (LUTS) and IIEF-5 scores on EuroQol-5D (EQ-5D) index, EuroQol-Visual Analogue Scale (EQ-VAS), and satisfaction with treatment. Both LUTS and IIEF-5 scores were independent, significant predictors of EQ-VAS in the multiple linear regression model.

Results Mean follow-up was 9 months (3–24). Reduction of LUTS and micturition improvement in the USS-PROM questionnaire after the surgery was found in 90 patients (85%). The average IIEF-5 score in the whole group did not change significantly, but in 39 cases (37%) worsened, and in 42 (39%) improved. Spearman's rank-order correlation indicated a significant positive correlation between improvement in IIEF-5 and general QoL in EQ-5D and also a positive correlation between improvement in IIEF-5 and improvement in EQ-VAS, which was also statistically significant (rho = 0.377, p <0.001).

Conclusions Urethral surgery can influence sexual performance. The appearance of sexual dysfunction negatively affects the patient's quality of life, regardless of the effective restoration of the urethral patency and reduction of LUTS.

Key Words: erectile function ‹› urethral stricture ‹› urethroplasty ‹› quality of life

INTRODUCTION

Urethroplasty is the 'gold standard' for the treatment of urethral stricture disease. The goal of the surgery is to restore urethral patency, which should result in the resolution of bothersome symptoms. The success is usually assessed by a physician based on the results of uroflowmetry, urethroscopy, or other imaging tests. Another interesting and more general measure to evaluate the result is the need for any further procedure for the urethral stricture. These methods try to objectively assess the effectiveness of surgical treatment but do not take into account the patient's quality of life or his satisfaction.

In 2011, Jackson developed the Urethral Stricture Surgery Patient-Reported Outcome Measure (USS-PROM) questionnaire, which is designed to evaluate the results of urethroplasty from a patient's perspective [1]. The questionnaire has undergone the adaptation process in many countries and is probably the most commonly used PROM in men undergoing urethroplasty. It examines the occurrence of lower urinary tract symptoms (LUTS), patient satisfaction, and quality of life (QoL).

Even though the male urethra is a part of the penis and plays a substantial role in ejaculation, the sexual problems related to the urethral stricture are not always taken into consideration in the treatment assessment. Therefore, from this point of view, the USS-PROM questionnaire has a disadvantage as it does not contain questions related to sexual life. The purpose of our study was to determine whether the appearance of sexual dysfunction after urethroplasty can negatively affect both the patient's QoL and his assessment of the results of surgery, regardless of effective stricture removal and elimination of urinary tract symptoms.

MATERIAL AND METHODS

Study population

We retrospectively analyzed the data of 137 consecutive patients after successful surgical treatment of urethral stricture (perceived by a urologist as no need for further intervention) who filled in the USS-PROM and International Index of Erectile Function (IIEF-5) questionnaires both before and after the surgery. Patients with no interest in sexual activity were excluded from the study (n = 31).
Before the surgery, in addition to questionnaires, we used uroflowmetry and urethrography to assess the stricture. Urethral sonography or magnetic resonance imaging were used as complementary studies in selected cases. Postoperative evaluation was performed after 3, 6, 12, and 24 months. The follow-up examination, in addition to the interview, included uroflowmetry and repeated completion of questionnaires. If the patient had more than one postoperative assessment during the follow-up period, the results of the last visit were considered.

Questionnaires

We used two questionnaires: USS-PROM and IIEF-5. The analyzed USS-PROM consists of three domains: The first domain contains six questions concerning LUTS, scored from 0 to 4 (a total score 0- least symptomatic to 24- most symptomatic), one LUTS-specific quality of life question (”Overall, how much do your urinary symptoms interfere with your life?”) scored from 0 to 3, and a visual scale to assess the urine stream (Peeling's voiding picture). The second domain contains two questions about patient satisfaction with the results of the operation: ”Are you satisfied with the outcome of your operation?” and ”If you were unsatisfied or very unsatisfied is that because …”. The third domain contains five questions about overall health status and QoL, taken from the EuroQol-5D questionnaire (EQ-5D) along with the analog quality scale of the EuroQol-Visual Analogue Scale (EQ-VAS). The IIEF-5 questionnaire consists of five questions addressing sexual performance, scored from 1 to 5. A total score below 22 is an indicator of erectile dysfunction (ED).

Statistical analysis

Data were analyzed using Python with packages Numpy, Pandas, Scipy, and Statsmodels. Plots were made using Seaborn. A small amount of random variation was added to scatterplots to facilitate the visualization of discrete distributions. Means and standard deviations were calculated for LUTS and IIEF-5 scores and EQ-5D index before and after treatment. Spearman rank correlations were used for correlation analyses. Multiple linear regression and ordinal logistic regression analyses were used for evaluating the influence of LUTS and IIEF-5 scores on the EQ-5D index, EQ-VAS, and satisfaction with treatment. Regression analyses were performed in R using the MASS package.

RESULTS

Data were available for 106 patients. A mean follow-up after the surgery was 9 months (3–24). Patients' characteristics are presented in Table 1.
The mean LUTS score decreased significantly after urethroplasty (Table 2). Before the operation 80 of 106 patients (75%) presented with ED, based on the results of IIEF-5. This number decreased to 69 (65%), however, 4 (4%) patients acquired de novo ED. The mean IIEF-5 score in the whole group did not change significantly, but in 39 cases

Table 1. *Baseline patients' characteristics*

n	106
Age, median (range)	49 (19–82)
Etiology, n (%)	
Iatrogenic	60 (56.6)
Traumatic	26 (24.5)
Hypospadias	12 (11.3)
Idiopathic	6 (5.7)
Lichen sclerosus	2 (1.9)
Stricture location, n (%)	
Bulbar	66 (62.3)
Penile	34 (32.1)
Peno-bulbar	5 (4.7)
Membranous	1 (0.9)
Procedure, n (%)	
Oral mucosa graft	44 (41.5)
End-to-end	37 (34.9)
Penile skin flap	16 (15.1)
Staged urethroplasty	9 (8.5)

Table 2. *Postoperative changes in mean LUTS score, QoL, and IIEF-5 score*

	Preoperative (mean ±SD)	Postoperative (mean ±SD)	
LUTS score	15.24 ±6.13	6.59 ±6.28	p <0.001
EQ-5D index	0.85 ±0.14	0.93 ±0.09	p = 0.29
EQ-VAS	62.41 ±22.03	74.07 ±20.57	p <0.001
IIEF-5	14.54 ±7.69	15.23 ±8.04	p = 0.20

LUTS – lower urinary tract symptoms; QoL – quality of life; IIEF-5 – International Index of Erectile Function; EQ-5D – EuroQol-5D; EQ-VAS – EuroQol-Visual Analogue Scale

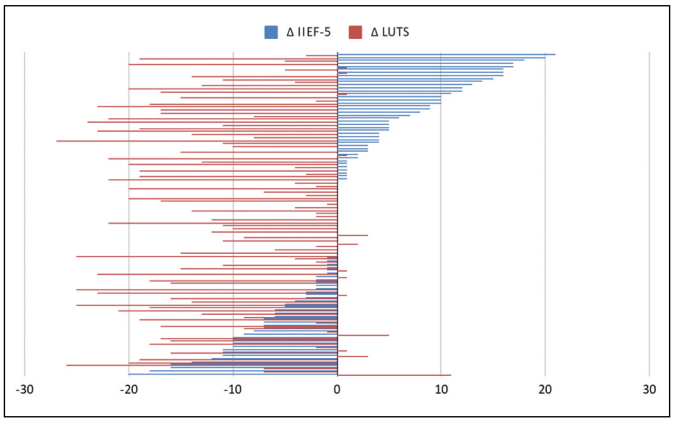

Figure 1. *The ratio of postoperative changes in IIEF-5 (blue) and LUTS (red) score in particular patients (the order according to the change in the IIEF-5 score).*

IIEF-5 – The International Index of Erectile Function questionnaire; LUTS – Lower urinary tract symptoms score of the Urethral Stricture Surgery Patient-Reported Outcome Measure questionnaire (USS-PROM)

(37%) it worsened, and in 42 (39%) improved (Figure 1). Generally, 94 (89%) patients were satisfied or very satisfied with the results of surgery.

We used two methods to assess the correlation between postoperative changes in sexual performance and QoL or satisfaction.

A Spearman's rank-order correlation indicated a positive correlation between improvement in IIEF-5 and improvement of general QoL in EQ-5D, which was statistically significant (rho = 0.371, p <0.001), and also a positive correlation between improvement in IIEF-5 and improvement in EQ-VAS, which was also statistically significant (rho = 0.377, p <0.001) (Figure 2). We also found a significant positive correlation between improvement in IIEF-5 and general satisfaction. The correlation was low but statistically significant (rho = 0.216, p <0.05).

A postoperative decrease of LUTS score significantly correlated with patients' satisfaction (rho = -0.526, p <0.001) as well as with their QoL in the EQ-5D questionnaire (rho = -0.402, p <0.001).

Additionally, three regression models were evaluated to determine the correlation between LUTS and sexual performance and QoL or satisfaction. For both the EQ-5D index and EQ-VAS models, multiple linear regression (MLR) was used. Since satisfaction with treatment was measured on four discrete levels, ordinal logistic regression (OLR) was used for this outcome. For all models, the predictors included LUTS scores and IIEF-5 results as well as their interaction.

The EQ-VAS score improved significantly after the treatment (p <0.001). A postoperative LUTS score

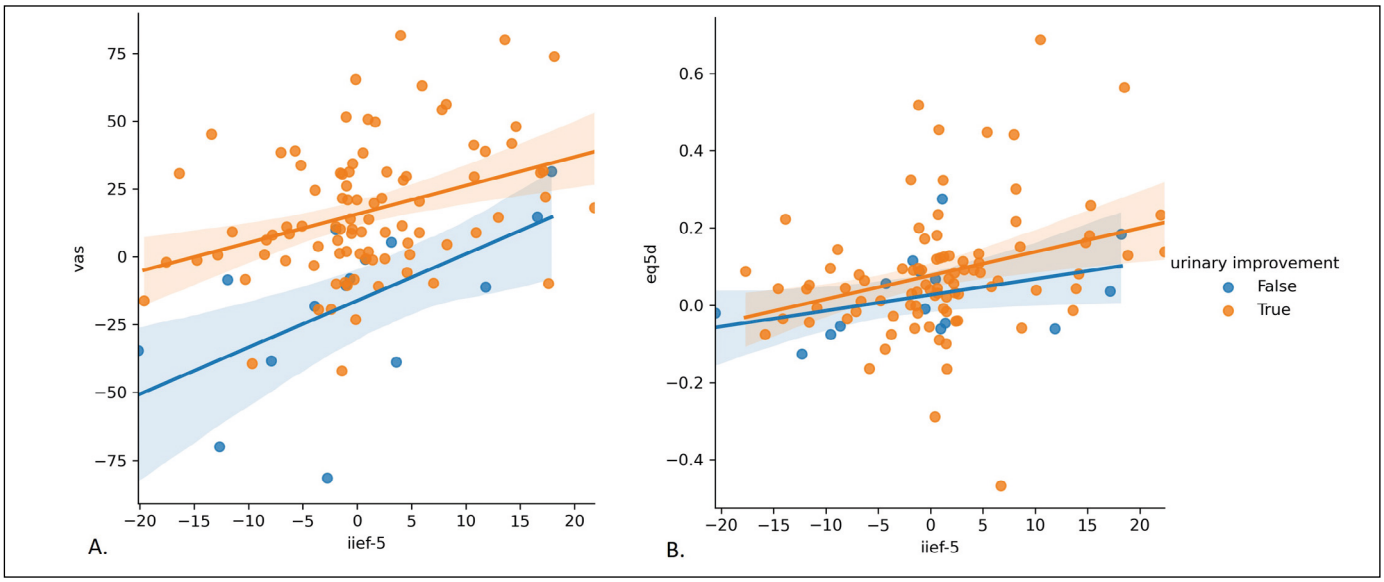

Figure 2. *The correlation between postoperative IIEF-5 score and quality of life (A – EQ-VAS; B – EQ-5D).*

VAS – EuroQol-Visual Analogue Scale (EQ-VAS); IIEF-5 – The International Index of Erectile Function questionnaire; EQ-5D – EuroQoL-5D

was an independent significant predictor of EQ-VAS ($\hat{I}_{\text{¸}}$ = -1.72; p <0.001). as well as IIEF-5 score ($\hat{I}_{\text{¸}}$ = .63; p <0.05). The EQ-5D index did not improve significantly (p = 0.29). In the model of regression predicting overall quality of life in EQ-5D, none of the two predictors (LUTS, IIEF-5) was statistically significant.

In the model predicting satisfaction with treatment (2nd domain of USS-PROM), LUTS scores emerged as a single statistically significant predictor of satisfaction with treatment (p <0.01), in contrast to the IIEF-5 score (p >0.5). A one-point increase in LUTS scores was associated with a 16% increased odds of lowering satisfaction with treatment by one level (OR = 0.859).

DISCUSSION

Sexual dysfunction can be a significant complication of urethral stricture and urethroplasty. It depends, among others, on the mechanism of urethral injury, particularly pelvic fractures, but also previous treatment, patient's age, and concomitant diseases. In the analyzed group, 75% of patients had at least mild ED assessed in IIEF-5 before the surgery, which is even more than reported by other researchers [2]. The incidence and severity of de novo sexual dysfunction after urethroplasty vary considerably between studies. In the postoperative period, deterioration of erection may affect up to 53% of patients after anastomotic urethroplasty and 33% after substitution [3]. In a large proportion of patients, the impairment of sexual function is transient and withdraws, usually within the first year after surgery [3–8]. It is probably a result of the reduction of edema and inflammation, pain relief, sensation improvement as well as psychological factors [2].

In our study, in the whole analyzed group, the average IIEF-5 score did not change significantly after the treatment. The percentage of patients with ED (IIEF-5 score <22 points) decreased from 75% (80/106) before surgery to 65% (69/106) after. However, there is a group of patients in which some deterioration of erection occurred (37%), and among them 4 patients with de novo erectile dysfunction. A similar proportion of patients (39%) felt the improvement of erections (see Figure 1). The overall score is a result of these changes. Other researchers report similar results [9]. It means that urethroplasty may significantly affect erectile function but this influence is not unidirectional.

The occurrence of ED has a significant negative impact on the QoL, and even increases the incidence of depressive symptoms [10, 11]. A similar effect is observed in patients experiencing sexual dysfunction after urethral surgery. We observe a significant correlation between sexual performance and postoperative QoL, on the EQ-VAS and EQ-5D scale, both in the entire study group and in the group of patients who obtained a reduction of urinary discomfort assessed in the first part of the USS-PROM (85% of patients). The MLR analysis also showed that the IIEF-5 score is an independent predictor of QoL assessed on the EQ-VAS scale, regardless of the severity of LUTS. A postoperative deterioration of erectile function may, therefore, reduce the QoL to such an extent that the patient feels worse after the surgery that was assessed as successful from the urologist's point of view. However, when we use the EQ-5D scale to assess the QoL, in the MLR model, neither LUTS score nor IIEF-5 is an important predictor of the EQ-5D score. We have also not found a significant change in the EQ-5D score after the surgery. Unfortunately, this shows that the EQ-5D scale is not specific for assessing the QoL in patients with urethral stricture. This stands in line with the results of Chung, who also showed that generic health QoL indicators like EQ-5D are less responsive in the assessment of urethral stricture surgery [12].

In the study group, we found a significant but low correlation between the IIEF-5 result and patient satisfaction with the procedure. Moreover, in the OLR analysis, patient satisfaction did not depend on IIEF-5 changes but only on LUTS reduction. In our opinion, this may be because the question of satisfaction with the procedure is very general and probably the most subjective in the entire USS-PROM questionnaire. Other studies indicate that postoperative sexual dysfunction can affect the patient's satisfaction [4, 7, 13].

The main limitation of our study is the heterogeneity of the studied group in terms of stricture location or type of performed surgery. Thus, we cannot prove, which type of urethroplasty or which stricture location carries the highest risk of postoperative ED.

CONCLUSIONS

Urethroplasty can influence erectile function and sexual performance. The appearance of sexual dysfunction negatively affects the patient's QoL, regardless of the effective restoration of the urethral patency and reduction of LUTS. The aspect of sexual function should always be an important point of discussion with patients before the surgery.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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