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ORIGINAL PAPER

Outcomes of transperineal reanastomosis as a salvage treatment for recurrent vesicourethral anastomosis stenosis after radical prostatectomy

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Summary *Purpose: To evaluate transperineal reanastomosis (TRPA) combined with incontinence surgery as a complex treatment for recurring vesicourethral anastomosis stenosis (VUAS) after radical prostatectomy (RP).*
Methods: Retrospective analysis of 8 patients who underwent TRPA for recurring VUAS. Detailed preoperative and follow up data were assessed.
Results: Mean follow up lasted 47 months (range 17-77) with mean age being 63.4 years (range 61-70). All patients achieved patency and 87.5% (7/8) maintained it to the end of follow up. However, four of them required additional procedures to retain patency. Six underwent incontinence surgery – artificial urinary sphincter (AUS) implantation – after which one cuff erosion occurred. In the end 62.5% (5/8) of patients achieved patent urethra and continence.
Conclusions: TRPA combined with incontinence surgery is a reasonable treatment for patients with recurrent VUAS.
Nonetheless, this is a set of difficult surgeries that may ultimately end in failure, i.e. the inability to restore urethral patency, urinary incontinence or urinary diversion, hence they should be performed by experienced surgeons.

KEY WORDS: Transperineal reanastomosis; Vesicourethral anastomosis stenosis; Radical prostatectomy complications.

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INTRODUCTION

Prostate cancer is the second most common cancer in men worldwide (1). With the rise of robot-assisted laparoscopic approach to *radical prostatectomy* (RP), the frequency of complications has been declining, one of them *being vesicourethral anastomosis stenosis* (VUAS) (2). Though rare, it is a serious condition of complicated nature. Patients usually seek medical help upon having problems with micturition post-prostatectomy. In more severe cases it may lead to acute urinary retention and require urgent care.
Endoscopic procedures remain first line treatment that can be repeated if needed. According to a recently published meta-analysis by *Delchet et al.* their overall success rate is between 62.9% and 72.8% with a negative influence on the outcomes of previous radiotherapy (3). If the transurethral approach fails, the next line is open de novo reconstruction (reanastomosis) which can be performed via abdominal, abdominoperineal or transperineal approach. All VUAS treatment may aggravate existing urinary incontinence or cause one to occur de novo which patients should always be informed about before undergoing any VUAS-related surgery. Following that, by consenting to the treatment of VUAS, the patient should be prepared for the necessity of further treatment for urinary incontinence.
The aim of our study was to retrospectively evaluate the outcomes of *transperineal reanastomosis* (TPRA) as a salvage treatment option for a selected group of patients who still suffer from VUAS after either repeated, unsuccessful endoscopic procedures or the recurrence of VUAS after prior reanastomosis.

METHODS

The study was designed as a retrospective case series study. We searched our medical records database for patients who underwent TPRA between 2016 and 2022. Then, we collected the data regarding their medical history as well as cancer treatment history. Follow up included evaluation of continence, sustenance of patency, and need for additional procedures. All patients were treated with a transurethral procedure at least once prior to TRPA. All patients had been informed and fully accepted the possibility of subsequent urinary incontinence after TRPA. Patency was evaluated with *retrograde urethrogram* (RUG) and *voiding cystourethrogram* (VCUG). In case of any doubt, endoscopic evaluation of lower urinary tract was performed.

Surgical technique

Patient is placed in a lithotomy position. Through a median perineal incision the bulbous urethra is visualized. Bulbocavernosus muscles are cut, and the bulb is mobilized both distally and proximally. Both arteries of bulb of penis (if still existing) are cut and ligated. The urethra is cut off at the distal end of stenosis - at the line between bulbous and membranous urethra, at the level of the diaphragm of pelvis. A flexible cystoscope is inserted through the cystostomy into the bladder neck. The scar tissue is incised under visual guidance of the cystoscope light. All fibrous tissue is dissected, and the patency of the newly formed vesical orifice is tested with 30Fr bougie. The scar tissue

around the bulbous urethra is dissected as well. Eight Polysorb (5/0) sutures are placed on the bladder and the urethra, and the knots are tied tension-free. After checking for leaks the 16Fr Foley transurethral catheter is placed. Via a separate incision a Redon drain is installed with the end close to the anastomosis. The wound is closed in three layers with absorbable, running 3/0 suture. The skin is closed using absorbable, interrupted 3/0 sutures. Finally, a 16Fr suprapubic catheter is placed (2, 4).
After three to four weeks RUG and VCUG are performed and, if there is no leakage, both catheters are removed.

Results

Eight patients underwent TRPA between 02/2016 and 05/2022, all performed by the same surgeon (MS). Patients' detailed overview is presented in Table (1). All patients received previous VUAS treatment with two having undergone open reanastomosis via abdominal approach. All of them suffered from complete erectile dysfunction. One patient underwent *artificial urethral sphincter* (AUS) placement before TRPA, which was complicated by cuff erosion and later AUS removal. All patients presented with a patent anastomosis in RUG and VCUG post-TRPA. All patients had a history of previous treatment with multiple transurethral procedures, including *direct visual internal urethrotomy* (DVIU), urethral dilatation, which were all failed. The median stenosis length estimated in urethrography was 28 mm.
Table (2) presents detailed overview of each patient's treatment history and follow up. All patients were incontinent after TPRA which was to be expected. Half of them needed additional intervention due to stricture, after which all of them but one are stricture-free. Out of seven patients with patent urethra six were willing to treat urinary incontinence and were treated with AUS implantation. There was one case of urethral erosion and required AUS removal. He is scheduled for another AUS to be implanted. The remaining 5 patients are socially continent. One patient after

Table 1.
Patients' characteristics.

	Number of patients	8
	Mean age (years)	63.4 (range 61-70)
	Mean follow up time (months)	47 (range 17-77)
Approach of RP	Open	5
	Laparoscopic	3
	History of radiotherapy	2
T staging	2a	1
	2c	5
	3a	1
	3c	1
Gleason score	5 (2+3)	2
	6 (2+4)	1
	6 (3+3)	3
	7 (3+4)	1
	7 (4+3)	1
	Mean length of defect (cm)	2.8 (range 2-5)
VUAS character	Non-obliterative	1
	Obliterative	7
	Mean vesical capacity (ml)	225 (range 180-300)
	Mean urethral rest (months)	14.9 (range 6-23)
	Mean time between RP and TPRA (months)	46 (range 28-84)
	Patients with cystostomy before TPRA	8
Comorbidities	Hypertension	6
	Diabetes mellitus	2
	Mean number of prior endoscopic procedures	4.9 (range 1-15)
	History of previous open reanastomosis	2
	Mean bleeding volume (ml)	250 (range 100-500)

RP: radical prostatectomy; TPRA: transperineal reanastomosis.

Table 2.
Detailed patients' treatment history and follow up.

Patient	1	2	3	4	5	6	7	8
Age (years)	70	63	71	64	61	69	61	64
Previous VUAS treatment	5x TUR, 10x UD	10x TUR, TRPA	DVIU, TUR	2x DVIU, TUR	TUI	5x TUR	AUS, 2x DVIU	TRAPA, DVIU
Time of follow up (months)	76	64	77	44	47	28	17	22
VUAS characteristics	Obliterative	Obliterative	Non-obliterative	Obliterative	Obliterative	Obliterative	Obliterative	Obliterative
Time from RP	32	30	44	42	32	77	84	28
Prior radiotherapy	N	N	Y	N	N	N	Y	N
Stenosis length (mm)	20	40	20	25	20	20	30	50
Blood loss (ml)	500	150	400	500	100	100	150	100
Postoperative complications	None	ACS, DVT	None	None	None	None	Urethrocutaneous fistula, osteitis pubis	Hematoma
Additional treatment	None	2x DVIU, TUR	DVIU	None	DVIU	None	Bricker ileal conduit	TPRA
Incontinence treatment	AUS (ZSI375*)	Refuses	AUS (ZSI375*)	AUS (ZSI375*)	AUS (AMS 800**)	AUS (AMS 800**)	-	AUS (AMS 800**)
Time between VUAS and incontinence treatment (months)	24	-	12	16	26	16	-	20
Incontinence treatment complications	None	-	None	None	None	None	-	Cuff erosion
Continence (0-1 pads) at the end of follow up	Continent	Incontinent	Continent	Continent	Continent	Continent	-	Incontinent
Daily pad use	0	5	1	0	1	1	-	4

*TUR: transurethral resection; UD: urethral dilatation; TPRA: transperineal reanastomosis; DVIU: direct vision internal urethrotomy; TUI: transurethral incision; TRAPA: transabdominoperineal reanastomosis; AUS: artificial urinary sphincter; ACS: acute compartment syndrome; DVT: deep venous thrombosis; *Zephyr Surgical Implants, Geneva, Switzerland; **Boston Scientific, Malborough; Massachusetts, United States of America.*

TRPA developed urethrocutaneous fistula which was later complicated by osteitis pubis. Eventually he underwent urinary diversion with Bricker ileal conduit.

Discussion

VUAS is a complication of RP that is recently observed rarer. After open RP its incidence has been reported to be between 2.6% (5) and 26% (6) but with the emergence of robot-assisted laparoscopic approach the incidence has declined to 0.2% (7)-1.6% (8). *Britton et al.* (9) have found a positive correlation between VUAS frequency and adjuvant radiation, BMI, prostate volume, urine leak, blood transfusion and nonnerve-sparing technique. They have also reported robot assistance and complete nerve sparing to be related to lower occurrence of stenosis (OR 0.39, $p < 0.01$ and OR 0.63, $p < 0.01$, respectively). A mean time of VUAS occurrence after RP is considered to be 3.4 months (9). Although rare, management of VUAS remains a significant surgical dilemma and substantially affect patients quality of life. It also should be noted the treatment of VUAS affects continence in most patients, thus it is crucial to appropriately inform patients about possible consequences of treatment (10).

Endoscopic procedures remain a first line treatment for patients with non-obstructive VUAS. It offers varied results with overall success rate between 13 and 73 (3, 11). Its low invasiveness and possible repeated nature are the reason for its wide acceptance by patients.

Open reanastomosis remains a treatment option in the cases of recurrent stenosis after failed multiple endoscopic interventions. Transperineal approach offers the best results with success rate of 93%, reaching 100% after a subsequent endoscopic procedure (12), compared to 60% (95% after subsequent endoscopic procedure) for abdominal (retropubic) approach (10) and 83% for abdominoperineal approach (13). While operating by retropubic access, one must manoeuvre in scar tissue after RP which hinders preparing the anastomosis. Moreover, transperineal approach is much less invasive than retropubic approach or combined abdominoperineal approach.

The concept of TRPA is similar to that of elaborate *pelvic fracture urethral injury* (PFUI) repair, involving complete mobilization of the bulbar urethra, crura separation, and in some cases inferior partial pubectomy for bladder neck access. Nonetheless, *Mundy* and *Andrich* characterize TRPA as far more challenging than standard PFUI repair, necessitating a surgeon with substantial experience in complex PFUI procedures and the skill to employ various supplementary techniques when needed (4).

Unfortunately, mobilization of the urethra during the surgery usually leads to damaging the sphincter which typically leads to incontinence. Thus, this access is commonly utilized in patients with preoperative urinary incontinence. Favourably the incontinence can be treated afterwards with good effect with sling or AUS implantation (14). *Ullate et al.* demonstrated that implanting the *adjustable trans-obturator male system* (ATOMS) in patients with urinary incontinence who were previously treated due to urethral stricture or bladder neck stenosis is not related with higher rate of complications such us surgical revision, device explantation or overactive bladder syndrome symptoms de novo. They observed, however, that 38% of the patients with treated stricture achieved continence (≤ 20 mL 24-h pad test) compared to 83% of those without. Moreover, multivariate analysis revealed that previous stricture was one of the predictive factors of failure (15).

The AUS implantation may come with a range of complications. However, with proper technique and surgical experience its risk can be significantly lowered. Mechanical complications, regarding the device itself, occur at overall rate of 6.2% with the most susceptible part being cuff. Among nonmechanical complications cuff erosion is the one requiring most consideration. It is most frequent during first two years after AUS implantation with overall prevalence of 8.5% (16). The available literature data does not provide a clear answer to the question of optimal urethral management during AUS explantation, and the options include urinary diversion by transurethral and/or suprapubic catheterization, urethrorraphy, and in situ urethroplasty (17). There are conflicting data on the safety of AUS implantation in patients who have had transperineal surgery in the past. It seems that previous unsuccessful sling procedure does not increase the risk of complications e.g. urethral injury or erosion (18, 19). On the other hand previous urethroplasty or AUS explantation due to erosion seems to negatively impact the risk of failure (20, 21). This could also be the reason for cuff erosion in the patient in our case series, who previously had three transperineal procedures.

In our series 62.5% (5/8) of patients with refractory VUAS have fully achieved the goal of treatment - continence with patent urethra. In addition, even a higher percentage of patients in our study declare satisfaction with the results of the treatment carried out. This is in concordance with the study by *Reiss et al.* (12), in which good results regarding quality of life after TRPA despite aggravation of incontinence in 60% of patients have been noted. Extended follow-up also shows high success rate of TPRA and high percentage of AUS implantation (22).

Nikolavsky et al. (23) have reported a case series of 12 patients who underwent open reanastomosis with a patency rate of 93% (11/12) and continence in 72.7% (8/11) of the patients at the end of follow-up with a median time of 75.5 months. Immediately after reconstruction only 33.3% (4/12) of patients were continent whereas 75% (6/8) were continent at the end of follow up, if incontinent patients had undergone incontinence treatment. However, having used different approaches - abdominal, abdominoperineal and perineal, with only 25% (3/12) being perineal - their results are not easily compared to ours.

There are also descriptions in the literature of case series in which *buccal mucosa graft* (BMG) was used in the treatment of VUAS. *Shahrour et al.* presented a series of 4 patients who underwent dorsal BMG urethroplasty for VUAS (24). *Dolezel et al.* recently published descriptions of the treatment of VUAS via ventral BMG urethroplasty and endourethroplasty with BMG (25). These techniques are, however, reserved for the patients with non-obliterative strictures and the capability of its usage still needs confirmation.

Limitations of this case series are its retrospective character as well as relatively small number of cases. However, with VUAS being a rare condition, and compared to the available literature, such a small number is to be expected.

Conclusions

TRPA is a valid treatment option for patients with obstructive, recurrent VUAS. It offers satisfactory success rates and, at the same time, provides surgeons with optimal field visualisation and access unhindered by scar tissue. However, achieving a patent urethra is only one step in VUAS treatment since reconstruction usually causes incontinence de novo or aggravates one existing prior. With that in mind, patients should always be informed to expect two-step treatment - firstly open reconstruction and afterwards incontinence surgery (AUS or sling implantation, depending on patient's preference and device availability). This way we limit patients' dissatisfaction and improve their adherence. What deserves to be emphasized, however, is that even for an experienced surgeon, this is a set of difficult surgeries that may ultimately end in failure, i.e. the inability to restore urethral patency, urinary incontinence or urinary diversion.

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