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Permanent perineal urethrostomy for anterior urethral strictures: A critical appraisal of long-term outcomes and erectile function

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ABSTRACT

Objective: In complex strictures, especially in elderly patients, perineal urethrostomy (PU) provide excellent voiding function. This study aimed at evaluating the long-term voiding and erectile function of PU as a permanent procedure for such strictures.

Material and methods: We retrospectively evaluated 146 patients who underwent permanent PU at our institution from January 2000 to December 2018. All patients had complex urethral strictures. Patients with posterior urethral involvement were excluded. Patients were followed up at 3 months and then yearly. Failure was defined as the need for any additional procedures. They were also evaluated with the International Index of Erectile Function (IIEF-5) questionnaire. Fisher's exact test and χ^2 test were used for statistical analysis.

Results: The median age at the time of surgery was 58±7.3 years. The mean stricture length was 6.5±2.1 cm. All the patients had a history of previous surgery, and the average number of procedures per patient was 2.4. The median follow-up period was 26 months. The most common early and late postoperative complications were bleeding and stenosis of the urethrostomy, respectively. A total of 129 (88.3%) patients had a successful surgery. The number of patients with no erectile dysfunction increased from 55.4% to 67.8% after PU. The mean IIEF-5 score improved from 20.07 to 21.31 after PU, but this did not achieve statistical significance (p=0.3558).

Conclusion: Permanent PU is an acceptable option for complex long-segment anterior urethral strictures, especially in elderly patients, with an excellent long-term outcome. A majority of patients also maintain a satisfactory erectile function.

Keywords: Complex stricture anterior urethra; erectile function; perineal urethrostomy; urethral stricture disease.

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Introduction

One of the best options for treatment of urethral stricture is urethroplasty.[1] However, in cases of recurrent urethral strictures, it is challenging to decide the best method of management. In recurrent strictures, at some point of time and in some groups of patients, especially elderly, perineal urethrostomy (PU) appears to be the best management.[2] The earliest description of PU for urethral stricture was given by Russell in 1914.[3] Little progress was made in the technique of PU until 1953 when Johanson described the inverted U-shaped flap for PU.[4] This was improvised by Turner-Warwick and further by Blandy.[5] In some patients, PU is made as planned definitive procedure, and in others, it is made as a part of a staged procedure. Staged reconstruction requires lay open and PU in the first stage. Many patients refrain from a second-stage surgery, with the reason in most cases being satisfaction after the first-stage surgery, and rare reason is stricture prohibiting retubularization. This study aimed at evaluating the long-term voiding and sexual outcomes of PU and comparing them with the existing literature.

Material and methods

This study is a retrospective evaluation of 146 patients undergoing permanent PU at our insti-

tution from January 2000 to December 2018. The indications of permanent PU were presence of complex or long-segment anterior urethral strictures, advanced age, history of multiple failed reconstructions, and extensive Lichen sclerosus (LS).[6] Patient choice was paramount in deciding for permanent PU. Complex strictures were defined as those with history of more than 1 previous surgical procedure (including 1 or more types of urethroplasty), whereas long-segment strictures were those longer than 4 cm.[7] The strictures involving both penile and bulbar urethra were called pan-anterior urethral strictures.[8] Patients with posterior urethral involvement were excluded from the study. As a part of preoperative evaluation, the patients were evaluated with clinical history and examination, hematology and serum chemistries, routine urine microscopy and culture, retrograde urethrography (RUG), and voiding cystourethrogram (VCUG) (Figure 1). The stricture length on RUG and VCUG, etiology, and location were recorded preoperatively. The patients were offered PU either as definitive or as a part of staged surgical procedure. For those patients who underwent PU as a part of staged procedure, the decision for the second stage was made by them. The surgical technique was followed as described by Johanson and Blandy.[4,5] A total of 98 patients underwent Johnson's PU, whereas 48 underwent Blandy's PU. Perurethral catheter was removed on the tenth postoperative day, and the patients were followed up at 3 months and then yearly. Voiding was assessed on the basis of urine flow described by the patient. If the patient reported a poor stream or straining, uroflowmetry was performed. If the peak flow rate was <15 mL/s, a gentle calibration of the urethrostomy and the urethra proximal to it was performed with a 16-Fr Foley catheter to assess for stenosis of the urethrostomy or stricture proximal to it. Failure was defined as the need for any additional procedures, such as urethral dilatation or revision of PU. The patients were also evaluated with the International Index of Erectile Function (IIEF-5) questionnaire for their sexual function during the follow-up period, which was filled at baseline that was their score before PU as recalled by them, and at their last visit after the procedure.[9] Early (within first 3 months) and long-term complications were recorded for each patient.

Main Points:

- In long and complex urethral strictures, the ideal mode of management is still debated.
- Permanent perineal urethrostomy (PU) is an acceptable option for complex long-segment anterior urethral strictures, especially in elderly patients.
- Permanent PU has excellent long-term outcomes.
- Success of permanent PU is high with rare complications and no requirement of frequent follow-up; hence, it is less tormenting, especially for elderly who have already become habitual to void in sitting position because of earlier complex urethral stricture.
- A majority of patients also maintain a satisfactory erectile function after surgery.

Statistical analysis

Fisher's exact test and χ^2 test were used for statistical analysis, and $p<0.05$ was considered statistically significant. IBM Statistical Package for the Social Sciences 20.0 software (IBM SPSS Corp.; Armonk, NY, USA) was used.

Ethics committee approval for this study was received from the institutional ethics committee of the Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India (2019-112-IP-EXP-16).

Results

From January 2000 to December 2018, 259 patients underwent PU as either a primary (permanent) or a staged procedure (Figure 2). A total of 113 patients opted for a secondary procedure for reconstruction of the urethra and were excluded from the study. In the remaining 146 patients, permanent PU was offered for up to 87 patients, whereas the remaining 59 patients underwent PU as the first stage of staged urethroplasty, and they chose against going for a second stage. Median age of these 146 patients at the time of surgery was 58±7.3 (range, 46–80) years. Location of stricture was the bulbar urethra in 28 (19.17%), penile urethra in 11 (7.53%), and bulbo-penile (pan-anterior) urethra in

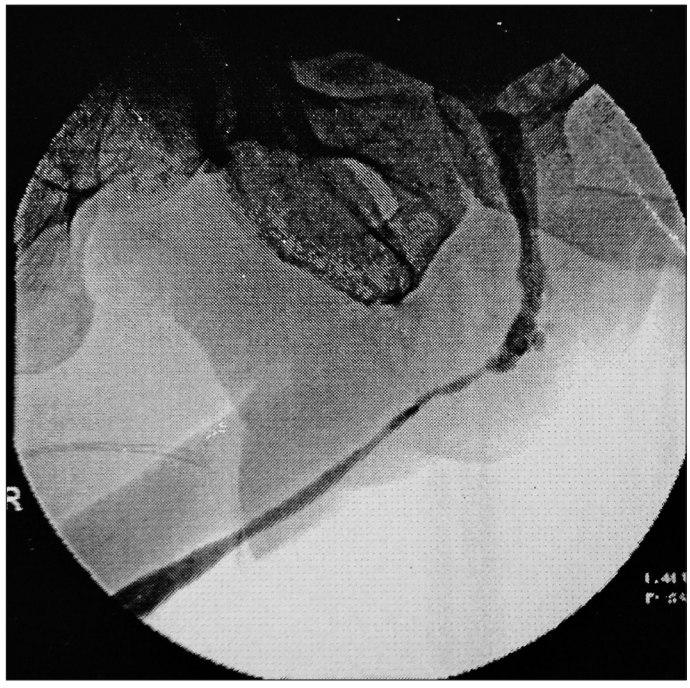

Figure 1. Retrograde urethrogram–voiding cystourethrogram of a patient with pan-anterior urethral stricture

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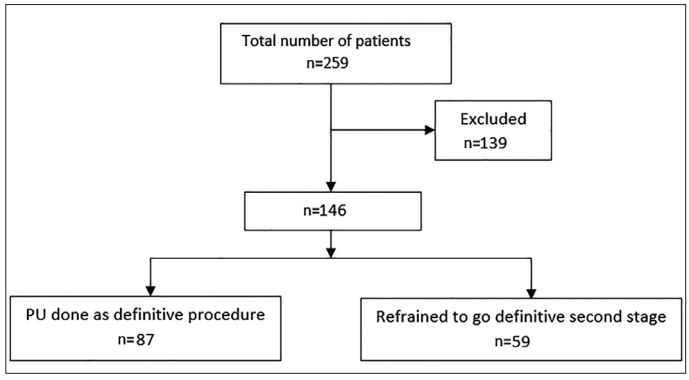

Figure 2. Flowchart to show the distribution of patients

Figure 3. Intraoperative picture of Blandy's urethroplasty

Table 1. Surgical procedures in patients before undergoing permanent perineal urethrostomy

Surgery	n	%
Urethral dilatation	122	83.5
Meatoplasty/meatotomy	81	55.4
DVIU	88	60.2
End-to-end urethroplasty	22	15.0
Preputial flap urethroplasty	10	6.8
Buccal mucosal graft urethroplasty	19	13.0
Split skin/full thickness skin graft urethroplasty	11	7.5
Overall more than 1 procedure	124	84.9

DVIU: direct visual internal urethrotomy; n: number of patients

107 (73.28%) patients. The mean stricture length was 6.5±2.1 (range, 4.0–12.0) cm. The etiology of the urethral stricture was unknown in 84 (57.53%), LS in 38 (26.02%), catheter related in 9 (6.16%), traumatic in 8 (5.47%), and iatrogenic (procedures other than urethroplasty) in 7 (4.79%) patients. All the patients had a history of previous surgery in the form of dilatation, direct visual internal urethrotomy, or urethroplasty (anastomotic/augmented/substitution urethroplasty), and the average number of such procedures per patient was 2.4 (Table 1).

Table 2. Complications after permanent perineal urethrostomy

Complications	n	%
Early complications		
Bleeding/hematoma	10	6.8
Suture dehiscence	3	2.05
Hip/backache and nerve compression	1	0.6
Urinary retention	1	0.6
Skin necrosis	3	2.05
Late complications		
Urethrostomy stenosis	15	10.2
Urethrostomy retraction	5	3.4
Remaining proximal urethral stricture	2	1.3

n: number of patients

Table 3. Comparison of the complications of the surgical techniques for perineal urethrostomy

Parameters	Johanson's technique	Blandy's technique
Number of patients, n (%)	98 (67.1)	48 (32.8)
Early complications, n (%)	11 (11.2)	7 (14.5)
Late complications, n (%)	16 (16.3)	6 (12.5)

The complications for Johnson's and Blandy's PU (Figure 3) are shown in Tables 2 and 3. The median follow-up was 26 (range, 12–75) months. Among the early postoperative complications, bleeding/hematoma was the most common and was seen in 10 (6.8%) patients (Table 2). Suture dehiscence was observed in 3 (2.05%) patients. The most common late postoperative complication was stenosis of the urethrostomy in 15 (10.2%) patients. Stricture of the remaining proximal segment was seen in 2 (1.3%) patients. On the basis of our definition of success as the lack of need for secondary procedures, 129 (88.3%) patients had a successful surgery. Of those with failure, 9 (52.9%) patients required meatal dilatation, and 8 (47.05%) patients required meatoplasty. Among these patients, the most common previous surgery was substitution urethroplasty (6 patients).

All the patients completed the IIEF-5 questionnaire (Table 4). The mean (standard deviation) preoperative IIEF-5 score was 20.07 (4.85), whereas the mean (standard deviation) postoperative IIEF-5 score was 21.31 (4.14). At the last visit after PU,

Table 4. Comparison of the erectile function using the IIEF-5 questionnaire before and after perineal urethrostomy

Parameters	Number of patients before surgery (n)	Number of patients at last visit (n)	Mean IIEF before surgery	Mean IIEF at last visit after surgery
Total number of patients	146	146	20.07	21.31
No ED	81	99	23.44	23.56
Mild ED	39	31	18.87	19.06
Mild-to-moderate ED	16	10	13.38	13.5
Moderate ED	8	5	9.25	9.4
Severe ED	2	1	3.5	5

IIEF: International Index of Erectile Function; ED: erectile dysfunction

the mean IIEF-5 scores of the patients were 19.06 (mild erectile dysfunction [ED]), 13.5 (mild-to-moderate ED), 9.4 (moderate ED), and 5 (severe ED) against 18.87 (mild ED), 13.38 (mild-to-moderate ED), 9.25 (moderate ED), and 3.5 (severe ED) before surgery. Overall, there was an improvement in the erectile function as evident from the change in the number of patients with no ED from 81 (55.4%) to 99 (67.8%) after PU. The mean IIEF-5 score was 20.07 before surgery, whereas it was 21.31 after surgery (p=0.3558). During the follow-up visit of the patients, when asked about their overall results of surgery, 109 (74.6%) patients were satisfied with the overall results of the surgery, and 115 (78.7%) patients said they would recommend this surgery to other patients with a similar condition.

Discussion

In this study, permanent PU was performed most commonly for the strictures of unknown etiology (57.53%). Of the known causes, LS was the most common (26.02%). In fact, LS has been reported as the most common etiology of pan-urethral stricture earlier as well.[10] It has been suggested that in LS-associated urethral stricture, the damage to the urethra proximal to the diseased segment may be a secondary effect of the physical obstruction to the urine flow and consequences of high-pressure voiding with secondary involvement of the periurethral glands.[11] If this is true, however, a PU by bypassing the obstruction should prevent the progression of the disease to the urethrostomy. The latter has not been found to be true by Kamat,[12] who reported 4 patients with stenosis of PU, 3 of whom had LS as the cause of stenosis. Furthermore, because LS does not recur in the buccal mucosa, buccal mucosal graft may be used for repair of the PU. Considering the fact that LS has predilection for a moist urine-exposed environment, it appears reasonable to divert the urine, and leaving the diseased segment dry may help in halting, if not regressing the changes seen in LS, as suggested by Depasquale et al.[13] In our experience, none of the patients required revision of the urethrostomy for stenosis secondary to LS.

The most common early complication in this study was bleeding/hematoma (6.8%). In a study by Lopez et al.[14], bleeding in the immediate postoperative period was reported in 1/17 (5.8%) patients, whereas delayed healing of the perineal wound necessitating prolonged catheterization was reported in 3/17 (17.6%) patients. Bleeding rarely occurs in the immediate postoperative period if the margins of corpus spongiosum have been sutured meticulously.[15] Among the late complications in our study, the most common was urethrostomy stenosis. Stenosis of the PU has been reported as one of the most common long-term complications in several studies.[15,16] The incidence of stenosis in these studies has been reported up to 30%. We found an incidence of 10.3%. It is related to the etiology of the stricture (most commonly LS) as well as the surgical technique. Myers et al.[17] suggested that incorporating the adventitial edge of the corpus spongiosum instead of full thickness suture through the corpus spongiosum preserves the blood supply. This would also ensure less fibrosis and hence less stenosis rates.

The long-term success rate of PU has been reported differently across various studies from around 70% by Kulkarni et al.[16] to 100% by Peterson et al.[18] Barbagli et al.[15], in their landmark study on the outcomes of PU, reported on the basis of questionnaire that 84% of the patients with PU did not encounter any problem. Of those with problems, 46% had urinary problem, and 22% had sexual activity dysfunction. Moreover, 69.9% (121/173) patients did not require surgical revision after PU. Surgical revision as such is a simple procedure, which had a median stricture free period of 3 years in this study. The mean follow-up period in these studies was 50–60 months, and in our study, the median follow-up was 26 months. The reason for difference in the success rate across various studies is also owing to the difference in the type and number of previous surgical procedures.[15,16,18] It has been observed that a previous urethroplasty is associated with inferior outcomes than otherwise. In our study, the overall success rate was 88.3%, and the average stricture length was 6.54 cm. In addition, 73.3% of all strictures were pan-urethral. Although the overall length of the stricture may not have a direct bearing on the success of PU, it does affect

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the outcomes of second-stage urethroplasty, which was not a part of this study. Importantly, 135/146 (92.4%) strictures involved the bulbar urethra with or without involvement of the penile urethra, and all of them could successfully undergo a PU.

The main reason as to why the patients, especially over the age of 50 years, opt for a permanent PU is the fact that they have been tormented by multiple procedures previously. In this study, 128/146 (87.6%) patients were older than 50 years. In their study, Barbagli et al.[15] reported that 127/173 patients did not opt for a second-stage procedure. The median age of these patients was 57 years. Furthermore, they showed that more than 50% of patients older than 50 years were "very satisfied" with the procedure. In this study, 110/146 (75.3%) patients were satisfied with the overall results of the surgery. The average number of procedures before PU was 2.4, out of which urethral dilatation was the most common. Meatotomy and dilatation were the most common procedures in the study by Peterson et al.[18] As the number of procedures increases, the compliance of the patient with further surgeries decreases. Thus, more than 40% of the patients may wish to continue with the PU.[18] Moreover, undergoing a second procedure for closure of the urethrostomy for mainly erect voiding is a tough choice for such patients, especially when they realize the possibility of recurrent stricture in the reconstructed urethra and the vicious cycle that seems inevitable. Murphy et al.[19] concluded that adjusting for stricture complexity in posterior urethrostomy outcome is comparable with that in anterior urethroplasty. As seen in several studies so far, most of these patients are older than 50 years and are already accustomed to seated voiding.[15,18] It is more of a patient rather than the surgeon preference for permanent PU in such cases. Younger patients would anyway remain good candidates for definitive repair of the urethra.

Almost all studies defining success consider the voiding function only, and sexual function has been largely ignored. In 2011, Jackson et al.[20] developed a urethral stricture surgery patient reported outcome measure (USS-PROM). These were questionnaires completed by patient, which subjectively measure their perception of outcome of the procedure. It is considered as an upcoming tool to score the outcome of intervention, but this tool lacks the erectile function questionnaire. We evaluated the erectile function in our patients using the IIEF-5 questionnaire. A total of 81 (55.4%) patients had no ED at baseline, whereas 10 (6.8%) patients had either moderate or severe ED at baseline. After PU, 99 (67.8%) patients had no ED. PU may not be the cause of sexual dissatisfaction, especially if the patient has undergone multiple previous urethral procedures. Among the 38 patients with LS, 26 (68.4%) patients had some degree of ED. Evidently, this group of patients had the least satisfactory sexual performance at baseline. It is known that as many as 30% of the men undergoing urethroplasty may develop ED, which is usually transient and improves with time.[21] ED after urethroplasty can occur because of several factors, such as damage to the cavernous and perineal nerves and deterioration of the flow of the bulbar artery. Many patients also develop psychogenic ED after urethral surgery, particularly when they undergo multiple surgeries.[22] Murphy et al.[19], on the basis of Sexual Health Inventory for Men and Male Sexual Health Questionnaire , concluded that posterior urethrostomy has no deleterious effects on sexual activity. In a retrospective review of Trauma and Urologic Reconstructive Network of Surgeons database, Murphy et al.[19] reported that compared with anterior urethroplasty, a PU offered improvement in the urinary function with no deleterious effect on sexual function. An important consideration in the assessment of sexual function is the declining sexual activity with age. As the age advances, men generally report decreased libido. When they report having sex less often, it may not be apparent whether it is secondary to loss of erectile function, particularly when multiple surgeries have been performed on the penis. Kalra et al. performed an interview-based study of Indian men and women older than 50 years and found that 16.6% of the men had stopped sexual activity.[24] This is comparable with the western data.[23] Furthermore, it was observed that the greatest percentage of men (40%) was involved in sexual activity only once a month. In striking contrast, even the oldest age group (75–85 years) in the western population had sex at least 2 to 3 times in a month and nearly one-fourth had sex once a week or more. Age and ill health accounted for decreased sexual activity in the majority of Indian men. Hence, in men who are sexually inactive, voiding function tends to score over the sexual function, and this must be considered while planning the surgical management.

The strengths of this study include a long follow-up and patient-based assessment of satisfaction as well as sexual function assessment using a validated instrument. Permanent PU is never a procedure of choice for urethral strictures, but it serves well to those patients who can accept its cosmetic shortcoming. This is especially true for elderly men in the Indian subcontinent. The limitations of this study are its retrospective design and single center design and inclusion of only 2 techniques of PU, whereas more techniques are described in the literature.[25,26] We could not use the standardized and validated patient-reported outcome measures questionnaires (PROMs), which is another limitation of our study is owing to its retrospective nature and a starting point as far as year 2000. One of the earliest PROMs, introduced specifically for urethral strictures, was USS-PROM in 2011.[20] Although international prostate symptom score and core lower urinary tract symptom score have been used previously for the assessment of Lower Urinary Tract Symptoms, they are not specific for urethral stricture and have many questions that are not relevant to urethral stricture disease.[27,28] Moreover, for sexual function, we only assessed the erectile function by means of IIEF-5 and could not assess the overall sexual function. Hence, our follow-up data included only those subjective findings that were reported by the clinicians, as told by the patients. A more objective assessment of patient satisfaction after PU could be a subject of research for future studies.

In conclusion, permanent PU is an acceptable option for complex long-segment anterior urethral strictures, especially in elderly patients, with excellent long-term outcome. The majority of patients also maintain a satisfactory erectile function after surgery.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Sanjay Gandhi Postgraduate Institute of Medical Sciences (2019-112-IP-EXP-16).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – R.K.; Design – P.Y., S.R.; Supervision – S.K.S., A.S., U.P.S.; Materials – P.Y., N.D., S.R.; Data Collection and/or Processing – N.D., S.R.; Analysis and/or Interpretation – P.Y., S.K.S., A.S., U.P.S.; Literature Search – P.Y., N.D., S.R.; Writing Manuscript – P.Y., N.D.; Critical Review – S.K.S, R.K., A.S., U.P.S.

Conflict of Interest: The authors have no conflicts of interest to declare.

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