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Direct Visual Internal Urethrotomy after Failed Bulbar Urethroplasty

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Abstract

Introduction: Ideal management of failed bulbar urethroplasty is ill defined. The role of direct visual internal urethrotomy (DVIU) as salvage treatment for failed urethroplasty warrants exploration.

Material and methods: Patients who failed urethroplasty (buccal or anastomotic) for bulbar urethral stricture from April 2000-April 2013 were reviewed. Demographics, prior treatments, stricture length, and operative approach were evaluated for risk of salvage DVIU failure.

Results: Forty-five patients underwent 11 anastomotic and 34 buccal mucosal urethroplasties. Mean stricture length was 3.9cm (0.5-9cm), mean follow-up was 40 months (12-160months) and mean time to failure was 20 months (1-133months). Upon failure, 4 patients underwent redo urethroplasty, and 41 underwent DVIU. Patients treated with immediate redo urethroplasty had no recurrence. 56% (23/41) treated with initial DVIU had no recurrence. Analysis of age, original and recurrent stricture length, and number of preoperative dilations or DVIUs showed no difference between those with and without recurrent stricture after DVIU. No significant difference in failure of salvage DVIU between anastomotic and buccal mucosal grafting was seen. Cox regression analysis showed no significant difference in time to recurrence after salvage DVIU based on anastomotic versus buccal (p=0.3), initial or recurrent stricture length, total prior dilations or DVIUs, and age. Secondary salvage procedures included 11 urethroplasties (successful in 8/11(72%)), and 5 redo DVIU (successful in 2/5 (40%)).

Conclusions: Salvage DVIU is an appropriate initial treatment of recurrent bulbar urethral stricture after urethroplasty. When this fails, redo urethroplasty has a high success rate.

Keywords: Bulbar uretheral stricture; Direct visual internal urethrotomy; Uretheral stricture; Urethera

Abbreviations: EPA: Excision and Primary Anastomosis; PU: Perineal Urethrostomy; BMGU: Buccal Mucosal Graft Urethroplasty; DVIU: Direct Visual Internal Urethrotomy

Introduction

The success rate of urethroplasty for bulbar urethral stricture is well defined: 86-98.8% for excision and primary anastomosis (EPA) [1,2] and 85%-93% with buccal mucosal graft urethroplasty (BMGU) [3,4]. Repeat urethroplasty is typically a difficult operation due to scarring and impaired blood supply [5]. Furthermore, prior urethroplasty has been associated with worse outcomes at the time of revision surgery [6].

Reported success rates of direct visual internal urethrotomy (DVIU) varies widely in the available literature, ranging from 8% to 65% [7,8]. Multiple DVIU's have been implicated as negative prognostic indicators for successful definitive urethroplasty [9]. Most experts now recommend no more than one DVIU prior to urethroplasty. However, less is known about the role for DVIU after urethroplasty. Rosenbaum et al. recently reported a success rate of 60.5% with a follow-up of 15 months when a DVIU was performed after BMGUs in any location within the urethra [10], this is the only report examining this approach and it warrants further validation.

We hypothesize that DVIU is an appropriate option for initial management of recurrent urethral stricture after EPA or BMGU for bulbar urethral strictures.

Materials and Methods

A retrospective review of an institutional review board approved database was performed. Patients treated for a bulbar urethral stricture, both buccal mucosal urethroplasty and anastomotic urethroplasty, were identified. Those patients who failed urethroplasty were selected for investigation and had at least one year follow up after salvage treatment.

Follow-up after urethroplasty entails a voiding cystourethrogram 1-3 weeks after surgery, followed by every 4 month flow study and post void residual assessments for one year, then yearly thereafter. Any symptoms or flow patterns suspicious for recurrence would instigate a retrograde urethrogram (RUG) to elucidate stricture. This follow up scheme has been proven to detect at least 98% of all urethroplasty failures [11].

Treatment options after the RUG include DVIU, redo urethroplasty, and perineal urethrostomy. Success of the salvage operation was then evaluated, and preoperative factors were investigated to determine significance on success of the procedure.

DVIU was performed with a cold knife at the 12 o'clock position. A Foley catheter was placed and left indwelling for three days post operatively. Urethroplasty options include a perineal urethrostomy, anastomotic, or buccal mucosal urethroplasty.

Statistical analysis

Statistical analysis was performed using SPSS® 21.0. Statistical significance was defined as a p-value less than 0.05 and all tests were 2-tailed unless otherwise stated. A Mann-Whitney test or Fisher's Exact Test was performed to compare preoperative factors (prior to the DVIU) in those with and without recurrance after salvage DVIU. Kaplan Meier analysis was performed to evaluate the rate of recurrence after DVIU, and a cox regression analysis was performed to evaluate preoperative factors associated with time to recurrences.

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Results

502 patients were treated for bulbar urethral strictures from April 2000 to April 2013. 45 male patients had failed urethroplasty and had sufficient follow up after salvage therapy. Patient factors can be seen in Table 1.

After failure, 41 patients underwent a DVIU, 4 underwent immediate urethroplasty. None of the patients who underwent immediate redo urethroplasty had a recurrence after a mean follow up of 16 months (12-21). 56% (23/41) of those patients treated with salvage DVIU were cured after a mean follow-up of 17 months (12-33). A comparison of successful DVIU and failures is seen in Table 2.

Kaplan Meier analysis can be seen in Figure 1. Cox regression analysis showed no significant difference in time to recurrence after salvage DVIU based on patient age (p=0.6), anastomotic versus buccal technique (p=0.3), initial stricture length (p=0.6), recurrent stricture length (p=0.1), total prior dilations or DVIUs (p=0.08).

Patients treated with EPA had a shorter preoperative stricture and a shorter recurrent stricture than those undergoing BMGU. Mean preoperative stricture length 1.8cm versus 4.6cm (P <0.1) for EPA and BMGU respectively; recurrent stricture length was 0.8cm versus 1.5cm (p=0.12) for EPA and BMGU, respectively.

Secondary salvage procedures include 11 urethroplasties (successful in 8/11(72%)), and 5 redo DVIU (successful in 2/5 (40%)). The salvage urethroplasties include 4 EPA, 5 BMGU, and 2 PU; success rates were 25% (1/4), 100% (5/5), and 100% (2/2), respectively. Chi-square analysis comparing EPA and BMGU demonstrates a significant difference (p = 0.05). A summary of treatment outcomes can be seen in Figure 2.

Discussion

This study has several important findings.

1. At 56% (23/41) success, salvage DVIU offers a reasonable approach to initial management of failed urethroplasty for bulbar urethral strictures.

2. When salvage DVIU fails, redo urethroplasty has efficacy similar to initial urethroplasty (8/11 or 72%).

Number	45
Age	50.5 (20-83)
BMGU/EPA	34/11
Number prior dilation and DVIU	3.6 (0-12)
Stricture length	3.9 (0.5-9)
Mean time to failure (months)	20 (1-133)
Total follow up (Months)	40 (12-160)
Number with Radiation	3

Table 1: Patient and stricture characteristics.

	Successful DVIU	Failed DVIU	P value
Number	23	18	-
Age	49 (23-78)	55 (27-83)	0.3
Original stricture length (cm)	4 (0.5-9)	4 (1-8)	0.8
Recurrent stricture length	0.9 (0.3-2.5)	1.5 (0.5-6)	0.06
BMGU/EPA	18/5	13/5	0.7
Dilations/DVIU	2.3 (0-10)	4.0 (0-12)	0.2
Follow up/time to failure	16.8 (12-33)	7.1 (1.2-35)	-

Table 2: DVIU success and failure comparison.

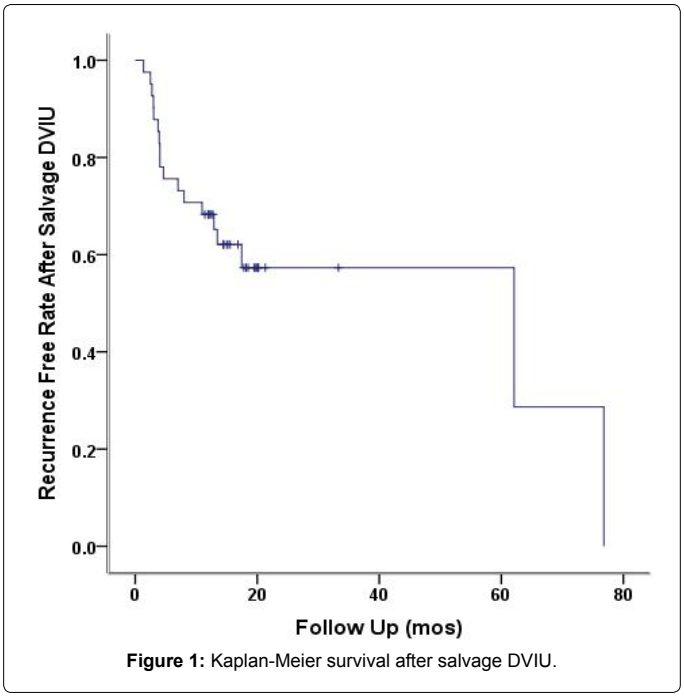

Figure 1: Kaplan-Meier survival after salvage DVIU.

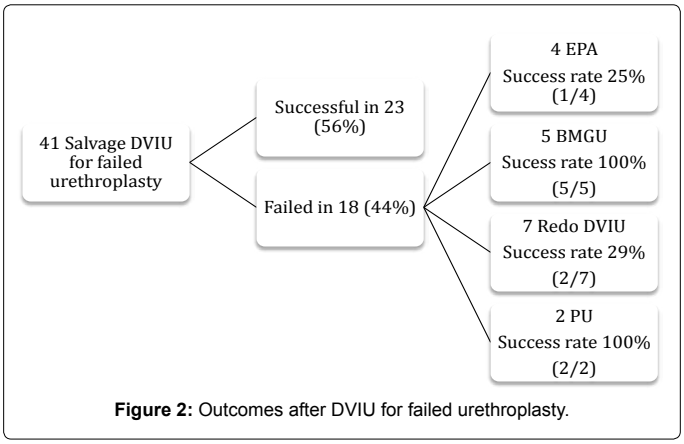

Figure 2: Outcomes after DVIU for failed urethroplasty.

3. EPA portended unfavorable outcomes compared to BMGU or PU after salvage DVIU (25% versus 100%).

The role of DVIU

While most experts agree, one attempt at DVIU for patients with small strictures at presentation is reasonable, less is known regarding the role in the salvage setting after failed urethroplasty. Rosenbaum et al. reported a 60.5% success rate of salvage DVIU with 11 months follow-up after BMGU [10]. While they included all stricture locations, the success rates were similar to those observed in this study. To our knowledge this is the only other report looking at DVIU after urethroplasty in adults. Helmy et al. reported a 90% success rate in DVIU after failed EPA in children [12]. However, the adaptation of pediatric outcomes to adults has not been effective in many areas of urethral reconstruction work, and the difference is not unexpected.

Kaplan Meier analysis predicted a high failure rate with longer-term follow up. This is likely in part due to the fact that in the analysis we had several patients who failed after DVIU at 70 months. However, these survival curves do reflect those reported by Santucci and Eisenberg for

failure after primary DVIU, though the time frame is slightly longer than those reported [7].

It has become our practice to offer patients with failed urethroplasty a DVIU, often concurrently with confirmatory RUG. At the time of the RUG, once a stricture is confirmed, a DVIU is performed. At the time of DVIU, the exact location, length, and status of the graft that was previously used can be assessed in anticipation of repeating the urethroplasty if the DVIU fails. If the RUG demonstrates an extensive stricture longer than 2 cm, then a DVIU will not be performed, and we will plan a repeat urethroplasty.

Salvage urethroplasty

Prior reports have demonstrated a success of repeat urethroplasty between 69 and 90% [13-15]. We found a similar success rate in the current study at 72% (8/11). It should be noted that this study does not include all patients treated at our institution for failed urethroplasty, just those whose original urethroplasties were performed at our institution. If a salvage urethroplasty is necessary, we follow a simple algorithm. If a prior ventral graft was placed, we place a dorsal graft. If a dorsal graft was placed, we place the graft ventrally. If there was a prior EPA, and the lumen is patent, we perform a ventral onlay buccal graft. And finally, if the lumen is completely occlusive we perform an EPA. The finding that EPA was less successful than BMGU was unexpected. We would anticipate a similar finding to primary urethroplasty outcomes with a higher success rate with EPA compared to BMGU. This outcome is likely a reflection of the underpowered nature of a small retrospective series.

The primary limitation of this study is the small retrospective nature of the series. Small numbers likely failed to power the investigation sufficiently to test preoperative risk factors for recurrences. There were also fewer anastomotic urethroplasties in this series; therefore, the analysis of this population is limited.

Conclusion

Salvage DVIU offers an appropriate first step in the management of failed urethroplasty for a bulbar urethral stricture with a cure rate of 56% (23/41) with at least one year of follow-up. If the DVIU fails, a redo urethroplasty has a comparable success rate to a first time urethroplasty at 72% (8/11).

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