

Dorsal Onlay Substitution Urethroplasty using Buccal Mucosa and Penile Skin Grafts - Our Experience

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ABSTRACT

Introduction: Urethral stricture is the term used for anterior urethral disease, or spongiofibrosis. Current research aimed to study buccal mucosal graft and penile skin grafts for dorsal onlay urethroplasty.

Material and methods: This was a prospective study conducted at the department of Surgery, R.I.M.S., Ranchi from November 2010 to October 2012 in urethral stricture cases in male adults. Detail history taking and imaging procedures were done for all patients. Patients were divided into two groups. The first group underwent buccal mucosal graft and the second group underwent penile skin graft.

Result: A total of 43 patients were included in the study. We found that urethral stricture was most common in the age group of 31-40 years. On follow-up, one patient (5%) in the BMG group and 3 patients (15%) in the PSG group had thinning of stream/failure.

Conclusion: For substitution urethroplasty, buccal mucosa should be the preferred substitute but penile skin can be used in cases when the buccal mucosa is unavailable as in cases of sub mucosal fibrosis.

Keywords: Urethra, Stricture, Buccal Mucosa, Penile Skin.

INTRODUCTION

Urethral stricture leads to luminal narrowing and loss of distensibility of the urethra. Various etiologies lead to this problem such as inflammation after blunt perineal trauma, iatrogenic causes like catheterization, endourological procedures or rarely infection. Location of these strictures varies from infective ones being at the bulbopenile region to post traumatic ones being at the bulb of the urethra. Several forms of urethroplasty have been developed in the past ranging from end to end urethroplasty for short segment strictures to substitution for the longer segments. Several substitutes have been used in the past like split and full thickness skin grafts from scrotum, penis and grafts from saphenous vein, colonic mucosa, bladder mucosa and buccal mucosa.

In this study we present our experience of dorsal onlay substitution urethroplasty using buccal mucosa and penile skin grafts. The purpose of our study was to compare buccal mucosa graft with penile skin graft used for substitution urethroplasty in terms of operative time, hospital stay, donor site morbidity and early and late outcome.

MATERIAL AND METHODS

This was a prospective study conducted at the department of Surgery, R.I.M.S., Ranchi from November 2010 to October 2012. We included male patients of all ages with urethral

stricture. Patients with balanitis xerotica obliterans, unhealthy penile skin, oral mucosal pathology, those who underwent more than one urethral dilatation / internal urethrotomy or urethroplasty and those not giving consent were excluded.

A detailed health evaluation of the patient was done along with necessary investigations. For imaging we did ultrasonography (USG) of penis (to look for spongiofibrosis and urethra), retrograde urethrography (RGU) (pre operative and post operative after 3 weeks), micturating cystourethrography (MCU) (pre operative and post operative after 3 weeks) and USG of the kidney, ureter and bladder (KUB) region to look for post-voidal residual urine. In all cases of stricture urethra Nelaton catheter was used under aseptic conditions for calibrating the urethra to know the exact distance of stricture from the external urethral meatus preoperatively. If not on Supra pubic cystostomy (SPC), patients were put on SPC for 3 months. After 3 months, they were evaluated with all the routine investigations, urinary investigations, calibration and imaging. If urinary tract infection was found in any of the patients, they were treated with the relevant antibiotic according to the culture and sensitivity report.

Patients were divided into two groups. Group I was planned for dorsal onlay buccal mucosa graft (BMG) and group II was planned for dorsal onlay penile skin graft (PSG) substitution urethroplasty. Single surgical team carried out the procedures. Patients were put on foley and SPC for 3 weeks. After foley removal, RGU and MCU were performed. SPC was removed and the patient was kept on follow-up.

RESULTS

A total of 43 patients were included in the study. We found that urethral stricture was most common in the age group of 31-40 years (Table 1). The most common etiology was trauma in 34 cases (79.1%) (Table 2). The stricture affected the penile segment in 6 cases and bulbar segment in 28 cases. In 9 cases, both the segments were affected.

There were 22 cases in the BMG group and 21 cases in the

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Age group (in years)	No. of cases	Percentage
1 – 10	00	0%
11 – 20	03	6.98%
21 – 30	14	32.56%
31 – 40	16	37.21%
41 – 50	05	11.63%
51 – 60	04	9.30%
61 onwards	01	2.32%
Total no. of cases	43	100%

Table-1: Age-wise incidence of urethral strictures

Cause	No. of cases	Percentage
Congenital	00	00%
Inflammatory	08	18.6%
Traumatic	34	79.1%
Non specific	01	2.3%
Total no. of cases	43	100%

Table-2: Etiology of urethral stricture

PSG group. In the BMG group, the average length of BMG was 4.02 cm. Average surgical time was 171.6 minutes. The mean post-operative hospital stay was 7.5 days. 22 patients had difficulty in eating/ mouth opening due to pain in the post-operative period. In 21 patients, the pain subsided within 3 weeks while in 1 patient, the pain subsided in 3 months. In the early post operative period (3 weeks), hematuria was the only minor complication noted in 1 patient (4.55%). One patient (4.55%) had the major complication of UTI. So a total of 9.1% had early complications.

In the PSG group, the average length of PSG was 4.62 cm. The average surgical time was 142.4 minutes. The mean post-operative hospital stay was 7.8 days. No donor site morbidity was noted in the post-operative period. In the early post-operative period, 4 patients (19.04%) had minor complications of which, 2 patients (9.52%) had hematuria, 1 patient (4.76%) had wound dehiscence and 1 patient (4.76%) had wound tightness. 3 patients (14.29%) had the major complication of UTI. So a total of 33.33% had early complications.

Subsequent follow-ups were available for 20 patients in both groups. Among the minor late post-operative complications, in the BMG group 2 patients (10%) had post void dribbling while in the PSG group, 1 patient (5%) had post void dribbling. No other minor complication was noted in any group. Among the major complications, one patient (5%) in the BMG group had chordee. In the PSG group, 3 patients (15%) had complications of which one (5%) had erectile dysfunction and 2 (10%) had chordee.

Urinary flow was assessed post-operatively. At 3 weeks after surgery, the BMG group had a success rate of 95% with 20 patients having good urinary stream and 2 patients having fair urinary stream as assessed by the patients. In the PSG group, the success rate was 85% with 18 patients having good urinary stream and 3 patients having fair urinary stream. Post void residual urine (PVRU) was insignificant in both the groups. On subsequent follow-ups, one patient (5%) in the BMG group and 3 patient (15%) in the PSG group had

thinning of stream/failure.

DISCUSSION

In the present study 43 cases of urethral stricture were selected and randomly divided into two groups, one group undergoing dorsal onlay penile skin grafting and the other undergoing dorsal onlay buccal mucosa graft and followed. In this study, it was seen that the age of the patients varied from 17 years to 61 years. Majority of the substitution urethroplasties were done in 2nd and 3rd decade accounting for about 70% of the total cases. Our study attributed trauma to be the major contributor to stricture urethra cases accounting for 79.1% of the total cases. Traumatic cases included straddle injuries, patients with history of catheterization or cystoscopic evaluation sometime in the past (i.e. iatrogenic trauma). Inflammation due to infection was the second major contributor with 18.6% of cases having infective etiology with no single organism isolated as almost all had mixed cultures.

22 patients underwent BMG and 21 patients underwent PSG dorsal onlay substitution urethroplasty. The average operative time for the BMG group was about 171.6 minutes as compared to the PSG group in which it was 142.4 minutes. The more time taken in BMG group was due to the fact that one surgical team was used in all the cases. The team was involved in both harvesting the graft and using it in substitution urethroplasty. This increased time could be shortened by utilizing the two team approach as advocated by Morey AF (1996)^{1,2} and Guido Barbagli (2006).³⁻⁵ Arlen AM et al (2010)⁶ described an operative time of 123 minutes with a two team approach; one team for the oral graft harvest and the other for the perineal surgery, each having its own set of instruments. The average length of the graft material used in the BMG group was 4.02 cm and in the PSG group was 4.62 cm. According to Morey AF^{1,2}, the graft size from BMG ranged in between 3.5 cm to 17 cm with an average of 6.4 cm. According to Guido Barbagli⁷, the mean graft length for BMG group was 4 cm and for the PSG group was 4.74cm. N Lumen⁸ revealed in his review paper an average graft size for the BMG group to be 4.6 cm and PSG to be 6.2 cm.

The patients who underwent BMG and PSG in our study had comparable hospital stay. BMG group patients had an average stay of 7.5 days as compared to 7.8 days for the PSG patients. Patients with BMG reported difficulty in eating due to pain as the major problem. These patients tolerated only cold food items for the first 1 to 2 days. Thereafter they started to tolerate other food items with mild pain during eating. This pain decreased in intensity and was absent by 3 weeks in majority except in 1 patient who continued to have some problem with eating till 3 months. Kamps et al⁹ reported pain lasting for 1 month in his patients undergoing BMG. W B Zimmerman¹⁰ reported difficulty in opening the mouth due to pain to be self limiting and its resolution in 3 months. My study does fairly agree with that of the above authors. Patients with the PSG did not show any donor site morbidity.

In our study both minor and major complications (recurrence

and donor site morbidity were excluded and dealt differently) were observed. Wound dehiscence was found in 1 patient (4.76%) from the PSG patient but in no patients in the BMG group. The patient with wound dehiscence had a superficial dehiscence and was managed with regular dressing and secondary suturing done later on. Haematuria was noted in 1(4.55%) patient in the BMG group and 2(9.52%) in the PSG group. All the patients with haematuria were treated conservatively and haematuria resolved in 3 to 4 days. Perineal wound tightness was complained by only 1 patient (4.76%) in the PSG group with none in the BMG group. Urinary tract infection in the first few weeks of surgery was seen in 1 patient (4.55%) in the BMG group with 3 patients (14.24%) affected in those receiving PSG. These patients developed fever with chills. After evaluation, urine was sent for C/S and they were treated with antibiotics accordingly. The patients improved in a few days. Al Quadah HS et al¹¹ reported 5% wound dehiscence in his work on dorsal onlay urethroplasties. Arlem AM et al⁶ had 8.33% of wound dehiscence in his series. Our study fairly agrees with the above authors. On haematuria, Al Qudah HS¹¹ reported 5% incidence in his studies. Perineal wound tightness as reported by Al Qudah et al¹¹ in his work is about 5% which is the same as seen in the PSG patients in our study. As 3 patients were lost in follow up, 2 from the BMG and 1 from the PSG, they were not included in the analysis of late complications (complications noted on follow up). Thus the number of patients in each group left was 20. On subsequent follow-ups, post void dribbling was complained by 2 patients (10%) in the BMG group as compared to 1 patient (5%) in those receiving PSG. None of the patients in the BMG group had change in their erectile function as compared to that with PSG in which 1 (5%) patient reported erectile dysfunction as compared to pre surgery phase. Urethro-cutaneous fistula was not seen in any of the patients in either of the groups though chordee developed in 1 patient (5%) receiving BMG as compared to 2 patients (10%) in the PSG group. Post voidal dribbling was reported in 12% of the cases by Joseph JV et al¹² and 23% cases by Dubey D et al¹³ for substitution urethroplasties. Raber M et al¹⁴ reported 8% incidence for the BMG patients and 7% for the PSG recipients. Erectile dysfunction as found by Al Qudah et al¹¹ was 0% for the BMG. Dubey D et al¹⁵ found 5% of his patients with substitution urethroplasties to have erectile dysfunction. Our study fairly agrees with the above authors. Urethrocutaneous fistulas have been reported in 11% by Martinez et al¹⁶, 3.5% cases by Aghazi et al¹⁷, 3% by Joseph J V¹², 8% by Xu YM et al¹⁸, 4.4% by Arlem AM⁶ et al. No fistulas have been reported by Barbagli et al.¹⁹ For a better analysis, the above post operative complications were combined into two parts in our study as done by Al Qudah HS et al¹¹ into early (major and minor) and late (major and minor) complications. The first were the early complications observed during the 1st three weeks of surgery. Early (minor) complications are haematuria, scrotal haematoma, wound dehiscence, wound tightness and retrograde urethrography leak. The only major early complication was Urinary tract infection. The second

group of observation was done on subsequent follow-ups at a regular interval of 3 months. Late (minor) complications that were observed included post voidal dribbling, urinary spraying, perineal and scrotal hypoaesthesia and UTI. Erectile dysfunction (if developed after surgery), any urethro-cutaneous fistula and chordee were considered major late complications. Early minor complications in the BMG were 4.55% in our study and the early major complication was also 4.55%. Thus the total percentage of early complications comes to around 9.1% for BMG, whereas the minor early complications in the PSG patient is about 19.04% and major 14.29% giving a total of 33.33% early complications for PSG. Pansodaro et al²⁰ reported 6% early complication. Al Qudah HS¹¹ reported 42% of early complications. Minor late complications of perineal and scrotal hypoaesthesia were not seen in any of the patients in the two groups. Post void dribbling was observed in 2 patients (10%) in the BMG group and 1 patient (5%) in the PSG groups. UTI was not seen in any of the patients later on. Of the major complications noted, erectile dysfunction was noted in only 1 (5%) of the patient in the PSG patient and none in the BMG group. Chordee was seen in 1 patient (5%) in the BMG group and 2 patients (10%) in the PSG group. None of the patients developed urethrocutaneous fistula in either of the groups. Thus it is seen that late complications account for a total of 15% in the BMG group patients and 20% in the PSG group. Andrich et al (2001)²¹ reported 21% of late complications in his series. Our observations are fairly in agreement with that of the above authors.

Urinary flow was assessed in the patients at 3 weeks after surgery when the foley was removed and on subsequent follow-ups. Due to lack of uroflowmetry facilities at our centre at that time, urinary flow was assessed by description of flow by the patient as good, fair or bad. It was further supplemented by looking for PVRU in each and every case. At the time of removal of foley catheter, 20 patients with BMG described their flow as good and 2 described it fair. At this point 18 patients in the PSG found their flow as good and 3 patients found it fair. None of the patients in both the group found their flow bad. PVRU at this time was insignificant in all the patients in both the groups. RGU and MCU were performed at this stage as a routine in every patient and was found to be normal. Patients in both the groups had no problems with micturition in their first 6 months of follow up and were satisfied. 1 patient in the PSG group developed thinning of stream at 9 months of follow-up and on evaluation had post void residual urine volume of 150 ml. He was taught CISC after dilation. Another patient in the same group complained of thinning of stream and had a PVRU of 180 ml at 12 months time and he needed a dilation followed by CISC. Another patient at about the same time of his follow up i.e. at 12 months having undergone PSG reported with thinning of stream, urgency, frequency and had to undergo a dilation followed by CISC after his PVRU was found to be 200 ml. Patients in BMG group had an uneventful follow up except 1 who needed a dilation and CISC training for thinning of stream after 1 year of surgery (his PVRU was

170 ml). As any instrumentation was regarded as a failure, 3 patients (out of 20 patients followed), i.e. 15% in the PSG group were considered as failure and 1 patient (out of 20 patients followed), i.e. 5% in the BMG group was considered as failure. Thus, the success rate in my study is 85% for the PSG group with an average 15.45 month follow up and 95% for the BMG patients with an average follow up of 15 months. In the BMG group Venn SR, Mundy AR²² reported a success rate of 97%. Success rates as reported by other authors are Martinez Pineiro et al¹⁶ - 83.3%, Dubey D et al¹⁵ - 88%, Aghaji AE et al¹⁷ - 89.6%, Pisapati VL et al²³ - 87%, Arlen et al - 86.4%. In the PSG urethroplasties Barbagli et al.¹⁹ reported 73% success. In comparative studies Raber M et al.¹⁴ reported 76% success rate in the PSG substitution urethroplasties as compared to 85% in the BMG substitution urethroplasties. In other report N Lumen et al.⁸ reported 85.9% success rate for Buccal Mucosa Graft as compared to 81.8% in case of Penile Skin Graft.

Our study had the limitation of being a single centre study with small sample size, strictures being small segment and a short follow up period.

CONCLUSION

Thus it can be concluded that for substitution urethroplasty, buccal mucosa should be the preferred substitute but penile skin can be used in cases when the buccal mucosa is unavailable as in cases of sub mucus fibrosis etc.

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