EVALUATION OF THE SHORT TERM OUTCOME OF UNILATERAL URETHRAL MOBILIZATION COMPARED TO CIRCUMFERENTIAL URETHRAL MOBILIZATION FOR THE MANAGEMENT OF BULBAR URETHRAL STRICTURE

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Abstract

Objective: To evaluate and compare the outcome of buccal mucosal graft urethroplasty of unilateral and circumferential urethral mobilization for the management of bulbar urethral stricture.

Methods: Seventy patients having bulbar urethral strictures admitted in the Department of Urology, Dhaka Medical College Hospital, Dhaka between January 2010 to December 2011. Patients were divided into two groups. Group-I, underwent unilateral urethral mobilization, and Group-II, underwent circumferential urethral mobilization for buccal mucosa graft urethroplasty. All patients were followed up at least six months. The statistics used to analyze the data were descriptive statistics, and p value <0.05 was considered as significant.

Results: Mean±SD of age in Group-II and Group-I were 41.1±9.2 and 37.4±8.2 years respectively. All the baseline findings were identically distributed between the groups. Comparison of outcome at month 3 showed that peak urinary flow rate increased from their baseline figures, but the increase was significantly more in the unilateral group than that in the circumferential group (21.2±1.2 vs. 18.9±2.0 Qmax, p =< 0.001). After 6 months, evaluation showed that the peak urinary flow rate significantly higher in Group-I, than that in Group-II, (24.2±2.9 vs. 21.9±3.3, p < 0.001). The voided urine volume was also significantly higher in Group-I, than that in Group-II (330.8±50.1 vs. 294.5±46.1 ml, p = 0.004). Consequently, PVR was lower in the former group than that in the latter group (11.6±3.3 vs. 14.1±2.9 ml, p = 0.002). Complications in unilateral urethral mobilization had a significantly lower (20%) than that of circumferential urethral mobilization(45.71%) (p=0.024).

Conclusion: Buccal mucosa grafting is a versatile and effective treatment for the anterior urethral stricture, and the outcome is excellent following unilateral urethral mobilization in experienced hands.

Key words: Buccal Mucosal Graft, Unilateral, Circumferential, Urethral mobilization.


Introduction:

The term 'urethral stricture' refers to scarring process involving the spongy erectile tissues of the corpus spongiosum causing spongiofibrosis that is composed of dense collagen and fibroblasts. As these scars contract, narrowing occurs in the urethral lumen which restricts urine flow and causes dilatation of the proximal urethra.

Further obstruction may cause secondary complications in the urinary tract like; urethritis, prostatitis, periurethral abscess, urethrocutaneous fistula, hypertrophied bladder muscle, and secondary bladder stones. Finally, chronic
Ghosh et al

urinary stasis due to severe stricture causes hydroureteronephrosis, and even patient may present with renal failure[1,2].

Successful male urethral reconstruction poses a continuing challenge in modern urology. Numerous surgical techniques have been described to repair bulbar urethral stricture according to the stricture length and location. Urethral reconstruction with excision of the stricture segment and end-to-end anastomosis is successful in more than 95% of patients with a stricture of up to 2 cm in length in proximal bulbar urethra. Patients with long anterior urethral stricture (> 2 cm) is suitable for dorsal or ventral onlay graft urethroplasty because end-to-end urethroplasty in such cases cause possible complications and rate of recurrence of stricture.

In this prospective study, 70 consecutive patients having bulbar urethral stricture were selected as per selection criteria in the Department of Urology, Dhaka Medial College Hospital, Dhaka. The patients were divided into two groups on the basis of alternate case selection. In group-I, 35 patients underwent unilateral urethral mobilization, and in Group-II, 35 patients underwent circumferential urethral mobilization for BMG urethroplasty.

Preparation of the Patients
Thorough wash of the genitalia and perineum was given with povidone iodine scrub once daily for three days by patient himself. Fresh soap bath was taken in the morning of operation.

Operative procedure
All patients were given general anesthesia. Operations were performed by two-team approach. One team harvested the buccal mucosa from the inner cheek and lower lip. The donor site was closed with 4-0 chromic catgut in running suture, and second team exposed the stricture.

Surgical technique of unilateral urethral mobilization
The patient was placed in a lithotomy position. The BMG was harvested from the cheek according to the standard technique. A midline perineal incision was made. The bulbar urethra was dissected from the corpora cavemosum only along the left side, starting from the distal tract where muscles are absent leaving the bulbopospongiosum muscle and the central tendon of the perineum intact. Along the right side, the urethra remained attached to the corpora cavemosum for its full length, thus preserving its lateral blood supply. On the left side, the urethra was partially rotated, and the lateral urethral surface was underlined. The distal stenosis was identified, the dorsal urethral surface was incised along the midline, and the urethral lumen was exposed. The stricture was then incised along its entire length by extending the urethrotomy distally and proximally. The BMG was trimmed to an appropriate size according to the length and width of the urethrotomy. The two apices of the graft were sutured to the proximal and distal apices of the urethrotomy. The right margin of the oral graft is sutured to the left margin of the urethral mucosal plate. A Foley 16 Fr silicone catheter was inserted. The bulbar...
urethra with the intact bulbospongiosum muscle was rotated to its original position over the graft. Interrupted 4/0 polyglactin sutures are used to stabilize the urethral margins onto the corpora cavernosa over the graft on the left side. The graft is completely covered by the urethra, and wound was closed in layers.

**Surgical technique of circumferential urethral mobilization**

The patient was placed in lithotomy position. A midline perineal incision was made. The bulbocavernous muscles were separated in the midline, and patients with proximal urethral stricture, the central tendon of muscles were separated in the midline, and patients on the left side. The graft is completely covered by the urethra. A suction drain is left in place for one day.

**Postoperative Care**

Mild pressure dressing was applied over the wound to prevent haematoma. The drain was removed after 24 hours, and patients were discharged after 3-5 days. The catheter was kept in situ for 3 weeks in all cases. A pericatheter urethrogram was performed after 3 weeks. If there was no periurethral leakage, the catheter was removed. Urethral catheters were kept in situ for further one week or more in patients, if any leakage was noted.

**Follow up Schedule and Evaluation**

All patients were followed up for at least six months by history, physical examinations, and investigations. RGU and MCU was done when peak flow was <15 ml/sec in uroflowmetry. Urethroscopy was done at 3rd and 6th month. Outcome was evaluated on the basis of post-operative complications, findings of pericatheter urethrogram, Uroflowmetry, RGU and MCU and Urethrocytoscopys. Successful reconstruction was defined as normal voiding; urine flow rate is e"15 ml/sec without need for any postoperative procedure, including dilatation.

**Statistical Analysis:**

Data were analyzed using SPSS version 13, and the descriptive statistics were used to analyze the data, and the Student’s t-test, Chi-square test, ANOVA, and Fisher exact test were used. A p value <0.05 was considered as significant.

**Results:**

Seventy patients (35 patients underwent unilateral urethral mobilization, and 35 patients underwent circumferential urethral mobilization) having bulbar urethral strictures were evaluated to compare the short-term outcome of the two techniques of urethral mobilization for the management of bulbar urethral stricture. Patients ≥ 40 years old were higher in the circumferential group compared to unilateral group. The mean age in the former and the latter groups were being 41.1±9.2 years and 37.4±8.2 years respectively. No significant difference was found between the groups in terms of causes of stricture. Preoperatively, a large proportion of patients in the circumferential group complained of poor urinary stream and LUTS than those in the unilateral group (97.1% vs. 77.1%, and 88.6% vs. 77.1%, respectively). Urethral discharges were almost identically distributed between unilateral and circumferential groups (40% vs. 45.7%). The incidence of acute urinary retention was higher in the former group than those in the latter group (34.3% vs. 17.1%, p = 0.101 and 34.3% vs. 5.7%, p = 0.003). The mean length of stricture and peak urinary flow rate was higher in unilateral group compared to circumferential group (3.6±0.8 vs. 3.5±0.7 cm and 7.8±1.5 vs. 7.6±1.5 Qmax respectively). However, mean volume of voided urine and PVR were considerably higher in the latter group than those in the former group (212.5±57.7 vs. 210.5±61.8 ml and 59.4±6.7 vs. 57.4±6.2 ml respectively). Over 45% of patients in unilateral group had urinary tract infection compared to 40% in the circumferential group. All the baseline findings were identically distributed between groups (Table-I). Over two-third (68.6%) of the patients in unilateral group and 71.4% in the circumferential group had longer stricture (>3 cm) (Figure 1). Comparison of immediate outcome showed that in both groups the peak urinary flow rate increased from their baseline figures,
and there was no significant difference between the groups in terms of peak urinary flow rate (15.3±1.2 vs. 15.9±1.8 Q$_{\text{max}}$). The voided urine volume was significantly higher in circumferential group than that in unilateral group (354.3±40.4 vs. 328.8±50.1 ml). Comparison of outcome at month 3 showed that a significant difference in peak urinary flow rate in the unilateral group than that in the circumferential group (21.2±1.2 vs. 18.9±2.0 Q$_{\text{max}}$). However, no significant difference was observed between the groups in respect to voided urine volume (331.8±25.1 vs. 340.3±40.4 ml) (Table-II). Uroflowmetric evaluation after 6 months of intervention showed that the peak urinary flow rate increased further in both unilateral and circumferential groups with former showing more increase than the latter (24.2±2.9 vs. 21.9±3.3). The voided urine volume was also significantly higher in the unilateral group than that in the circumferential group (330.8±50.1 vs. 294.5±46.1 ml). Consequently, PVR was lower in the former group than that in the latter group (11.6±3.3 vs. 14.1±2.9 ml) (Table-III). Complications like wound infection, urethrocutaneous fistula, recurrence of stricture and optical instrumentation to dilate the stricture were less common in the former group than that in the latter group although the differences were not statistically significant (Table-IV).

**Table-I**

<table>
<thead>
<tr>
<th>Baseline findings</th>
<th>Group-I</th>
<th>Group-II</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 35)</td>
<td>(n = 35)</td>
<td></td>
</tr>
<tr>
<td>Length of stricture</td>
<td>3.6±0.8</td>
<td>3.5±0.7</td>
<td>0.938</td>
</tr>
<tr>
<td>Peak urinary flow rate</td>
<td>7.8±1.5</td>
<td>7.6±1.5</td>
<td>0.589</td>
</tr>
<tr>
<td>Voided urine volume</td>
<td>210.5±61.8</td>
<td>212.5±57.7</td>
<td>0.840</td>
</tr>
<tr>
<td>PVR</td>
<td>57.4±6.2</td>
<td>59.4±6.7</td>
<td>0.829</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>21(45.7)</td>
<td>14(40.0)</td>
<td>0.629</td>
</tr>
</tbody>
</table>

# Data were analysed using Student’s t-Test and presented as mean ± SD. Figures in the parentheses indicate corresponding percentage. * Data were analysed using Chi-square ($\chi^2$) Test.

**Table-II**

<table>
<thead>
<tr>
<th>Outcome variables</th>
<th>Group-I</th>
<th>Group-II</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 35)</td>
<td>(n = 35)</td>
<td></td>
</tr>
<tr>
<td>Peak urinary flow rate (Q$_{\text{max}}$)</td>
<td>21.2±1.2</td>
<td>18.9±2.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Voided urine volume (ml)</td>
<td>331.8±25.1</td>
<td>340.3±40.4</td>
<td>0.313</td>
</tr>
</tbody>
</table>

# Data were analysed using Student’s t-Test and presented as mean ± SD.

**Table-III**

<table>
<thead>
<tr>
<th>Outcome variables</th>
<th>Group-I</th>
<th>Group-II</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 35)</td>
<td>(n = 35)</td>
<td></td>
</tr>
<tr>
<td>Peak urinary flow rate (Q$_{\text{max}}$)</td>
<td>24.2±2.9</td>
<td>21.9±3.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Voided urine volume (ml)</td>
<td>330.8±50.1</td>
<td>294.5±46.1</td>
<td>0.004</td>
</tr>
<tr>
<td>PVR (ml)</td>
<td>11.6±3.3</td>
<td>14.1±2.9</td>
<td>0.002</td>
</tr>
</tbody>
</table>

# Data were analysed using Student’s t-Test and was presented as mean ± SD.

**Table-IV**

<table>
<thead>
<tr>
<th>Complications encountered by the patients of two groups</th>
<th>Group-I</th>
<th>Group-II</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 35)</td>
<td>(n = 35)</td>
<td></td>
</tr>
<tr>
<td>Bleeding*</td>
<td>4(11.4)</td>
<td>10(28.6)</td>
<td>0.073</td>
</tr>
<tr>
<td>Wound infection*</td>
<td>6(17.1)</td>
<td>12(34.3)</td>
<td>0.101</td>
</tr>
<tr>
<td>Urethrocutaneous fistula*</td>
<td>1(2.9)</td>
<td>3(8.6)</td>
<td>0.307</td>
</tr>
<tr>
<td>Recurrence of stricture*</td>
<td>3(8.6)</td>
<td>6(17.1)</td>
<td>0.239</td>
</tr>
<tr>
<td>Optical instrumentation*</td>
<td>3(8.6)</td>
<td>6(17.1)</td>
<td>0.239</td>
</tr>
</tbody>
</table>

* Data were analysed using Chi-square ($\chi^2$) Test. # Data were analysed using Fisher’s Exact Test.

**Discussion:**

The present quasi-experimental study was conducted in the Department of Urology, Dhaka Medical College Hospital, Dhaka between January 2010 to December 2011.

In the present study, no significant difference was found between the two groups in terms of mean age, length of...
Moreover, the causes of stricture in various international series of substitution urethroplasty of anterior urethral stricture, the patients were selected with a stricture length of >2cm at bulbar part[14,15]. The anterior urethral stricture, the patients were selected from their baseline figures, but no significant difference was observed (15.3±1.2 vs. 15.9±1.8 Q_{max}, p=0.104). However, the voided urine volume was significantly higher in group-II than that in group-I (354.3±40.4 vs. 328.8±50.1 ml, p=0.023).

Comparison of outcomes at 3rd and 6th month of intervention showed a significant difference of peak urinary flow rate between two groups (21.2±1.2 vs. 18.9±2.0 Q_{max}, p<0.001 and 24.2±2.9 vs. 21.9±3.3, p<0.001 respectively). There was no significant difference in terms of voided urine volume at 3 month (331.8±25.1 vs. 340.3±40.4 ml, p=0.313), however, it was significantly higher in group-I than group-II at 6 month follow up (330.8±50.1 vs. 294.5±46.1 ml, p=0.004). In the series of Palmintiri et al. (2008)[16] using unilateral urethral mobilization, post operative peak urinary flow of successful patients was 31.02 ml/s versus the preoperative average peak urinary flow of 7.64 ml/s. Another study reported peak flow rate ranged between 18-29 ml/sec (mean 21) after successful operation of bulbar urethral stricture using circumferential urethral mobilization[17]. Six patients in group-I developed wound infection which was subsided with regular dressing, and fistula was observed in 1(2.9%) patient, who was cured spontaneously with two weeks further catheterization. Three patients (8.6%) develop recurrence, which was managed by internal urethrotomy. In group-II 12 patients developed wound infection and 3 patients developed fistula which were managed as in previous group. Six patients (17.1%) developed recurrence, which was also managed by internal urethrotomy. One study reported 11% of recurrent stricture of dorsal onlay buccal mucosa graft urethroplasty of bulbar urethral stricture[18].

In different studies from 1998 to 2008 reported a success rate ranged from 65.8% to 90% with circumferential urethral mobilization for penile or buccal mucosa graft urethroplasty of bulbar urethra with a complications rate ranged from 3 to 25% and reoperation rate ranged from 2 to 8% which correspond the present study of using circumferential urethral mobilization[17]. Muscle and nerve sparing bulbar urethroplasty of six patients showed no postvoiding dribbling, semen sequestration, and no recurrence in 6 to 12 months after surgery[19]. In various studies of BMG urethroplasty using circumferential urethral mobilization Kene et al. [20] reported a success rate 94.3%, Pansadoro et al. [21] reported 96% and Andrich and Mundy[22] reported 89%.

A success rate of 87.5% with a recurrence of original disease of 12.5% reported by Kulkarni et al. [12] in 32 patients underwent circumferential urethral mobilization of BMG urethroplasty which is similar to the results of present study. They also reported their previous experiences, in Kulkarni et al. (2003)[23] an 83.5% success rate, and the dorsal BMG urethroplasty showed a 77.3% success rate. In a series using a new vascular, muscle and nerve-sparing procedure, the success rate was 92% which represent the results of present study.

In the present study in group-I BMG urethroplasty, success rate was 91.4% and in group-II BMG urethroplasty group success rate was 82.85%. There is an encouraging outcome in group-I and significant difference was observed between the groups in terms of the peak urinary flow rate, voided volume of urine and PVR. Although overall complication rates in group-II were higher, no significant difference was observed between the groups in terms of postoperative complications and recurrence of disease.

Conclusion:
Buccal mucosa grafting is a versatile and effective treatment for the anterior urethral stricture, and in experienced hands, the outcome is excellent. The outcome of unilateral urethral mobilization is better than circumferential urethral mobilization for BMG urethroplasty of bulbar urethral stricture. Long-term follow-up and large sample are necessary to clarify the outcome which is related to urethral mobilization using BMG.

Conflict of Interest : None declared

References:

3. Gupta NP, Ansari MS, Dogra PN, Tandon S. Dorsal buccal mucosal graft urethroplasty by a ventral sagittal urethrotomy and minimal access perineal approach for anterior urethral stricture. BJU Int 2004;93:1287–90.


Abbreviations:
BMG : Buccal Mucosal Graft
MCU : Micturating Cystourethrogram
PVR : Post Void Residue of Urine
RGU : Retrograde Urethrogram