SALVAGE MATHIEU URETHROPLASTY: REUSE OF LOCAL TISSUE IN FAILED HYPOSPADIAS REPAIR

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ABSTRACT

Objectives. To report our experience with Mathieu urethroplasty for revision of hypospadias repairs. Mathieu perimeatal-based flap urethroplasty remains a popular technique more than seven decades after its description for single-stage hypospadias repair. The excellent results of primary distal hypospadias repair are well documented, but reports of the results using the technique as a salvage procedure are sparse. The reuse of local tissue may be hampered by the presence of scar tissue and reduced vascularity.

Methods. A total of 40 patients underwent salvage urethral reconstruction. Of the 40 patients, 34 (mean age 70 months, range 11 to 216) underwent salvage Mathieu urethroplasty. All patients underwent surgery at least 6 months after the previous surgery. One, two, and three or more prior procedures had been performed in 22, 6, and 6 patients, respectively. The mean follow-up period was 29 months (range 1 to 84). In 6 patients, local tissue was scarred and immobile, and they underwent the procedure using buccal mucosal grafts.

Results. Satisfactory functional and cosmetic results after the initial procedure were achieved in 25 patients (74%). Two patients underwent reoperation for repair of meatal stenosis, and 5 (15%) underwent simple repair of fistula without the need for urethral reconstruction. Two patients underwent reoperation at other medical centers and were lost to follow-up. Overall, cure was achieved in 32 (94%) of the 34 patients.

Conclusions. Mathieu urethroplasty is an efficient technique for salvage hypospadias repair. Patient selection is the key to successful repair. Despite the effects of previous surgery, local tissue of adequate quality to facilitate repair exists in most patients.


Despite vast improvements in surgical techniques and suture materials, complications of hypospadias repair are still encountered and present a constant challenge to surgeons. The use of local tissue is hampered by the presence of scar tissue and reduced vascularity. Several techniques have evolved, avoiding the use of penile skin and using buccal mucosal grafts, bladder mucosal grafts, tunica vaginalis, or dermal grafts. Despite the obvious disadvantages of compromised local tissue, a number of favorable reports of such revision procedures have been published.1 The meatal-based flap urethroplasty remains a popular technique more than seven decades after its description as single-stage hypospadias repair by Mathieu,2 achieving excellent results for primary distal hypospadias repair. The role of the technique as a salvage procedure has not been well documented.3,4

We report our experience with the Mathieu urethroplasty for revision of complications of previous hypospadias repair procedures.

MATERIAL AND METHODS

A total of 40 patients underwent salvage urethral reconstruction. Of these patients, 34 (mean age 70 months, range 11 to 216) underwent salvage Mathieu urethroplasty. The indication for surgery was complete breakdown of a previous repair in 22, fistula in 10, and urethral stricture in 2. One, two, and three or more prior procedures had been performed in 22, 6, and 6 patients, respectively. The technique used in the previous procedures was known in only a few patients, because many were referred from other centers. Ten patients had undergone tubularized incised plate (TIP) repair, 2 patients had undergone one previous Mathieu urethroplasty, 1 had undergone two previous Mathieu urethroplasty procedures, and 2 had undergone surgery using a preputial island onlay graft. All patients underwent surgery by a single surgeon (J.B.C.). Magnification loupes and needle tip cautery were used in all cases, and the suture material was 5-0 polyglactin absorbable suture. At the end of the procedure, silicon urethral stents or...
catheters were placed and bio-occlusive dressings applied in all cases, followed by a double diaper for children not yet toilet trained. Both stents and dressings were removed 1 week after surgery. In 8 patients, additional procedures were performed during the same session: 5 underwent midline dorsal penile plication for repair of curvature, 1 underwent repair of penile torsion, 1 underwent repair of umbilical and inguinal hernias, and 1 repair of hydrocele. The length of the hospital stay was determined according to the support system available for each patient, ranging from same-day discharge to a 3-day hospitalization. Patients were examined postoperatively at 1 and 4 weeks, and then as required. We attempted to achieve a longer follow-up period and to gain additional information regarding the long-term results of the procedure after the immediate postoperative period. During data collection, the medical staff interviewed parents and patients, inquiring about complications arising after the short-term follow-up period and whether further surgical procedures were required. We failed to contact 5 patients, who had been examined in the immediate postoperative period; for those patients, the follow-up period was 1 month. The mean follow-up period was 29 months (range 1 to 84). During the 7-year study period, the local tissue was too scarred and immobile, inappropriate for a salvage procedure, in only 6 patients. These patients underwent urethral reconstruction using buccal mucosal grafts.

RESULTS

Satisfactory functional and cosmetic results after the initial procedure were achieved in 25 patients (74%). Two patients underwent repeat surgery for repair of meatal stenosis, and 5 (15%) underwent simple local repair of fistula, without the need for urethral reconstruction. Two patients underwent reoperation at other medical centers and were lost to follow-up. The results and complications according to the number of previous procedures are given in Table I. Additional procedures for urethral reconstruction were not required in any of the 32 patients (94%) who were followed up at our institute.

COMMENT

The Mathieu urethroplasty has been in extensive use for decades and has only recently been partially replaced by TIP urethroplasty. Although excellent results of primary hypospadias repair are available, the results of salvage Mathieu urethroplasty are sparse. Rabinowitz reported his series of 59 Mathieu urethroplasties, 8 of which were salvage procedures, with a 75% success rate. Wheeler and Malone reported on six secondary procedures, 5 patients required no further treatment and 1 underwent a successful fistula closure procedure. Secrest et al. retrospectively reviewed 190 complications of hypospadias repair. Mathieu urethroplasty had been performed in 34 of the 65 patients who required urethral reconstruction. The procedure was definitive in 18 patients (53%), but the other 16 patients required additional surgery. Simple local procedures were performed in 3 of these patients, for repair of meatal stenosis and small fistula; the other 13 patients underwent various urethral reconstruction procedures. Jayanthi et al. reported on 28 patients who underwent salvage Mathieu urethroplasty. Success was reported in 20 patients (71%), and 4 patients required simple repair of fistula or stricture, 4 patients underwent reoperation for urethral reconstruction, including two successful Mathieu urethroplasty procedures. Similar results were reported by Simmons et al., who achieved successful results in 13 (76%) of 17 cases, with 2 additional patients requiring simple small fistula repair. In the largest available series, Emir and Erol reported on 55 salvage urethroplasties, with a fistula occurrence rate of 25.4% (14 patients) and an additional three early postoperative complications requiring surgery. The follow-up period in their study was relatively short, at a mean of 3.2 months. In most previous studies, the follow-up periods were similarly short, if mentioned at all. Through the use of telephone interviews, we were able to present a longer follow-up period, with a mean of 29 months (range 1 to 84).

The rationale for postoperative bladder drainage is to avoid the urethral high pressure caused by edema, and the resulting risk of fistula formation, and to allow easy, painless urination. The technique, as originally described by Mathieu, did not involve urethral stenting. Later reports have shown comparable results after stented and unstented primary Mathieu urethroplasty. In previous reports of revision hypospadias repairs using the Mathieu technique, different approaches were at-

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**TABLE I. Results and complications according to number of previous procedures**

<table>
<thead>
<tr>
<th>Previous Procedures</th>
<th>Patients (n)</th>
<th>Fistula (n)</th>
<th>Meatal Stenosis (n)</th>
<th>Lost to Follow-up *</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>2</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3+</td>
<td>6</td>
<td>2</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

* Underwent reoperation elsewhere.
tempted. Rabinowitz\(^a\) reported on stentless modified Mathieu repair. Eight of the patients underwent revision hypospadias repair, and satisfactory results were achieved in six. Emir and Erol\(^b\) used both a urethral stent and a suprapubic tube, but their success rates were not superior to those of other reports that avoided suprapubic drainage. Our practice of urethral stenting reflects the one commonly used in most revision hypospadias reports, although the results published by Rabinowitz\(^a\) in his small series of patients are in line with the results of stented procedures and merit further consideration.

Another adjunct used by surgeons when dealing with revision hypospadias repair is the administration of testosterone. First reported by Immergut et al.,\(^1\) local application of testosterone has since been reported to promote penile growth and facilitate surgery, although controlled trials are not available. The possibility of parenteral testosterone therapy has also been evaluated, reportedly with negligible and reversible side effects.\(^2,3\) Still, the preferred route of administration is not clear, because significant differences between the routes have not been identified. We avoided the use of either form of testosterone administration, because we believe that in those few cases in which local tissue is not suitable for reconstructive procedures, other techniques are available that will not subject patients to the potential side effects of local or systemic testosterone administration.\(^4\)

TIP urethroplasty has obtained a major role in distal hypospadias repair.\(^5,6\) Numerous reports of excellent results in primary repairs have been published, but its role as a salvage procedure is still evolving. Salvage TIP was mentioned by Snodgrass et al.\(^1\) in their multicenter report, in which successful procedures were performed in 11 patients. In a later report, Shanberg et al.\(^2\) achieved good results in 11 of 13 patients. Complications occurred in 2 patients; 1 developed a midshaft fistula attributed to bladder spasms, and 1 developed mental stenosis. Borer et al.\(^3\) evaluated the impact of TIP on both primary and repeat hypospadias repairs. The complication rate after repeat hypospadias repair was 24% (6 of 25 patients); 4 of 5 cases of urethral fistula occurred after procedures in which no second-layer coverage was used. In the series published by Snodgrass and Lorenzo,\(^4\) 15 patients underwent salvage TIP, 8 of whom had originally undergone procedures that involved incision of the urethral plate. Three complications occurred. Two patients developed a small fistula, and one developed dehiscence of the glans. As experience accumulates, larger studies will be available. It remains to be seen whether TIP will acquire a major role in salvage hypospadias repair, similar to that already achieved in primary repair.

The concept of using local tissue in salvage hypospadias repairs may seem contrary to the principals of reconstructive surgery. Surgeons favor the use of well-vascularized, supple tissue. Using local scar tissue for repair of complications of previous hypospadias repair procedures implies using tissue of poor quality, with less than optimal vascularity. The true challenge of a surgeon attempting to achieve good functional and cosmetic results in these cases is patient selection. Salvage Mathieu urethroplasty may be undertaken in patients with a short distal defect and with adequate local tissue. In our series, although Mathieu urethroplasty was not used sparingly, the local tissue quality proved adequate, resulting in a 94% eventual success rate. An experienced hypospadias surgeon should evaluate the quality of the local tissue, a key factor in determining the outcome of the procedure. A surgeon attempting to perform salvage hypospadias repair should be proficient in other techniques to be used when the local tissue is inadequate.

**CONCLUSIONS**

Mathieu urethroplasty is a useful and efficient salvage procedure. Despite the effects of previous procedures, local tissue of adequate quality facilitating repair exists in most patients. In these patients, local tissue can be used, avoiding the use of grafts and the associated morbidity. An experienced, well-versed surgeon should perform patient selection, the most critical factor determining the outcome of the procedure.

**REFERENCES**


