Tunica vaginalis flap cover in hypospadias cripple following Bracka's stage 1 using buccal mucosal graft: A reliable option than simple Theirsch duplay urethroplasty

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Abstract. Objective: Objective of this study was to assess the significance of tunica vaginalis flap cover in cases of proximal penile hypospadias cripples managed by staged repair on Bracka’s principle. Methods: This retrospective study included cases of proximal penile hypospadias cripples managed on Bracka’s principle using buccal mucosa graft. Second surgery was on Theirsch duplay principle. Group I included cases with tunica vaginalis flap reinforcement, Group II using dartos cover. All cases were managed by a uniform protocol. Outcome was assessed at day 10 after stent removal and at first follow up. Urethroplasty was considered successful in case with no leak. P value < 0.05 was considered significant. Results: Out of 42 cases, 18 cases in group I and 24 cases in group II formed the study group. Mean age at hypospadias repair was 4.2 ± 0.9 years (range1.1 – 5.2 years) and 4.1 ± 0.7 years (range1.3 – 5.6 years) in group I and II respectively. Leak at the time of stent removal was present in 1/18(5.57%) and 4/24(16.67%) cases in group I and II (p=0.04). Leak at the time of first follow up was present in 1/18(5.55%) and 5/24(20.83%) cases in group I and group II (p=0.03). Complete disruption of urethroplasty was present in 1/18(5.57%) and 2/24(8.33%) cases in group I and group II (p=0.1). The overall success rate in group I and II was 15/18(83.83%) and 13/24(54.16%) (p=0.01). Conclusions: Tunica vaginalis flap reinforcement in cases of proximal penile hypospadias cripples is a viable and reliable option.

Key words: Bracka's principle, Dartos flap, Fistula, Proximal penile hypospadias cripples, Tunica vaginalis flap

Introduction

Hypospadias is one of the common congenital anomaly of urethra with a reported incidence of 1 in 300.1 Management of proximal penile hypospadias offers a technical challenge to the operating surgeon. This challenge is both in terms of cosmesis and association with a high fistula rate. A number of techniques have been described. We tried to compare the results of management of proximal penile hypospadias cripples managed by staged repair on Bracka's principle using tunica vaginalis flap reinforcement and the use of dartos flap.

Objective of this study was to assess the significance of tunica vaginalis flap cover in cases of proximal penile hypospadias cripples managed by staged repair on Bracka's principle.

Materials and Methods

This was a retrospective analysis. Case records of cases of proximal penile hypospadias cripples between January 2007 and May 2013 were analyzed. Hypospadias cripple was defined as cases of hypospadias with at least two prior attempts of urethroplasty but presenting with complete dehiscence. Those cases that were managed with staged repair on Bracka's principle using buccal mucosa graft followed by urethroplasty on Theirsch-duplay principle at least 6 months after the initial procedure were included. All the cases were operated by a single senior surgeon experienced in harvesting buccal mucosa graft, tunica vaginalis flap and applying it also in other techniques of application of second layer over urethroplasty. These cases were divided into two groups. Group I included cases with tunica vaginalis flap reinforcement (Fig. 1A, B) and Group II using dartos cover. All the cases were managed by a uniform protocol using 6-0 interrupted PDS sutures for urethroplasty and 5-0 vicryl for flap reinforcement followed by compression dressing for 4 days. Dressing was removed on
Day 4. All the urethroplasties were done over 7 Fr infant feeding tube as stent. Stent was removed on D10. All the patients received tab ethinylestradiol (Lynoral) 0.01 mg bedtime and tab phenobarbitone (luminal) 5mg/kg/dose bedtime to prevent erections. Cases with incomplete data or where dressing was removed before day 4 or stent was removed came out before day 10 or where lynoral/luminal intake was irregular were excluded. Outcome was assessed at day 10 after removal of the stent and at first follow up visit. Urethroplasty was considered successful in case of no leak and no splaying of urine. While any leak from the urethroplasty site or disruption of closure was considered as failure.

The data analysis was done using STATA software version 11 [Stata Corp LP Texas USA]. The statistical tests applied were chi square test, Wilcoxon signed rank test. P value was calculated using fisher exact test and the value < 0.05 was considered statistically significant.

Results

In the defined period of January 2007 and May 2013 a total of 129 cases of proximal penile hypospadias were operated. Out of these 129 cases of proximal penile hypospadias there were 67 cases of hypospadias cripples. 43 cases were managed by Bracka’s staged repair and formed the study group. A total of 33 out of these 43 cases had at least one of the two surgeries for hypospadias done at some other hospital while the remaining 10 cases were operated in other hospitals and referred to us for management of hypospadias cripples. Among these 43 cases 19 cases were managed by tunica vaginalis and remaining 24 cases were managed by dartos flap reinforcement in the second stage. One case with tunica vaginalis flap reinforcement was excluded as stent came out accidently at day 6 (though he had no fistula). Thus 18 cases in group I and 24 cases in group II formed the study group. The mean age at hypospadias repair was 4.2 ± 0.9 years (range 1.1 – 5.2 years) and 4.1 ± 0.7 years (range 1.3- 5.6 years) in group I and II respectively. The outcome difference between the two groups was as shown in table 1.

As seen in table 1, leak at the time of removal of stent was present in 1/18(5.55%) case in group I while it was present in 4/24(16.67%) cases in group II and this difference was significant (p=0.04). There were 1/18(5.55%) case in group I and 5/24(20.83%) in group II where there was no leak at the time of stent removal but had leak at first follow up. This difference was also significant (p=0.03). Complete disruption of urethroplasty was present in 1/18(5.55%) and 2/24(8.33 %) cases in group I and group II respectively and this difference between the two groups was not significant (p=0.1). The overall success rate in group I was 15/18 (83.83%) while it was 13/24 (54.16 %) in group II and this difference was significant (p=0.01). One of the cases with tunica vaginalis flap reinforcement developed testicular retraction which was managed conservatively. None had scrotal hematoma or meatal stenosis.

Table 1. Outcome of cases managed for proximal penile hypospadias cripples with tunica vaginalis flap or dartos flap reinforcement (n=42)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Group 1 (n=18)</th>
<th>Group 2 (n=24)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leak at stent removal on day 10</td>
<td>1 (5.55%)</td>
<td>4 (16.67%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Leak at first follow up</td>
<td>1 (5.55%)</td>
<td>5 (20.83%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Complete disruption</td>
<td>1 (5.55%)</td>
<td>2 (8.83%)</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td>3 (16.17%)</td>
<td>11 (45.84%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Success</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No leak</td>
<td>15 (83.83%)</td>
<td>13 (54.16%)</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Discussion

The incidence of hypospadias is 1 in 300 live births. The management of proximal penile hypospadias is challenging for a managing surgeon in terms of demanding cosmesis and high incidence of associated fistulas. A number of procedures have been devised for the management of these cases. Despite the improvements in the techniques of hypospadias surgery, some patients still present with failed repairs. Many
techniques have been introduced in the management of such situations which includes burying the repaired urethra in the scrotum,\textsuperscript{[10]} staged repair,\textsuperscript{[4,5]} overlapping denuded subcutaneous tissue,\textsuperscript{[6]} rotating skin flaps.\textsuperscript{[7, 8]} Successful outcomes are usually associated with the unwanted problems like scarring, defective vascularity and lack of the prepuce after failed previous repairs. The best option thus is to manage the cases with reinforcement of an extra layer over the urethroplasty. There are various available options for this reinforcement which includes use of tissues such as dartos fascia of ventral side of the penis or tunica vaginalis flap reinforcement. Furness and Hutchenson reported a success rate of 98% for dartos fascia use and of 109 patients, only 2 developed fistulas.\textsuperscript{[9]} A study in Turkey demonstrated better cosmetic results using mucosal collars. In that study, fistula and mental stenosis rates were 8.3% and 14%, respectively.\textsuperscript{[10]} In another study, the success rate with tunica vaginalis flap was 100% without a significant complication.\textsuperscript{[11]} In a study by Snow and colleagues, most of the post tunica vaginalis flap complications were related to scrotal hematoma and abscess, a rate of 5% was reported for urethrocutaneous fistula.\textsuperscript{[10]} Therefore, Snow and associates recommended tunica vaginalis flap as a second layer for primary hypospadias repair. In our series of tunica vaginalis flap reinforcement we fortunately did not have any scrotal hematoma though one case had mild testicular retraction. Fistula formation was seen in 2/18(11.11%) and 1/18(5.55%) had complete disruption of urethroplasty. In our study, the rate of fistula was higher (11.11%) this could be due to the selection of cases with poor local tissue and scarring due to previous hypospadias surgeries. By performing complete hemostasis and good anatomical dissection we did not encounter scrotal complications.

Hypospadias cripples can be classified as grade I, minor complications (no reoperation needed), e.g., small dehiscence, hematoma, etc; grade II, cosmetic complications (reoperation optional), e.g., meatal retraction or dystopia, skin surplus, scar contraction, circumcised appearance; grade III, major or functional complications (reoperation required), e.g., bleeding, fistula, curvature, disruption.\textsuperscript{[11]} All the cases selected in our study were grade III cripples where complete disruption of the urethroplasty needed redo surgery. Traditionally staged repair have been advocated in the management of these cases, this all started with Devine et al who described 70 patients with failed primary repairs and severe complications.\textsuperscript{[12]} These investigators used a very wide variety of techniques (more than 30) to solve individual problems. They advocated the use of staged techniques in this group of patients. Kropf et al followed them and they demonstrated the short- and midterm results of the treatment of forty complicated hypospadias recurrences.\textsuperscript{[15]} They used miscellaneous techniques for reconstruction of their patients. Fistulas were seen in the repairs where random pattern flaps (40 percent fistulas) were used compared with island flaps (14 percent fistulas). Elder and Duckett\textsuperscript{[10]} also described the benefits of staged repair. With time staged buccal mucosa graft (Bracka’s procedure) has gained acceptance in hypospadias surgery. Since its initial description,\textsuperscript{[11]} Bracka’s procedure has often been quoted as a good alternative in hypospadias cripples. Advantages of this technique include a well-vascularized graft for urethral reconstruction, lower complications and cosmetic aspect more similar to a normal neomeatus.\textsuperscript{[17, 18]} The principle consideration in this technical modification is to achieve a large enough graft to avoid significant contraction. Snodgrass and Elmore performed the Bracka’s procedure in 25 patients who underwent re-operation for hypospadias and showed excellent results.\textsuperscript{[18]} There are many such citations in literature that has increased the acceptability of Bracka’s procedure so much so that it is now considered as a gold standard in the management of these cases. There are still certain disadvantages in the form of scarring and fistula formation even in expert hands. We feel that by applying an additional layer in the form of tunica vaginalis flap in these cases the results can definitely be improved as seen in our study (p=0.01). There is as such no series available in literature demonstrating such comparison between additional layers in these cases though due to a limited number of patients our study needs further validation. A large randomized controlled trial is required to reach to any final conclusion however.

Conclusions

Tunica vaginalis flap reinforcement in cases of proximal penile hypospadias cripples is a viable and reliable option. With the proper use of this flap these cases can be managed successfully with best results.

References

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