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ORIGINAL ARTICLE

Tunica vaginalis flap cover in hypospadias cripples: Our experience in a tertiary care center in India

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Abstract

Objective: The objective of the following study is to assess the outcome of treatment with tunica vaginalis flap cover in cases of proximal penile hypospadias cripples. **Materials and Methods:** This retrospective study included cases of proximal penile hypospadias cripples managed by thiersch-duplay urethroplasty. Cases were divided into three groups. Group I included cases with tunica vaginalis flap, group II with dartos flap and group III included staged hypospadias repair on Bracka's principle. 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 was considered to be significant if less than 0.05. **Results:** Out of 67 cases, 18 cases were in group I, 24 cases were in group II and 24 were in group III. They formed the study group. Leak at the time of stent removal was present in 1/18 (5.57%), 4/24 (16.67%), 2/24 (8.33%) cases in group 1, II and III respectively ($P = 0.04$ and 0.4). Leak at the time of first follow-up was present in 1/18 (5.55%), 5/24 (20.83%) and 3/24 (25%) cases in group I, II and III respectively ($P = 0.03$ and 0.3). Complete disruption of urethroplasty was present in 1/18 (5.57%), 2/24 (8.83%) and 1/24 (4.16%) cases in group I, II and III respectively ($P = 0.1$). The overall success rate in group I, II and III were 15/18 (83.83%), 13/24 (54.16%) and 18/24 (75%) respectively ($P = 0.01$ and 0.1). **Conclusions:** Tunica vaginalis flap reinforcement in cases of hypospadias cripples is a viable and reliable option. This should be favored over dartos flap.

Key words: Bracka's repair, dartos flap, fistula, leak, proximal penile hypospadias cripples, tunica vaginalis flap

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INTRODUCTION

Hypospadias is one of the common congenital anomaly of the urethra with reported incidence of 1 in 300.[1]

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Management of proximal penile hypospadias is a technical challenge and is thus associated with maximum failures and cripples. Management of cases operated multiple times previously is very difficult not only due to poor tissues but also due to inappropriate second layers. Most of these cases are considered as surgeons nightmares and a number of techniques have been described for them. It becomes the responsibility of the operating surgeon to provide a final answer to them due to the psychological trauma associated with previous multiple surgeries and associated expectations. The results of various available techniques are mixed. Of all the available techniques

waterproofing second layer following the urethroplasty is the most important one. Traditionally this can be done using local dartos flap. Tunica vaginalis flap cover as a second layer is more promising and has got definite superior results when compared to the dartos flap. Many surgeons now consider a straightaway Bracka's staged repair rather than attempting a repair. We tried to evaluate and to compare our results in the management of these cases of proximal penile hypospadias cripples using redo urethroplasty with tunica vaginalis flap reinforcement, dartos flap and Bracka's staged repair with buccal mucosa graft in the first stage.

OBJECTIVE

To assess the outcome of treatment with tunica vaginalis flap cover in cases of proximal penile hypospadias cripples.

MATERIALS AND METHODS

This was a retrospective analysis. Case records of cases of proximal penile hypospadias cripples managed using redo urethroplasty on Theirsch-Duplay principle with tunica vaginalis flap and dartos flap reinforcement and by staged Bracka's repair (using buccal mucosal graft) 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. All the cases were operated by a single senior surgeon experienced in harvesting the tunica vaginalis flap/buccal mucosal graft and applying it and also in other techniques of application of the second layer over urethroplasty. Cases were divided into three groups, group I included cases of urethroplasty with tunica vaginalis flap reinforcement [Figure 1a and b], group II included urethroplasty with dartos flap used as the second layer and group III were managed by staged Bracka's repair with buccal mucosal graft in the first stage followed by urethroplasty on Theirsch-duplay principle. All

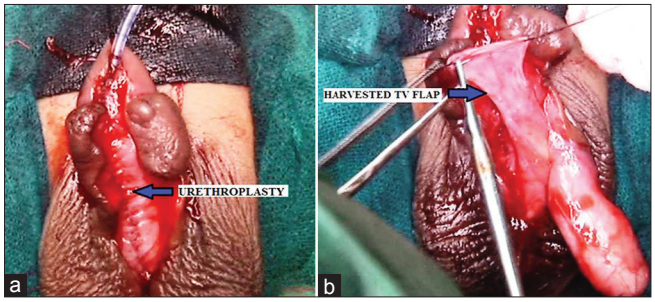

Figure 1: (a) Thiersch-duplay urethroplasty in proximal penile hypospadias cripple (b) Tunica vaginalis flap harvested and being applied as second layer

the cases were managed by a uniform protocol using 6-0 interrupted polydioxanone sutures for urethroplasty and 5-0 vicryl for flap reinforcement followed by compression dressing for 4 days. Dressing was removed on the day 4. All the urethroplasty were done over 7 Fr infant feeding tube as stent. Stent was removed on D10. All patients received tablet ethinyl estradiol (Lynoral) 0.01 mg bedtime and tablet phenobarbitone (luminal) 5 mg/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 of urethroplasty 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. Any leak from the urethroplasty site or disruption of closure was considered as failure. In group I and II, the result of the first surgery while in group III the result of a second surgery i.e. urethroplasty was considered for comparison studies.

The data analysis was performed using STATA software version 11 (Stata Corp LP Texas USA). The statistical tests applied were Chi-square test, Wilcoxon signed rank test. P was calculated using fisher exact test and the value <0.05 was considered as statistically significant. Institute's ethical committee approval for this study was taken.

RESULTS

In the defined period of January 2007 and May 2013, a total of 329 cases of hypospadias and 267 cases of proximal penile hypospadias were operated. Out of these 267 cases of proximal penile hypospadias, there were 67 cases of hypospadias cripples. A total of 43 cases were managed by single staged repair with some kind of flap while the remaining 24 cases were managed by Bracka's staged repair. A total of 49 out of these 67 cases had at least one of the two surgeries for hypospadias done at some other hospital while the remaining 18 cases were operated in other hospitals and referred to us for management of hypospadias cripples. Among these, 43 cases managed by single stage repair with reinforcing flap 19 cases were managed by tunica vaginalis and remaining 24 cases were managed by dartos flap reinforcement. 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 and 24 cases in group III formed the study group. The mean age at hypospadias repair was 4.2 ± 0.9 years (range 1.1-5.2 years), 4.1 ± 0.7 years (range 1.3-5.6 years) and 6.2 ± 0.8 years (range 2.8-8.2 years) in group I,

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

Outcome	Group I (*n*=18) (%)	Group II (*n*=24) (%)	*P* value
Failure			
Leak at stent removal on day 10	1 (5.55)	4 (16.67)	0.04
Leak at first follow-up	1 (5.55)	5 (20.83)	0.03
Complete disruption	1 (5.55)	2 (8.83)	0.1
Total	3 (16.17)	11 (45.84)	0.03
Success			
No leak	15 (83.83)	13 (54.16)	0.01

Table 2: Outcome of cases of proximal penile hypospadias cripples managed with tunica vaginalis flap or Bracka's staged repair (*n*=42)

Outcome	Group I (*n*=18) (%)	Group III (*n*=24) (%)	*P* value
Failure			
Leak at stent removal on day 10	1 (5.55)	2 (8.33)	0.4
Leak at first follow-up	1 (5.55)	3 (12.5)	0.3
Complete disruption	1 (5.55)	1 (4.16)	0.1
Total	3 (16.17)	6 (25)	0.3
Success			
No leak	15 (83.83)	18 (75)	0.1

II and III respectively. The outcome difference between the three groups was as shown in Tables 1 and 2.

As can be seen in Tables 1 and 2 leak at the time of removal of stent was present in 1/18 (5.55%) case in group I, 4/24 (16.67%) cases in group II and 2/24 (8.33%) in group III. The difference in the leak rates between group I and II was significant (P = 0.04) but there was no significant difference in the results between group I and III (P = 0.4). There were 1/18 (5.55%) cases in group I, 5/24 (20.83%) in group II and 3/24 (12.5%) in group III with leak at first follow-up. This difference between group I and group II was also significant (P = 0.03), but there was no significant difference between group I and group III. Complete disruption of urethroplasty was seen in 1/18 (5.55%) in group I, 2/24 (8.83%) cases in group II and in 1/24 (4.16%) in group III respectively. This difference between the three groups was however not significant (P = 0.1). The overall success rate in group I was 15/18 (83.83%) whereas it was 13/24 (54.16%) and 18/24 (75%) in group II and group III respectively. This difference was significant between group 1 and group II (P = 0.01), but insignificant between group I and group III (P = 0.3). One of the cases with tunica vaginalis flap reinforcement developed testicular retraction, which was managed conservatively. None had scrotal hematoma or metal stenosis.

DISCUSSION

The incidence of hypospadias is 1 in 300 live births.[1] 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.[2] Many techniques have been introduced in the management of such situations, which includes burying the repaired urethra in the scrotum,[3] staged repair,[4,5] overlapping denuded subcutaneous tissue,[6] rotating skin flaps.[7,8] Successful outcomes are usually associated with the unwanted problems such as 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 the ventral side of the penis or tunica vaginalis flap reinforcement. Furness and Hutcheson reported a success rate of 98% for dartos fascia use and of 109 patients, only 2 developed fistulas.[9] A study in Turkey demonstrated better cosmetic results using mucosal collars. In that study, fistula and meatal stenosis rates were 8.3% and 14%, respectively.[10] In another study, the success rate with tunica vaginalis flap was 100% without a significant complication.[11] In a study by Snow *et al*., most of the post tunica vaginalis flap complications were related to scrotal hematoma and abscess, a rate of 5% was reported for urethrocutaneus fistula.[12] Therefore, Snow *et al*. 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%). 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 redo cases with poor local tissue and scarring due to previous surgeries done in other institutes. By performing complete hemostasis and good anatomical dissection we did not encounter scrotal complications. Chatterjee *et al*. used Snodgrass method alongside dartos fascia in 20 patients and tunica vaginalis flap in 29 patients as a second layer for hypospadias repair.[13] They used flaps as a second layer in fresh cases of hypospadias and saw a fistula rate of 20% and 10% in the dartos fascia group and the tunica vaginalis flap group respectively. The leakage was visible only during voiding. A urethral catheter was replaced in all 7 patients

and kept for another 7-14 days. In three patients with a dartos wrap, leaking tracts gradually increased in size to 1-2 mm and epithelialized into fistulae around the corona. However, in three patients in the tunica vaginalis group the wound healed and urinary leakage stopped. There was no metal stenosis in either group. Interestingly, in the above-mentioned study, placement of a urethral catheter (urethral recatheterization) for another 7-10 days resulted in urinary leakage improvement as well as prevention of permanent fistula formation. In contrast, those subjects in whom a dartos fascia was used as the second layer, urethral recatheterization could not prevent permanent fistula formation. We however did not attempt recatheterization so we cannot comment on this issue. Fistula rate in our cases was 16.67% and 45.84% in group I and group II respectively while it was 25% in group III, which could be attributed to the cohort of redocases. It is pretty evident that tunica vaginalis flap cover was superior to any other tissue cover in the management of these cases ($P = 0.01$). Thus, tunica vaginalis flap appears to be a superior option in the management of cases of proximal penile hypospadias as a second reinforcing layer.

Hypospadias cripples can be classified[14] as grade I, minor complications (no reoperation needed), e.g., small dehiscence, hematoma, etc., grade II, cosmetic complications reoperation optional), e.g., metal retraction or dystopia, skin surplus, scar contraction, circumcised appearance; grade III, major or functional complications (reoperation required), e.g., bleeding, fistula, curvature, disruption. 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*.[15] who described 70 patients with failed primary repairs and severe complications. 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. Kröpfl *et al*.[16] followed them and they demonstrated the short-and midterm results of the treatment of forty complicated hypospadias recurrences. They used miscellaneous techniques for reconstruction of their patients. Fistulas were seen in the repairs where random pattern flaps (40% fistulas) were used compared with island flaps (14% fistulas). Elder and Duckett[17] 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,[4] 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.[4,5] 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.[5] There are many such citations in the 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. We found no significant difference in the results of those managed by hypospadias repair and tunica vaginalis flap reinforcement with those managed by standard Bracka's technique in our study ($P = 0.3$). Unfortunately, there is no such study available in literature to compare the results of these two promising procedure. Single stage repair using tunica vaginalis flap reinforcement offers the advantage that these patients are saved from the psychological trauma of extra surgery required in staged Bracka's repair. We thus recommend redo urethroplasty based on theirsch duplay principle with tunica vaginalis flap reinforcement as the first line in the management of these cases. A large randomized controlled trial is required to reach to any final conclusion however.

CONCLUSIONS

Tunica vaginalis flap reinforcement in cases of hypospadias cripples is a viable and reliable option. This should be favored over dartos flap.

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