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ORIGINAL ARTICLE

Frequency of urethrocutaneous fistula after tubularized incised plate urethroplasty and urethral advancement and glanuloplasty incorporated in coronal hypospadias.

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ABSTRACT… Objective: To find the incidence of urethrocutaneous fistula after Tubularized Incised Plate Urethroplasty (TIPU) and Urethral Advancement and Glanuloplasty Incorporated (URAGPI) repairs in children presenting with coronal hypospadias. **Study Design:** Randomized Prospective Study. **Setting:** Department of Paediatric Surgery, Pak Emirates Military Hospital, Rawalpindi. **Period:** 10th March 2022 to 10th November 2022. **Material & Methods:** A total of 40 children were enrolled in the study. Patients were randomly allocated to receive either TIPU (n=20) or URAGPI (n=20) technique after approval of hospital ethical review committee. Data was collected on a specifically designed proforma. Outcome was measured in terms of incidence of urethrocutaneous fistula in the two study groups. **Results:** Average age of patients was 28.2 ± 9.7 (months) in TIPU and 29.6 ± 9.9 months in URAGPI group. Frequency of fistula was 4 (20.0%) in TIPU repair compared to none 0 (0.0%) in the URAGPI repair. Difference in proportions of urethrocutaneous fistula was found statistically significant between the two groups (p-value = 0.03). **Conclusion:** Incidence of urethrocutaneous fistula was found greater in TIPU technique when compared with URAGPI technique.

Key words: Hypospadias, TIPU, URAGPI, Urethrocutaneous Fistula.

INTRODUCTION

In Hypospadias, a congenital anomaly, the urethral meatus lies ectopically on the ventral surface of the penis. The location of abnormally located meatus can vary.[1] In mild cases, meatus is distal at glanular, coronal and sub coronal level whereas in most severe cases the meatus lies further below towards the perineal region.[2] Hypospadias occurs in 1 out of 200 - 300 live births.[3]

The management of hypospadias is always surgical. Chordee, a bend in the penile shaft, is associated with this anomaly more so with the proximal meatus like perineal, penoscrotal and scrotal hypospadias. Hence, the aim of hypospadias surgery is not only to bring the meatus to its orthotopic position but also to have a straight penis after correction of chordee. The goal of treatment is to have the straight urinary stream and address the future fertility issues along with acceptable and satisfactory cosmetic outcome. There have been various surgical techniques available for hypospadias repair and many newer methods continue to evolve.[4] Most of the times, for distal hypospadias and selected cases of mid penile hypospadias with minimal chordee, primary repair is performed whereas for proximal hypospadias staged approach is adopted in which as a first step, skin grafting is done with preputial skin and later on urethroplasty is performed. The choice of surgical treatment option is dependent upon many factors like the location of the meatus, presence / absence of chordee and surgeon's experience / liking.[5] Despite continued refinement of various surgical procedures, there is no universally accepted technique for hypospadias repair in terms of complications and cosmesis.[6]

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In the recent literature, Tubularized Incised Plate Urethroplasty (TIPU) and Urethral Advancement and Glanuloplasty Incorporated (URAGPI) have been shown successful in repairing a hypospadias with variable results of cosmesis and re-surgery.[7] The most common complication of hypospadias surgery is the formation of urethrocutaneous fistula. Formation of fistula depends on various factors like type of hypospadias, choice of surgical technique, type of suture used and age being one significant factor along with others.[8] This complication is seen more in proximal hypospadias. In distal hypospadias, fistula formation is relatively less but does happen. In TIPU, urethral tube is made using urethral plate. In URAGPI, urethra is mobilized and brought up to required location. We hypothesized that in TIPU chances of fistula formation will be more because a neo urethra is constructed after incising the urethral plate. Hence, the suture line is liable to dehisce, or a stitch can give way leading to formation of fistula. In contrary to that, in URAGPI, no neo urethra is constructed rather the existing urethra is freed, mobilized and stitched to desired orthotopic location hence avoiding fistula formation.

No trial could be found regarding comparison of these two repair techniques. Thus, we conducted this study to find out the incidence of urethrocutaneous fistula after TIPU and URAGPI repairs in children presenting with coronal hypospadias.

MATERIAL & METHODS

This study was conducted in the department of paediatric surgery, Pak Emirates Military Hospital, Rawalpindi. A total of 40 children with hypospadias were enrolled in a period of eight months from 10th March 2021 to 10th November 2021. Study was approved by institutional review board (A/28/EC/488/2022) and written informed consent was taken from all patients/guardians.

Patients were randomly allocated to receive either TIPU (n=20) or URAGPI (n=20) technique. Sample size was based on the assumptions of 20% urethrocutaneous fistula rate with TIPU vs 0% with URAGPI and a study power of 70% and confidence level of 95%. The sample came out to be total 40 cases equally divided into two groups.

Data was collected on a specifically designed structured proforma. The demographic details of patients in terms of age were noted. The occurrence of fistula was assessed after one month of surgical repair. The data collection was done by the researcher himself to limit selection bias and maintain data continuity and quality. All cases of coronal hypospadias were included except those which were recurrent. Both surgeries were done in general anaesthesia by same surgeon after preoperative workup. Patient was put in supine position. Penile block was also administered. For TIPU repair, after circumcising incision and degloving, urethral plate was used to make urethral tube after making a vertical incision on the plate. First layer of urethroplasty was performed with vicryl 6/0 in an interrupted fashion and second layer was done in continuous fashion using same suture. Both layers were re-enforced by a layer of dartos fascia either from ventral aspect if patient was circumcised or from dorsal hood if patient was uncircumcised. To avoid meatal stenosis, a known cause of fistula formation, meatal shape was aimed to be like a fish mouth. For URAGPI, urethra was mobilized and brought upto required position and anchored inside glans with vicryl 6/0. In both the procedures, glanuloplasty was done and feeding tube was used as a catheter for 5 days. The primary outcome was measured in terms of rate of urethrocutaneous fistula in the two study groups.

Statistical analysis was done in SPSS version 20.0. The quantitative variables like age were measured as mean and standard deviation. The categorical variables like fistula were measured as frequency and percentages. The rate of fistula was compared between the two groups using chi square test. A p-value of <0.05 was considered significant.

RESULTS

In this study the average age of patients was 28.2 ± 9.7 months in TIPU group and 29.6 ± 9.9 months in URAGPI group. There were 8 (40.0%)

children between 12-24 months of age in TIPU group compared to 7 (35.0%) in URAGPI group. Similarly, there were 6 (30.0%) children between 24-36 months in TIPU group and 7 (35.0%) in URAGPI group. The remaining children were older than 36 months, these were 6 (30.0%) children each in TIPU and URAGPI groups. (Table-I)

Frequency of fistula formation was compared between the two groups. There were 4 (20.0%) children with fistula in TIPU group after hypospadias repair compared to none (0.0%) in the URAGPI group. Overall, there were 16 (80.0%) children in TIPU group and 20 (100.0%) in URAGPI group without any complication and fistula. This difference in the proportions of urethrocutaneous fistula was found statistically significant between the two groups (p-value, 0.03). (Table-II)

	TIPU (n=20)	URAGPI (n=20)	P-Value
Age (Months)			
12-24	8 (40.0%)	7 (35.0%)	0.93
24-36	6 (30.0%)	7 (35.0%)	
>36	6 (30.0%	6 (30.0%)	
Mean ± SD	28.2 ± 9.7	29.6 ± 9.9	0.64

Table-I. Age of patients in two groups

	TIPU (n=20)	URAGPI (n=20)	P-Value
Urethrocutaneous Fistula			
Yes	4 (20.0%)	0 (0.0%)	0.03
No	16 (80.0%)	20 (100%)	

Table-II. Comparison of fistula formation between two study groups

DISCUSSION

This study found a high rate of urethrocutaneous fistula (UCF) in patients with hypospadias managed with TIPU compared to none in the URAGPI group. The study proves that TIPU is significantly associated with UCF after hypospadias repair when compared with URAGPI technique. This is a very significant finding especially in the context of coronal and sub coronal hypospadias cases. There has been previous evidence regarding this finding in the literature as well.

One of the determinants in the outcome of TIPU repair is width of the urethral plate although most authors do not consider it significant because after incising it, width becomes sufficient to be tubularised so, we also did not take this factor into account. A study conducted by Guler Y witnessed urethral fistula in 4.7% patients who had wide urethral plate while in 30.9% of patients who had narrow urethral plate during TIPU repair.[9] Our results are still comparable to the study mentioned as in our study 20% patients who underwent TIPU repair developed UCF against 30.9% in patients with narrow urethral plate.

The incidence of UCF also depends on the usage of layers to cover the neo urethra during TIPU. Different techniques are used for that. We used dartos flap for this purpose. Researchers have used spongioplasty also and studies have witnessed that using single layer urethral plate flap incurs more fistula than the double layered urethral plate flap. Moreover, a study mentioned fistula formation of around 8% with spongioplasty technique and the results are much superior to ours as sample size in the study mentioned was also large like 113 patients.[10-12]

In our study no patient from URAGPI group developed fistula. Many studies on distal and anterior hypospadias have also witnessed fistula free successful repair with URAGPI. A study by Haider N and colleagues witnessed 0% UCF in their study.[13]

Similar to our finding, many other studies by Gite VA et al, Chakraborty AK et al and Hassan HS et al reported that none of their patients developed UCF after urethral mobilization and advancement granuloplasty.[14-16]

Age is also a determinant of outcome in hypospadias surgery. In our study, UCF was found prevalent in children older than 24 months and no case of younger age had incidence of fistula. Though all the UCF occurred in the TIPU group, the association of age also needs to be taken into consideration. Many previous studies have also witnessed that child age at the time of hypospadias repair has been found linked to an increased frequency of fistula.[8,17] The ideal age

for hypospadias repair has been suggested to be below one year. However, in cases where children present later for the repair, the incidence of fistula and other complications has been witnessed higher. Huang LQ et al found a 15 times greater risk of fistula in children older than 6 years compared to the younger ones.[8] The explanation given for this fact is erection, with increasing age there is a greater chance of erection which affects the healing of hypospadias wound and incurs UCF. In addition to this, it is also well known that in younger age the healing capacity is greater. Thus, the recommendation by the American Pediatric Association that hypospadias must be repaired between 6 and 12 months has evidence base that proves this suggestion.[18]

Postoperative complications can usually be identified early on in the first few months after surgery in most cases, but long-term follow-up is mandatory because delayed presentation with a urethral fistula and recurrent curvature of the penis following puberty spurt have been documented.[19] A recent systematic review of the long-term functional outcomes following hypospadias repair demonstrated that patient reported urinary symptoms, such as obstructive voiding, spraying, and deviated stream, more often than controls.

The postoperative evaluations of the penis after hypospadias repair may include observed voiding and post-void residue assessments or formal uroflowmetry. The most frequent side effects after hypospadias repair may include but not limited to UCF, meatal or urethral stenosis, glans dehiscence, urethral diverticulum or urethrocele, which can lead to infections and post-void dribbling, cosmetic problems like excess residual skin, skin tags, inclusion cysts, skin bridges, suture tracts, hair-bearing urethra, recurrent or persistent penile curvature, spraying or misdirected urinary stream and/or irritative symptoms, dysfunction of penile erection, and balanitis xerotica obliterans of the urethra leading to strictures.

In view of the above comparisons it can be said that URAGPI technique is very effective, as technically there is no chance of postoperative UCF formation which is the most common reason of redo surgery after hypospadias repair with other techniques. Moreover, as in the case of TIPU technique the URAGPI technique also has good functional outcome besides it has excellent cosmetic results. Its superiority in terms of fistula control is distinctive and proves it to be an ideal repair method for children with hypospadias.

To date there is no or very rare studies comparing the two interventions assessed in this study. This could be a strength of this study. After repair of hypospadias the outcome is followed over a long period of time. The management related complications of hypospadias are performed after a period of healing over 4 to 6 months, with the exception of urethral or meatal stenosis, which require more emergent attention. The primary goal of this research was to measure the incidence of urethral fistula. If appeared after hypospadias procedure, urethral fistula closures involve excision and closure of the fistula with adequate dartos flap coverage after excluding distal urethral stenosis. Coronal or more distal fistulas may also require a redo glanuloplasty.

LIMITATIONS

The limitations were mainly in terms of small sample size, due to the lack of presentation of coronal and sub coronal hypospadias cases. Another limitation was lack of long term outcome of these cases. The majority of hypospadias outcome papers focus on surgical complications and there are few publications assessing long-term functional outcomes.

CONCLUSION

The rate of UCF was found significantly greater in TIPU technique when compared with URAGPI technique. Thus fistula has been found significantly associated with TIPU in this study. It can be suggested that URAGPI can be used as an effective and complication free technique for hypospadias repair in the local community. Further trials using rigorous research methods and large sample size may be conducted on the topic, before generalization of these findings.

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