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Comparison of Interrupted Vs Continuous Suture Urethroplasty in Tabularised Incised Plate Hypospadias Repair. A Prospective Study

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ABSTRACT

Objectives: Hypospadias, a congenital malformation characterized by the abnormal positioning of the urethral opening, poses a significant challenge for pediatric urologists. Tabularized incised plate urethroplasty (TIPU) is a widely accepted surgical approach, offering reliable function and cosmetic outcomes. While the overall technique remains consistent, the choice between continuous and interrupted suture closure of the urethral plate remains a point of debate. This prospective study aims to compare these two suturing methods in TIP urethroplasty, focusing on key outcomes such as fistula formation, meatal stenosis, glans shape, urethral stricture, surgical site infection and patient satisfaction. **Methods:** This prospective study aimed to evaluate the outcome of tabularized incised plate urethroplasty (TIP) conducted at the Pediatric Surgery Department of Mayo Hospital Lahore/KEMU, involving 60 pediatric patients with primary sub coronal, distal and mid penile hypospadias from December 2023 to August 2024 who were randomized in two groups: Group A (30) boys received interrupted suture repair and Group B (30) boys received continuous suture repair. Outcomes were assessed through follow-up visits focusing on post-op complication rate and cosmetic appearance. **Results:** This study found interrupted suture technique superior to continuous suture technique in term of better functional and cosmetic outcome and fewer post operative complication. Patient and parent satisfaction were also found higher in interrupted suture. Post operative complications were most common in continuous group (mean=0.77) compared to the interrupted group (mean=0.20). the former group also had higher fistula rate (mean=0.90 vs 0.50). For other post operative outcomes, continuous group also shows slightly higher rate but had a better cosmetic appearance than the interrupted group (mean=0.27 vs 0.03).

INTRODUCTION

Hypospadias, a congenital condition characterized by an abnormally positioned urethral meatus, often requires surgical intervention to correct the anomaly and achieve both functional and aesthetic outcomes. The reported incidence of hypospadias is on the rise, with estimates ranging from 1 in 150 to 1 in 300 live births[1]. The word hypospadias has Greek origin with 'Hypo' meaning under & 'Spodon' meaning a rent [3]. over 200 variations of hypospadias repair have been documented, with the tabularised incised plate (TIP) urethroplasty, introduced by Warren Snodgrass in 1994, now recognised as the standard surgical technique for distal and midshaft hypospadias repair [1,2]. The suturing technique in hypospadias repair primarily depend on surgeon's choice. Additionally, the selected suturing method may influence the outcome of repair[4,9]. While there is consensus on the use of absorbable sutures in hypospadias repair, The discussion regarding best suture technique for TIP urethroplasty remains conflicting [5]. Some research indicates that the suturing technique does

not significantly impact the outcome [4,5], while other studies support that suturing pattern affect surgical outcome [6,7,8]. Given the conflicting evidence, there is a clear need for a prospective study that directly compares the outcomes of these two suture techniques in TIP urethroplasty. The goal of this study is to systematically evaluate postoperative complications, cosmetic outcomes, functional results, and patient/parent satisfaction in 60 paediatric patients who underwent TIP urethroplasty at the Paediatric Surgery Department of Mayo Hospital from December 2023 to August 2024.By rigorously analysing the data, this study seeks to determine whether the interrupted suture technique offers a superior balance of safety and efficacy compared to continuous suturing, thereby providing surgeons with evidence-based guidance on the optimal approach for hypospadias repair.

MATERIAL AND METHODS

This prospective study was conducted at the Paediatric Surgery Department of Mayo Hospital, involving 60 paediatric patients with hypospadias who underwent tabularised incised plate (TIP) urethroplasty. The patients were divided into two groups of 30 each, with one group receiving interrupted sutures and the other receiving continuous sutures.

Data Collection Period

The data was collected from December 2023 to August 2024.

Patient Selection

Patient were selected on the basis of inclusion and exclusion criteria.

Inclusion Criteria: Cases with sub coronal, distal- or mid-penile hypospadias with mild chordae suitable for Snodgrass TIP urethroplasty were included in the study.

Exclusion Criteria: Cases with glanular, recurrent, proximal hypospadias, or hypospadias with moderate-to-severe chordee were not included in this study.

All patients were assessed on presentation and follow-up with history, clinical examination, and routine blood investigation.

The study was performed after obtaining ethical consideration from institutional ethical committee.

Randomization: All patients meeting the inclusion criteria were prospectively randomized into two groups according to the type of suture technique used for urethroplasty in TIP. Randomization was achieved by giving sequential numbers to the patients and then random sampling was done using a computer generated random, ensuring a 1:1 distribution between the two groups**.**

Follow-up: Patients were followed up at regular intervals—1 month, 2 months, and 3 months postoperatively—to monitor and record any complications, functional outcomes, and cosmetic results.

Surgical Technique

All patients were Preoperatively assessed and parental counselling was done. Prophylactic intravenous antibiotics were administered on the operating table just before the induction of general anaesthesia as per routine. Urethral plate was incised and tabularization was done over a catheter of an appropriate size (6–8 Fr) using 5/0 or 6/0 absorbable sutures by using t1o different techniques i.e., interrupted (group A) or continuous sutures (group B). dartous facia flap was used in all patient as second layer to cover tubularized urethral plate. Glanular wings were raised and re approximated over the neourethra and the skin was closed. A compression dressing was applied thereafter. The catheter was left in place for 7 to 9 days postoperatively.

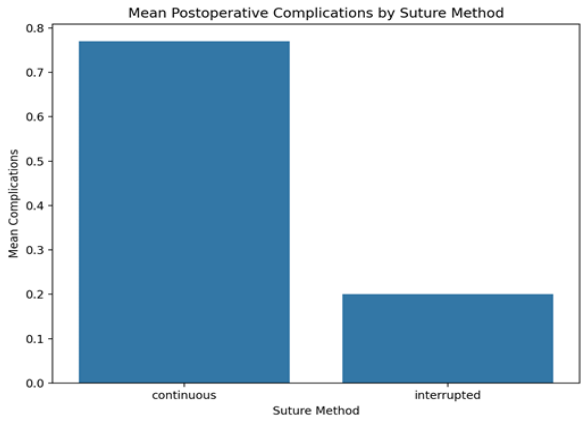
All patients were assessed post operatively at the time of catheter removal and then at 1 month, 2 month and at 3 months postoperatively. The evaluation included examination for complications like urethral fistula formation, meatal stenosis, urinary stream, urethral stricture, glans shape and surgical site infection. The post operative complications were compared and reported.

Statistical Analysis

Latest version of SPSS was used to carry out statistical analysis. Data was summarized and expressed in terms of percentages and mean ± SD. A P-value less than 0.05 was considered statistically significant.

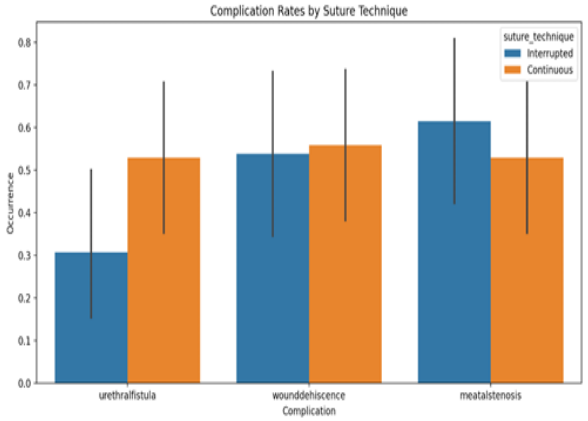
RESULTS

Graph 1



Postoperative complications were higher in the continuous group (mean = 0.77) than the interrupted group (mean = 0.20). Urethral fistula was more frequent in the continuous group (mean = 0.90) than the interrupted group (mean = 0.50). Wound dehiscence (mean = 0.90 vs. 0.77), meatal stenosis (mean = 0.90 vs. 0.83), and immediate complications (mean = 0.43 vs. 0.80) were also higher in the continuous group. Cosmetic appearance was better in the continuous group (mean = 0.27 vs. 0.03).

Graph 2



This bar plot compares the occurrence rates of different complications (urethral fistula, wound dehiscence, and meatal stenosis) between the two suture techniques.

Table 1

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Postop complications	Between Groups	4.817	1	4.817	27.479	.000
	Within Groups	10.167	58	.175		
	Total	14.983	59			
Urethral fistula	Between Groups	2.400	1	2.400	13.647	.000
	Within Groups	10.200	58	.176		
	Total	12.600	59			
Wound dehiscence	Between Groups	.267	1	.267	1.917	.171
	Within Groups	8.067	58	.139		
	Total	8.333	59			
Meatal stenosis	Between Groups	.067	1	.067	.563	.456
	Within Groups	6.867	58	.118		
	Total	6.933	59			
Cosmetic appearance	Between Groups	.817	1	.817	6.932	.011
	Within Groups	6.833	58	.118		
	Total	7.650	59			
Immediate complication	Between Groups	2.017	1	2.017	3.636	.061
	Within Groups	32.167	58	.555		
	Total	34.183	59			

The ANOVA results show significant differences between groups for postoperative complications (F = 27.479, p = .000), urethral fistula (F = 13.647, p = .000), and cosmetic appearance (F = 6.932, p = .011). However, no significant differences were found for wound dehiscence (F = 1.917, p = .171), meatal stenosis (F = 0.563, p = .456), or immediate complications (F = 3.636, p = .061).

The ANOVA test results shows that there are statistically significant differences were found between the groups for:

- Postoperative complications
- Urethral fistula
- Cosmetic appearance

In contrast following outcomes did not show any significant differences:

- Wound dehiscence
- Meatal stenosis
- Immediate complications

Key Observations from the Statistical Analysis

The most significant finding is the difference in urethral fistula occurrence between the two suture techniques. This suggests that the choice of technique may influence the risk of this particular complication.

There's a trend towards significance in cosmetic appearance, which might be worth exploring further.

Age does not seem to be a confounding factor in this study, as there's no significant difference in age distribution between the two groups.

For most other complications and variables, there were no statistically significant differences between the interrupted and continuous suture techniques.

DISCUSSION

Hypospadias is one of the most commonly occurring congenital abnormalities of the male external genitalia, affecting about 1 in 250 newborns or 1 in 125 live male births [11,12]. It is categorized by the position of the urethral meatus into anterior or distal (60–65% of cases), middle (20–30% of cases), and posterior or proximal (10–15% of cases) [6,12]. The main goal of hypospadias repair is to create phallus with normal appearance and to achieve satisfactory functional and cosmetic outcomes[14]. Various techniques have been developed for hypospadias repair, with ongoing advancement and modifications aimed at improving outcome. One of the most widely accepted methods, especially for primary distal and primary proximal hypospadias, is the Snodgrass technique[6]. This approach involves a midline incision of the urethral plate followed by tabularization, which has been found successful in forming a functional urethra with minimal complications. The procedure's success is evaluated based on excellent cosmetic results particularly the shape of glans, straight voiding from the tip of the glans[4].

Although hypospadias repair has achieved significant success, postoperative complication still occurs in 1-24% [15]. Common complication include infection, urethrocutaneous fistula, meatal stenosis [15]. TIP Urethroplasty can occur through both continuous and interrupted suture techniques, and the present study was conducted to observe any difference in post-operative complications between these two suturing techniques [15]. In our study, we used 5/0 or 6/0 polyglactin atraumatic suture in both groups to exclude suture-related factors as a variable.

The study conducted a comparative analysis of interrupted versus continuous suture techniques in tabularized incised plate (TIP) urethroplasty for hypospadias repair. The findings indicate that the interrupted suture technique yields superior outcomes compared to the continuous suture method.

Key Findings

Complications: The interrupted suture group experienced significantly fewer complications, including lower rates of urethral fistula formation and meatal stenosis. This suggests that the interrupted technique may provide a more stable and secure closure, reducing the likelihood of postoperative complications.

Cosmetic and Functional Outcomes: Patients in the interrupted suture group reported better cosmetic and functional results. This is crucial as the aesthetic and functional aspects of hypospadias repair are important for patient and parent satisfaction.

Statistical Significance: The results revealed notable differences between the two groups in terms of postoperative complications, urethral fistula formation, and cosmetic appearance, reinforcing the superiority of the interrupted suture technique.

Comparison with Existing Literature: The results correlate with the former studies that have suggested the superiority of interrupted sutures in reducing complications and improving outcomes in urethroplasty. However, some studies have reported no significant differences between the two techniques, indicating that further research may be needed to confirm these findings across different patient populations and surgical settings.

Clinical Implications: The outcome of this study have important clinical implication. The interrupted suture technique should be considered as a preferred method in TIP urethroplasty for

hypospadias repair due to its lower complication rates and better cosmetic outcomes. Surgeons should weigh these benefits against any potential drawbacks, such as increased operative time, when choosing the suturing method.

Limitations and Future Research

The limitation of this study includes a relatively small sample size and a single-centre study, which may affect the applicability of the results. Future studies should focus on this research gap including larger and multicentre approach to endorse these findings and evaluate the long-term outcomes of hypospadias repair in term of difference in suturing technique.

CONCLUSION

In the current study, Interrupted suture technique in TIP urethroplasty for hypospadias repair showed better outcomes in term of urethrocutaneous fistula formation than the continuous technique. However, Patients in the interrupted group had fewer complications, including lower rates of wound dehiscence and meatal stenosis. Functional results, along with patient and parent satisfaction, were more favourable with interrupted sutures, indicating its superiority in achieving successful surgical outcomes.

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