

Comparative Analysis Of Continuous And Interrupted Suturing Techniques In Urethroplasty For Hypospadias

Kamran Aziz¹, Asra Aleem², Safdar Saeed³, Muhammad Rashid Jamal⁴, Ijaz Hussain Shah⁵, Sana Shaukat Siddiqui⁶

Abstract

Objective: Hypospadias is one of the most frequent congenital anomalies in males that affects penile development and hence optimal urine and semen flow. Snodgrass Tubularized Incised Plate Urethroplasty (TIP) is a widely employed technique for hypospadias, done in a single stage. While both continuous and interrupted sutures are options for TIP procedures, the best technique for minimizing complications is still under debate.

Methods: A quasi-experimental study was carried out in the Urology department of DG Khan Medical College and Hospital from June 2022 to June 2023 that included 69 boys divided into 2 groups based on suturing technique: 37 boys underwent continuous-suture Snodgrass TIP urethroplasty and 32 boys underwent interrupted-suture Snodgrass TIP urethroplasty. The ethical protocol was followed throughout the period.

Results: The mean age was 9.12 years, and we found that there was a statistically significant association between the type of complication and the suturing technique ($p=0.117$). Meatal stenosis (MS), urethral stricture, and urethrocutaneous fistula (UF) did not exhibit significant differences between groups (p -values > 0.05). Compared to patients with complications (53.6%), those without complications had a significantly higher chance of having a healthy single urine stream (100%).

Conclusion: Our findings suggest that interrupted suturing in TIPU may be associated with fewer complications and a higher rate of single urine stream compared to the continuous suturing technique.

Keywords: Hypospadias, Urethra, postoperative complications, Suturing Techniques.

^{1,2} Assistant Professor, DG Khan Medical College, Dera Ghazi Khan; ³ Consultant Urologist, DHQ Hospital, Taunsa Shareef, Dera Ghazi Khan; ⁴ Senior Registrar Urology, Allama Iqbal Teaching Hospital, Dera Ghazi Khan; ⁵ Professor, Plastic Surgery, Sheikh Zayed Medical College, Rahim Yar Khan; ⁶ Assistant Professor Community Medicine, Sheikh Zayed Medical College, Rahim Yar Khan.

Correspondence: Dr. Sana Shaukat Siddique, Assistant Professor Community Medicine, Sheikh Zayed Medical College, Rahim Yar Khan. Email: drssiddiqui7@gmail.com

Cite this Article: Aziz K, Aleem A, Saeed S, Jamal MR, Shah IH, Siddiqui SS. Comparative Analysis Of Continuous And Interrupted Suturing Techniques In Urethroplasty For Hypospadias. JRM. 2025 Jan. 1;28(4):663-667. <https://doi.org/10.37939/jrmc.v28i4.2647>.

Received June 26, 2024; accepted September 13, 2024; published online December 31, 2024

1. Introduction

Hypospadias is one of the most common congenital anomalies seen in male infants. It has been reported that 1 in 150–300 live babies had hypospadias.¹ Approximately 0.2 to 4.1 live newborns out of every 1000 have hypospadias.² Hypospadias repair aims for a normally functioning and looking penis: straight during erection, single standing stream, and a proper opening at the tip. Over 250 surgical methods exist, with Tubularized Incised Plate (TIP) urethroplasty gaining popularity for its ease and good results.³ Snodgrass urethroplasty is a versatile procedure for hypospadias repair, known for its ease of replication and favourable cosmetic outcomes. The introduction of the Tubularized Incised Plate Urethroplasty (TIP) by Warren Snodgrass in 1994 significantly improved hypospadias repair.⁴ It is the most widely used method for primary hypospadias repair in a single stage. Various suturing techniques have been explored in different surgical contexts. Continuous suturing (CS) is often faster than interrupted suturing (IS) but may carry a higher risk of tissue complications due to potential strangulation and ischemia.⁵ While

continuous and interrupted sutures are options for TIP procedures, there's no definitive consensus on the optimal method for Snodgrass urethroplasty. Some studies, like Ulman et al., suggest a potential benefit of continuous subcuticular sutures in Mathieu repairs, but Snodgrass et al. found no significant difference in TIP repairs.^{6,7} Despite the apparent surgical success of TIP, a few complications still exist. The most common are urethrocutaneous fistula (UCF) and meatal stenosis.⁸ Less frequent complications include glans dehiscence, proximal meatal dehiscence, skin necrosis, and wound infections.^{9,10} Although these complications are few, they can be evaluated and eliminated if they relate to the suturing technique. This study aims to compare the complications and outcomes of continuous and interrupted suturing techniques in Tubularized Incised Plate Urethroplasty for primary hypospadias repair.

2. Materials & Methods

This study was conducted in the urology department of DG Khan Medical College and Hospital. It compared the effects of interrupted and continuous suturing procedures in TIPU for hypospadias using a quasi-

experimental methodology. The study used a nonequivalent control group design, comparing patients who received interrupted suturing to those who underwent continuous suturing, even though patients were not randomly assigned to groups. Although a formal power analysis was not carried out before the study began, the 69-patient sample size was considered adequate based on earlier research and professional judgment. After gaining informed agreement, patients with primary anterior hypospadias between the ages of 5 and 12 were included. Individuals with moderate-to-severe chordee, glandular, recurring, or proximal hypospadias were not included. Patients were divided into two groups: Group B (interrupted suture) and Group A (continuous suture). Trained research assistants gathered data from standardized questionnaires and medical records.

Before surgery, all patients received prophylactic preoperative intravenous antibiotics (amoxicillin-clavulanic acid). The surgical procedure was performed under general anaesthesia with caudal analgesia to minimize postoperative pain. In both groups, Snodgrass TIP urethroplasty was conducted using subcuticular 6–0 polyglactin 910 (Vicryl) sutures in two layers over an 8–10 F catheter. Additionally, neourethral coverage with a preputial dartos flap was employed for all cases.

The surgical team adhered to standard operative and perioperative principles for hypospadias repair. Following surgery, the catheter remained in place for 10–12 days to facilitate bladder drainage. After catheter removal, urinary stream observation was conducted for all patients in both groups. Postoperatively, antibiotic prophylaxis with amoxicillin + clavulanic acid was administered for 7 days, and dressing removal occurred on the fifth postoperative day. Patients underwent examination upon catheter removal every month for the initial three months. Outcomes in both groups were evaluated using the following criteria: (i) operative time, (ii) incidence of complications encompassing both early and late postoperative complications, (iii) urinary stream during voiding, and (iv) aesthetic appearance. A satisfactory aesthetic appearance was defined as one that is comparable to the meatus at the tip of the glans in a typical circumcised penis. In the postoperative monitoring phase, individuals with urethrocutaneous fistulas were handled appropriately; some witnessed natural closure, while others necessitated corrective interventions. Additionally, early postoperative complications involved partial superficial wound infections. Notably,

these infections improved with conservative treatment, and no instances of urethrocutaneous fistula occurred.

3. Results

Participants in both groups were about 9 years old on average, which was comparable. Compared to the interrupted suture group (58.75 minutes), the continuous suture group's average operation time was slightly longer (64.05 minutes). Interestingly, all participants in the mid-penile category were included in the continuous group 32(100%), while those with distal penile had a more diverse distribution with the majority in continuous group 26(70.3) and 14(43.8%) in the interrupted group.

Table 1: Distribution of Variables by Type of Urethroplasty Suture(n=69)

Variable	Continuous (n=37)	Interrupted (n=32)
Age of participants	9.24±2.07	9.12±6.97
Duration of surgery	64.05±29.97	58.75±21.92
Type of hypospadias		
Distal penile	26 (70.3%)	14 (43.8%)
Mid penile	32 (100%)	-

Table 2 presents the comparison of continuous and interrupted suturing procedures. Overall, there was a statistically significant difference ($p=0.117$) with patients undergoing continuous urethroplasty having a significantly higher complication rate 29(78.4%) compared to those undergoing interrupted urethroplasty 19(59.4%). Partial superficial wound infection was significantly more common in continuous 9(24.3%) compared to interrupted 2(6.3%) ($p=0.018$). Meatal stenosis (MS), urethral stricture, and urethrocutaneous fistula (UF) did not exhibit significant differences between groups (p -values > 0.05). The co-occurrence of meatal stenosis and urethrocutaneous fistula is limited to continuous urethroplasty. The success rate for interrupted urethroplasty was higher 20(62.5%) for single urine streams than for continuous 17(45.9%), however, the difference was not statistically significant ($p=0.227$). Regarding aesthetic appearance, there was no statistically significant difference ($p=0.781$) between the two groups that was generally satisfactory in both groups, with slightly higher satisfaction in the interrupted group 25(78.1%).

A group analysis was conducted to investigate the relationship between the type of complication and urinary stream outcome (Table 3). The outcomes

showed significant differences ($p < .0001$ for both groups) between complications and urinary streams for each group. In the continuous suture group, all patients 10(100%) with urethrocutaneous fistula had a splayed urinary stream, while all patients 9(100%) with partial superficial wound infection had a single urinary stream. Patients with meatal stenosis, urethral stricture, or

urethrocutaneous fistula + meatal stenosis in both groups also exhibited splayed urinary streams. However, the interrupted suture group showed a more varied pattern, with 4(44.4%) of patients with urethrocutaneous fistula experiencing a splayed urinary stream and 5(55.6%) having a single stream.

Table 2: Outcomes of Continuous vs. Interrupted Urethroplasty: Complications, Urinary Stream, and Aesthetics(n=69)

Variable	Continuous (N=37)	Interrupted (N=32)	Total (N=69)	P-Value
Occurrence Of Complication				0.117
Yes	29 (78.4%)	19 (59.4%)	48(69.5%)	
No	8 (21.6%)	13 (40.6%)	21(30.4%)	
Type Of Complication				0.018
Urethrocutaneous Fistula(Uf)	10 (27.0%)	9 (28.1%)	19(27.5%)	
Partial Superficial Wound Infection	9 (24.3%)	2 (6.3%)	11(15.9%)	
Meatal Stenosis(Ms)	6 (16.2%)	5 (15.6%)	11(15.9%)	
Urethral Stricture	2 (5.4%)	3 (9.4%)	5(7%)	
Uf+Ms	2 (5.4%)	-	2(2.8%)	
Urinary Stream				0.227
Single	17 (45.9%)	20 (62.5%)	37(53.6%)	
Splayed	20 (54.1%)	12 (37.5%)	32(46.3%)	
Aesthetic Appearance				0.781
Satisfactory	27 (73.0%)	25 (78.1%)	52(75.3%)	
Non-Satisfactory	10 (27.0%)	7 (21.9%)	17(24.6%)	

Table 3: Comparison of Complications Between Continuous and Interrupted Suture Urethroplasty with Urinary Stream Outcomes (p-value <0.001) (n=69)

Type of complication	Continuous suture urethroplasty		Interrupted suture urethroplasty	
	Single stream	Splayed stream	Single stream	Splayed stream
Urethrocutaneous fistula	0(0%)	10(100%)	5(55.6%)	4(44.4%)
Partial superficial wound infection	9(100%)	0(0%)	2(100%)	0(0%)
Meatal stenosis	0(0%)	6(100%)	0(0%)	5(100%)
Urethral stricture	0(0%)	2(100%)	0(0%)	3(100%)
Urethrocutaneous fistula + meatal stenosis	0(0%)	2(100%)	0(0%)	0(0%)

4. Discussion

Hypospadias reconstruction aims to restore a penis that functions and looks normal. Numerous methods have been devised to accomplish this, such as the TIP repair, which is a well-liked option for treating hypospadias. Although the surgeon has the final say in the suturing technique used, it can have an impact on the repair's result.⁵ The impact of different suturing procedures has been most thoroughly examined in the context of bowel anastomosis, where it has been discovered that using an interrupted suturing technique reduces the risk of complications when compared to continuous suturing.¹¹ Similarly, research has been done on the impact of the suturing technique on the results of hypospadias correction; however, detailed guidelines about the

suturing technique are still lacking.¹² Both continuous and interrupted suture techniques can be used for urethroplasty; the goal of the current study was to compare any variations between the two suturing methods. To rule out variables related to sutures in our study, we utilized subcuticular 6-0 polyglactin 910 (Vicryl) sutures in both groups. The study's main findings included the occurrence of complications, urine stream, and aesthetic appearance. The findings indicated that there was no statistically significant variation in the frequency of complications between the two groups ($p=0.117$). Regarding the kind of complication, there was a notable difference between the two groups ($p=0.018$). The most frequent complication in both groups was urethrocutaneous fistula (UF), with a higher incidence in the continuous suture group (27.0% vs.

28.1%). The greater complication rate in the continuous group could be explained by the ischemic effect of continuous sutures. Similar to our research, various studies found no statistically significant difference in the complication rate between interrupted suturing and continuous suturing.11-13 Samir, Mohamed, et al, on the other hand, found complication rate was significantly higher in continuous than interrupted suture technique. However, similar to our study, this study reported the occurrence of UF significantly higher in continuous suture technique. All these studies employed randomized study design which is not the case in our study. Urinary outcomes in our study showed a significant association with the type of complications in both groups. Patients with urethrocutaneous fistula in the continuous suture group consistently had splayed urinary streams, while those in the interrupted suture group showed varied outcomes. Previous research suggests a possible link between UF after TIP urethroplasty and obstructed urinary flow patterns, however, its association with the type of suture technique is not given.14-16 Our study did not find any significant association between aesthetic outcome and the type of suturing technique which is in coherence with previous studies.17-19 While the findings of our study suggest that interrupted suturing may be associated with fewer complications and a higher rate of single urine stream, further research is needed to confirm these results. However, our study had limitations, including being single-centered, lacking randomization, having a relatively small sample size, and lacking follow-up beyond 3 months. A randomized controlled trial with a longer follow-up period and a larger sample size would strengthen the evidence base regarding the optimal suturing technique for this procedure.

5. Conclusion

In the present study interrupted suture technique represents a promising approach for TIPU urethroplasty, offering a lower risk of complications and comparable urinary stream outcomes.

Institutional Review Board Approval

No./40/ERC/DGKMC & Hospital
31-05-2022

D.G. Khan Medical College

CONFLICTS OF INTEREST- None

Financial support: None to report.

Potential competing interests: None to report

Contributions:

K.A, A.A, S.S, M.R.J, I.H.S, S.S.S- Conception of study

K.A, A.A, S.S, M.R.J, I.H.S, S.S.S -

Experimentation/Study Conduction

K.A, A.A, S.S, M.R.J, I.H.S, S.S.S -

Analysis/Interpretation/Discussion

K.A, A.A, S.S, M.R.J, I.H.S, S.S.S - Manuscript Writing

K.A, A.A, S.S, M.R.J, I.H.S, S.S.S - Critical Review

K.A, A.A, S.S, M.R.J, I.H.S, S.S.S - Facilitation and Material analysis

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

References

1. Partin AW, Dmochowski RR, Kavoussi LR, Peters CA, Wein AJ. Campbell walsh wein urology: 3-volume set: Elsevier Health Sciences; 2020.
2. Sparks TN, Medicine SfM-F. Hypospadias. 2021;225(5):B18-B20.
3. More B, Patel RV, Mishra V. Hypospadias. Handbook of Pediatric Surgery: Springer; 2022. p. 261-7. https://link.springer.com/chapter/10.1007/978-3-030-84467-7_32
4. Kambouri K, Aggelidou M, Deftereos S, Tsalikidis C, Chloropoulou P, Botaitis S, et al. Comparison of two tubularized incised plate urethroplasty techniques in hypospadias reconstructive surgery. 2020;9(3):254. doi: 10.29252/wjps.9.3.254
5. Samir M, Mahmoud MA, Azazy S, Tawfick AJJoPU. Does the suturing technique (continuous versus interrupted) have an impact on the outcome of tubularized incised plate in hypospadias repair with adequate urethral plate? A prospective randomized study. 2021;17(4):519. e1-. e7. <https://doi.org/10.1016/j.jpuro.2021.04.021>
6. Ulman I, Erikci V, Avanoğlu A, Gökdemir AJEjops. The effect of suturing technique and material on complication rate following hypospadias repair. 1997;7(03):156-7. <https://doi.org/10.1055/s-2008-1071079>
7. Snodgrass W, Bush NJJoPU. Persistent or recurrent ventral curvature after failed proximal hypospadias repair. 2019;15(4):344. e1-. e6. <https://doi.org/10.1016/j.jpuro.2019.03.028>
8. Choudhury P, Saroya KK, Jain V, Yadav DK, Dhua AK, Anand S, Mawar S, Verma V, Kapahtia S, Acharya SK, Shah R. 'Waterproofing layers' for urethrocutaneous fistula repair after hypospadias surgery: evidence synthesis with systematic review and meta-analysis. Pediatric Surgery International. 2023 Apr 3;39(1):165. <https://doi.org/10.1007/s00383-023-05405-1>
9. Fauzan A, Hidayatullah F, Salsabila S, Setiawan MR, Fitriani R, Rizkyansyah HF, et al. Comparison of the efficacy and

- safety of dorsal inlay graft urethroplasty (DIGU) method with tubularized incised plate urethroplasty (TIPU) method in primary distal hypospadias repair: a systematic review and meta-analysis. 2023;12(2):2251-7.
<https://doi.org/10.15562/bmj.v12i2.4612>
10. El-Karamany TM, Al-Adl AM, Omar RG, Aal AMA, Eldakhakhny AS, Abdelbaki SAJU. A critical analysis of stented and unstented tubularized incised plate urethroplasty through a prospective randomized study and assessment of factors influencing the functional and cosmetic outcomes. 2017;107:202-8. <https://doi.org/10.1016/j.urology.2017.04.056>
 11. Gupta A, Gupta R, Srivastav P, Gupta AJAJoU. Comparison of interrupted-and continuous-suture urethroplasty in tubularised incised-plate hypospadias repair: A prospective study. 2017;15(4):312-8.
<https://doi.org/10.1016/j.aju.2017.10.004>
 12. Mahmud S, Tashfika UH, Ferdous KMN-u, Faruky KSBJSJAMS. Comparison of the Outcome of Interrupted Suture and Continuous Suture in Tabularized Incised-Plate (TIP) Urethroplasty Hypospadias Repair. 2023;1:55-9.
<https://doi.org/10.1016/j.aju.2017.10.004>
 13. Fathi BA, Elgammal AA, Ghoneimy OM, Alrefaey AA, Abouelgreed TA, Elhelaly MA, et al. Urethral advancement and glanuloplasty versus tubularized incised plate urethroplasty for distal hypospadias repair: a prospective randomized study. 2023;23(1):70.
<https://doi.org/10.1186/s12894-023-01242-5>
 14. Leunbach TL, O'Toole S, Springer A, Williamson PR, Ahmed SFJSD. A systematic review of core outcomes for hypospadias surgery. 2020;13(4):165-70.
<https://doi.org/10.1159/000504973>
 15. Winberg H, Anderberg M, Arnbjörnsson E, Stenström PJJPU. Urinary flow measurement in hypospadias correlated to surgical procedure and risk of development of urethra-cutaneous fistula. 2020;16(3):306. e1-e8.
<https://doi.org/10.1016/j.jpuro.2020.03.004>
 16. Workneh ST, Woldelessie HG, Temesgen F, Taddese A, Negussie T, Kiflu W, et al. Outcomes of tubularized incised plate urethroplasty (TIPU) for hypospadias at tikur anbesa specialized and menelik II referral hospitals: one-year prospective cohort study. 2022;168:189-94.
<https://doi.org/10.1016/j.urology.2022.06.022>
 17. Alaraby SO, Abdeljaleel IA, Hamza AA, Elhassan AE. A comparative study of polydioxanone (PDS) and polyglactin (Vicryl) in hypospadias repair. African Journal of Paediatric Surgery. 2021 Jan 1;18(1):53-7.
https://doi.org/10.4103/ajps.AJPS_90_20
 18. Shirazi M, Haghpanah A, Dehghani A, Haghpanah S, Ghahartars M, Rahmania MJAJoU. Comparison of post-urethroplasty complication rates in pediatric cases with hypospadias using Vicryl or polydioxanone sutures. 2022;9(2):165-9. <https://doi.org/10.1016/j.ajur.2021.08.010>
 19. Güler YJA. TIPU outcomes for hypospadias treatment and predictive factors causing urethrocuteaneous fistula and external urethral meatus stenosis in TIPU: clinical study. 2020;52(9):e13668.
<https://doi.org/10.1111/and.13668>