Original Article

Outcomes of the Complications Between Early and Late Stent Removal in Hypospadias Repair

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ABSTRACT

Objective: To compare the postoperative complications between early (5th postoperative day) and late (10th postoperative day) stent removal following Snodgrass repair for distal penile hypospadias.

Study Design: Randomized controlled trial study

Place and Duration of Study: This study was conducted at the Department of Pediatric urology, Children Hospital Faisalabad from 01 November-2024 to July 2025.

Methods: This trial was done after the approval by the ethical committee of the institutional review Board (IRB). A total of 86 treatment-naïve patients of distal penile hypospadias were included and randomly segregated into two groups. Where group A early stent removal considered at 5th day While late stent removal counted at 10th day was Group B. Standard Snodgrass repair was performed in all patients by the same surgical team. Complications like i.e. urethrocutaneous fistula (UCF) and wound dehiscence were assessed at 2 weeks, 1 month, and 3 months postoperatively. Data analysis was done with the help of SPSS version 26, and p-values <0.05 were considered significant.

Results: Patients were segregated in two groups, each group consists of 43 patients. Group-A removed catheter at 5th day of surgery, while in group-B removed catheter at 10th day of surgery. Bleeding from wound site found in group-A (8.14%) 07 patients, while in group-B 05 (5.81%). Wound infection in group-A (6.98%) 06 patients, while in group-B 07 (8.14%). UTI in group-A (2.33%) 02 patients, while in group-B 04 (4.65%). Urinary retention in group-A (6.98%) 06 patients, while in group-B 05 (5.81%). Urinary Extravasation in group-A (10.47%) 09 patients, while in group-B 12 (13.95%).

To access the late compilations twenty seven patients (31.47%) were uneventful in group-A while twenty nine patients (33.72%) in group-B were remained uneventful. UC Fistula in group-A (10.47%) 09 patients, while in group-B 08 (9.30%). Wound Dehiscence in group-A (8.14%) 07 patients, while in group-B 06 (6.98%).

Conclusion: Early stent removal following Snodgrass repair may potentially reduce postoperative morbidity and hospital stay without increasing complication rates.

Key Words: Postoperative Complications, Early and Late Stent Removal, Hypospadias Repair

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INTRODUCTION

Hypospadias is considered as a commonly found congenital urethral anomaly of the genitalia in male population, distinctively by an abnormally placed urethral opening on the ventral side of the penis. The reason of this condition, is due to incomplete fusion of urethral folds during embryological development [1,2]. The prevalence varies globally, affecting approximately one in 250 live male population [3,4]. It is commonly classified into anterior, middle, and the posterior types based on the position of the meatus. The anterior and middle forms are more frequent and usually repaired in a single stage, whereas the posterior forms may require staged procedures [5,6].

Surgical correction of hypospadias aims to achieve both functional and cosmetic restoration of the penis. The primary goals include creating a straight penis (orthoplasty), positioning the meatus found at the tip of the glans, and ensuring a good urinary stream with minimal postoperative complications. Numerous surgical techniques evolved with the passage of time, but the Snodgrass technique (Tabularized Incised Plate

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urethroplasty), introduced in 1994, has become the most widely accepted due to its simplicity, reliability, and excellent cosmetic outcomes[7].

Despite advancements in surgical methods, complications i.e. urethrocutaneous fistula, dehiscence of wound, meatal stenosis remain major concerns[8,9]. The timing of stent removal after repair is a crucial factor influencing outcomes. Extended catheterization may enhance healing by preventing urinary leakage across the repair site, but prolonged use increases discomfort, urinary tract infections, and bladder spasms. Conversely, early removal of the stent may reduce hospital stay and improve patient comfort, but may pose a risk of suture line disruption. Therefore, determining the optimal timing for stent removal is essential for improving surgical outcomes[10].

Previous studies have reported mixed results. Fakhry et al. (2021) suggested no major difference between the early and the late removal of stent[11], while Kumar and Ram (2022) observed higher bladder spasms in the late removal group[12]. However, there remains a small amount of local data, especially in the Pakistani population. This study seeks to provide evidence-based insight to guide paediatric surgeons & paediatric urologist in optimizing postoperative management following Snodgrass repair.

METHODS

This randomized controlled trial (RCT) was conducted in the Pediatric urology Department, Children Hospital Faisalabad, over a duration of 12 months following approval. A total of 86 patients. Where the 43 participants in each group, selected through the non-probability convenient sampling technique of sampling. The study included treatment-naïve patients with distal penile hypospadias, aged between 6 months and 12 years. Patients having hypospadias repair in the past, syndromic conditions or major congenital malformations, bladder dysfunction, deranged renal function, or those presenting with mid or proximal hypospadias will be excluded from the study.

Methodology: After obtaining ethical approval and informed consent, 86 cases were enrolled. All underwent Snodgrass repair under aseptic conditions. Standard surgical steps included penile degloving, correction of chordee if present, incision made on the midline of urethral plate, and tabularization over the stent. The neourethra was reinforced using a dartos flap. Patients were assigned randomly into two different groups: Group-A (stent removal at 05th Postoperative day) and Group B (stent removal at 10th postoperative day). Follow-up evaluations were done at 2 weeks, 1 month, and 3 months to assess early and late complications.

Statistical Analysis: Data analysis was done with the version 26 of SPSS. Quantitative data were expressed as mean ± SD, and qualitative data were presented as the frequencies and the percentages. Chi-square test, was used to compare the complication rates between the groups. P-value <0.05 was considered as statistically significant.

RESULTS

In our study there were total N=86, Male patient Aged ranged from 02 years to 14 years, The mean age of the entire study of 86 male patients is 8.58 years. Patients were segregated in two equal groups where each group consisted on 43 patients. Group-A patients have been removed catheter at 5th post operative day, while in group-B the catheters was removed at 10th post operative day. Bleeding from wound site found in group-A (8.14%) seven patients, while in group-B five (5.81%). Wound infection in group-A (6.98%) six patients, while in group-B seven (8.14%). UTI in group-A (2.33%) two patients, while in group-B four (4.65%). Urinary retention in group-A (6.98%) six patients, while in group-B five (5.81%). Urinary Extravasation in group-A (10.47%) nine patients, while in group-B twelve (13.95%).

To access the late compilations 27 patients (31.47%) were uneventful in group-A while 29 patients (33.72%) in group-B were remained uneventful. UC Fistula in group-A (10.47%) nine patients, while in group-B eight (9.30%). Wound Dehiscence in group-A (8.14%) seven patients, while in group-B six (6.98%).

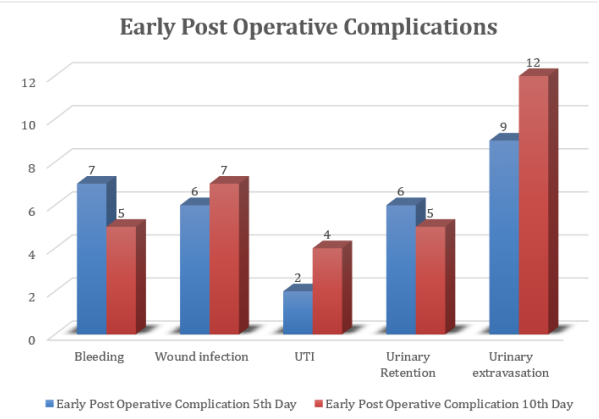

Figure No.1: Early Post-Operative Complications

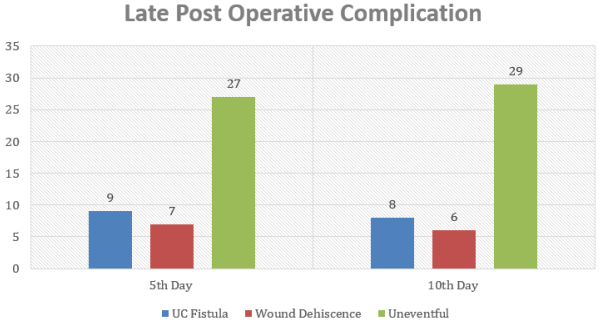

Figure No.2: Late Post Operative Complication

T-Test: Age vs. Early Complication: The T-test compares the mean age of male patients who developed an early post-operative complication against those who did not.

T-Test Results:

- **Calculated T-Statistic (T):** 0.354
- **P-value:** approx 0.725

Conclusion: We are unable to reject the null hypothesis because the P-value of 0.725 is significantly higher than the significance level (alpha=0.05). There is no statistically significant difference in mean age between male patients who experienced an early complication and those who did not.

2. Chi-Square Test: Early Complication vs. Late Complication

This test assesses if there is an association between experiencing an early post-operative complication and a late post-operative complication.

Table No.1: Contingency (Observed Frequencies)

	Late Comp. None	**Late Comp. Present**	**Row Total**
Early Comp. None	19	4	**23**
Early Comp. Present	37	26	**63**
Column Total	**56**	**30**	**N=86**

P-value [Fisher's Exact Test]: 0.045

Since the P-value of 0.045 is less than the significance level (alpha=0.05), we reject the null hypothesis. This indicates a statistically significant association between the occurrence of an Early Post-Operative Complication and a Late Post-Operative Complication among these 86 male patients. More specifically, it appears that having a complication earlier in life is linked to having a complication later on.

DISCUSSION

This study explored the relationship between timing of stent removal and postoperative complications in distal penile hypospadias repaired using Snodgrass technique. The findings correspond with international literature that early stent removal does not significantly increase the risk of urethrocutaneous fistula or wound dehiscence. Early removal improves patient comfort, reduces hospital stay, and minimizes catheter-associated infections.

Hypospadias repair is ideally performed at 6–18 months to reduce psychological and developmental impact, though studies show mixed results on whether older age increases complications. TIP remains the most widely used technique due to its simplicity and low complication rates, while alternatives like Mathieu, Duckett, and Koyanagi are used in specific cases. Across techniques, urethral fistula is the most common complication, followed by meatal stenosis, glans dehiscence, and chordee, with higher rates in proximal cases. Risk factors include poor urethral plate quality, constipation, and prolonged procedures, while preventive measures like showering protocols and antibiotics show limited benefit. In the present study, complication rates were higher than some reports, but frequent follow-up and recent surgical improvements suggest evolving outcomes.

Several studies, including those by Fakhry et al. (2021), have demonstrated that the success of Snodgrass repair remains high with low complication rates regardless of stent duration. However, some authors advocate for delayed stent removal to ensure optimal healing. This study contributes to local data, offering valuable evidence to guide postoperative care in pediatric surgical units across Pakistan[11].

Kumar and Ram conducted a study on 62 patients who underwent TIP hypospadias repair and concluded that early catheter removal did not influence the occurrence of long-term complications. However, the study's limitations included a small sample size and its descriptive design. Therefore, prospective randomized controlled trials are necessary to evaluate the safety of early catheter removal and its impact on quality of life during the early postoperative period[12].

According to Scarpa, no catheter-related complications, including blockage or malfunction, were observed in group A, and no urinary tract infections were recorded. Following catheter removal, three episodes of urinary retention occurred: one case in the stented group (1/18) and two cases in the unstented group (2/26). All episodes occurred in patients older than 24 months and were managed with temporary urinary catheterization under sedation. No long-term complications, such as fistula or stenosis requiring surgical intervention, resulted from these episodes. During the follow-up period, four cases of persistent fistula were identified, with two cases in group A and two in group B. Our protocol is to delay fistula repair until at least six months after the initial surgery. One patient underwent reoperation seven months after the primary procedure, while the remaining cases were diagnosed later and treated at ten, twelve, and fourteen months, respectively. Among the unstented patients, apart from one individual who developed meatal stenosis followed by a fistula, only one case of subclinical meatal stenosis was observed[13].

In his study, Tatanis et al, reported that a 20-hour post-op catheter placement after hypospadias repair is an effective alternative whose outcomes are comparable to conventional catheter duration methods, where it decreases the discomfort of patient while not raising the complication risk[14].

Hadidi studied on 63 patients having perineal hypospadias. Study included 59 patients who were observed regular follow-up then which were reviewed. Where suprapubic cystostomy was performed and

catheter was placed only for 04 days, which shorten the stay in the hospital and reduced discomfort of patient. It gives satisfactory results and considered the standard technique in hypospadias of perineal position[15].

Drake et al studied revealed that late removal of the catheter increased the stenosis meatal (12.7%) significantly as compared to early removal of catheter during the 3rd post-operative days[16].

In the study by Daher, catheter removal was performed after one week in group I and after three weeks in group II. No patients in either group experienced catheter-related bladder spasms. The overall complication rate was significantly higher in group I compared with group II (22.1%, n = 21 vs. 7.4%, n = 7; P = .005). Reported complications included meatal stenosis, which occurred in four patients in group I and two patients in group II, and urethrocutaneous fistulas, observed in 17 patients in group I and five patients in group II. No cases of postoperative wound infection, urinary tract infection, urethral diverticulum, glans dehiscence, or complete wound dehiscence were reported. Coronal fistulas were significantly more common in group I than in group II (13.7% vs. 3.2%, P = .01). However, there were no statistically significant differences between the two groups in the rates of mid-shaft fistulas (1.1% vs. 1.1%, P = .994), penoscrotal fistulas (3.2% vs. 1.1%, P = .317), or meatal stenosis (4.2% vs. 2.1%, P = .414). All complications occurred within the first six months postoperatively, with no late complications observed. Meatal stenosis was managed with urethral dilatation, whereas urethrocutaneous fistulas required surgical correction[17].

Gabra studied 119 patients and found the statistically significant association between the type of hypospadias and the duration of urethral stenting ($p < 0.001$). Patients with distal hypospadias were more likely to have catheter removal within five days, whereas those with proximal hypospadias tended to require longer stenting. In addition, patients who developed a urethral fistula were significantly more likely to have catheter removal after five days compared with those without fistula formation ($p = 0.037$). No significant associations were observed between prolonged urethral stent duration and other postoperative complications[18].

Tubularized incised plate urethroplasty (TIPU) with snodgrass modification remains the most common technique for distal hypospadias repair, offering good functional and cosmetic outcomes, though fistula remains a frequent complication with rates around 5.9% in the literature. In the presented series, the fistula rate was 9% (similar between stented and unstented groups), and urinary retention occurred mainly in toilet-trained children older than 24 months, consistent with prior reports. While stents are traditionally kept for 2–7 days, unstented repairs allowed earlier discharge (median 3 vs. 7 days) without significantly higher complication rates, though older age at surgery was linked to poorer compliance and increased risks. Overall, surgeon experience, patient age, and stent use influence outcomes, with early catheter removal potentially balancing hospital stay reduction against manageable complications[19].

Hypospadias is considered one of the most common conditions found in the boys are born with, and the goal of surgery is always the same: to give them a penis that looks and works normally so they can grow up without physical or emotional difficulties. The TIP-Urethroplasty technique has become the go-to method for distal cases because it's straightforward, reliable, and usually gives good results. Still, like any surgery, complications can happen—most often fistulas, meatal narrowing, or wound breakdown—usually within the first six months. Surgeons have learned that adding protective tissue layers, like spongioplasty, helps lower the risk of fistulas and supports healing[20].

One of the big debates is whether to use stents or catheters after surgery. Stents can be uncomfortable and may cause bladder spasms, while catheters are generally better tolerated and seem to reduce complications, especially when left in place for longer. In fact, some studies suggest keeping a bladder catheter for up to three weeks can cut the risk of fistulas significantly, though it does mean managing spasms with medication. Age also plays a role: operating earlier—ideally between 6 and 18 months—tends to lower complication rates, while waiting until after 18 months can make healing harder.

In short, the best outcomes come from balancing technique, timing, and aftercare. Using protective tissue, choosing the right diversion method, and operating at the right age all help minimize risks and give children the best chance at a normal, healthy future.

CONCLUSION

Early stent removal following Snodgrass repair of distal penile hypospadias is considered the safe and the effective alternative to delayed removal. It does not significantly increase complications and contributes to enhanced patient recovery and comfort.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Imran Qadir, Ahmad Wahab Arshad, Sadaqat Ali
Drafting or Revising Critically:	Tahir Shahzad Nawaz Babar, Hamza Sohail, Nisar Ahmad
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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