



Impact of Patient Age on the Frequency of Urethrocutaneous Fistula After Hypospadias Repair Using Autologous Platelet-Rich Fibrin

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ABSTRACT

Background: Urethrocutaneous fistula (UCF) remains the most common complication after hypospadias repair. Autologous platelet-rich fibrin (PRF) has emerged as a biological sealant to improve surgical outcomes. However, the impact of patient age on UCF formation despite PRF use remains under-explored. **Objective:** To determine the frequency of urethrocutaneous fistula in children aged 1–6 years versus 7–12 years undergoing hypospadias repair with PRF as an intermediate layer. **Methods:** This was a prospective observational study conducted over 12 months at the Department of Pediatric Surgery, Services Hospital, Lahore. A total of 139 male patients undergoing primary hypospadias repair were included. Patients were divided into two groups based on age: Group A (1–6 years, n=87) and Group B (7–12 years, n=52). All surgeries utilized the tubularized incised plate (TIP) urethroplasty technique with PRF application between the neourethra and skin. Patients were followed for 3 months postoperatively for development of UCF. Data were analyzed using SPSS 25.0, and chi-square test was applied to determine statistical significance ($p < 0.05$). **Results:** The overall frequency of UCF was 7.9% (11/139). In Group A, 4 out of 87 patients (4.6%) developed UCF, while in Group B, 7 out of 52 patients (13.5%) developed UCF. The difference was statistically significant ($p < 0.05$), indicating higher complication rates in older children. **Conclusion:** Hypospadias repair in children aged 1–6 years is associated with significantly lower rates of urethrocutaneous fistula even when PRF is used. Early surgical intervention is recommended to minimize postoperative complications and optimize the benefits of PRF application.

INTRODUCTION

Hypospadias is one of the most frequently occurring congenital urogenital defects in male newborns, affecting 200–300 live births worldwide, and is even more common in South Asia and the Middle East¹. Surgical correction is necessary for functional and cosmetic recovery, but postoperative complications, including urethrocutaneous fistula (UCF), still represent a problem^{2,3}.

The appropriate timing for the repair of hypospadias has been a matter of controversy. Early repair—at 6 to 18 months of age—is favoured by many owing to improved tissue compliance, reduced psychological impact, and enhanced healing^{4,5}. Conversely, delayed repair is common in low-income areas and in cases of late diagnosis. Age is being recognized as one of the contributing factors of postoperative complications including fistula formation^{6,7}.

Autogenous platelet-rich plasma (PRP), a second-generation platelet concentrate, has also been used as an adjunct in paediatric urology. Its fibrin scaffold is rich in growth factors and cytokines, favouring angiogenesis and

tissue healing, which ultimately may lead to lower rates of complications^{8,9}. Many recent studies indicate that PRF can reduce the incidence of UCF, when it is applied as an interposed layer in the anastomotic urethroplasty^{10,11}. However, the influence of patient age on outcomes following PRF-augmented repairs, particularly rates of fistula remain incompletely characterized.

The objective of the study is to assess the effect of patient age on the incidence of urethrocutaneous fistula following hypospadias repair with autologous PRF and to compare the incidence between the ages of 1–6 and 7–12 years.

METHODOLOGY

This descriptive cross-sectional study was carried out in paediatric surgery department, Services Hospital, Lahore, over a period of 6 months starting from 20th June 2019 to 19th December 2019. A sample of 139 male patients, 1 to 12 years old, assessed with primary hypospadias and selected for surgical correction was analysed. Sample size was determined based on the 95% Confidence interval, 5% margin of error, and an expected prevalence of

urethrocutaneous fistula 13%; non-probability, consecutive sampling method was used for recruiting the participants.

Patients who had a prior hypospadias repair, associated penile anomalies (eg, chordee without hypospadias), disorders of coagulation, defects of platelet function, or who were lost to follow-up within three months after the surgery were excluded. After written informed consent was obtained from the patient's parents/guardians, all the patients received hypospadias repair with intraoperative use of autologous PRF membrane as an intermediate layer. The PRF membrane was obtained by collecting 5–10 ml of peripheral venous blood from each patient, which was immediately centrifuged at 3000 rpm for 10 minutes to produce a fibrin clot. These clots were mashed to form a membrane and were placed on top of the neo-urethra before the skin was sutured.

For the assessment of age-dependent results, patients were categorised in two different age groups Group A (1–6 years) and Group B (7–12 years group). All operations were performed by a paediatric surgeon experienced in laparoscopic surgery with standard approaches and postoperative follow-up in outpatient clinics for a minimum of three months. UCF was any pathologic communication between the neourethra and skin with urine leakage during micturition and examined up to 3 months after surgery. Statistical analyses were performed with SPSS version 20. Continuous variables, such as age, were described as mean \pm SD, and categorical variables, specifically site of hypospadias, technique of repair, and fistula formation were presented as frequencies and percentages. The frequency of UCF between ages was compared using the Chi-square test and the statistical significance difference was set at $p \leq 0.05$. The study was approved by the Ethical Review Committee of the Services Institute of Medical Sciences (SIMS), Lahore and all information was kept confidential.

RESULTS

A total of 139 patients were included in the study, with 87 (62.6%) in the 1–6 years age group and 52 (37.4%) in the 7–12 years group. The overall frequency of urethrocutaneous fistula (UCF) was 7.91% (11 out of 139 cases).

In the 1–6 years group, only 4 patients (4.6%) developed UCF, while in the 7–12 years group, 7 patients (13.46%) experienced this complication. This indicates a higher frequency of UCF in older children undergoing hypospadias repair using autologous platelet-rich fibrin. The distribution of patients, fistula cases, and calculated fistula rates for each age group is presented in Table 1 and illustrated in Figure 1.

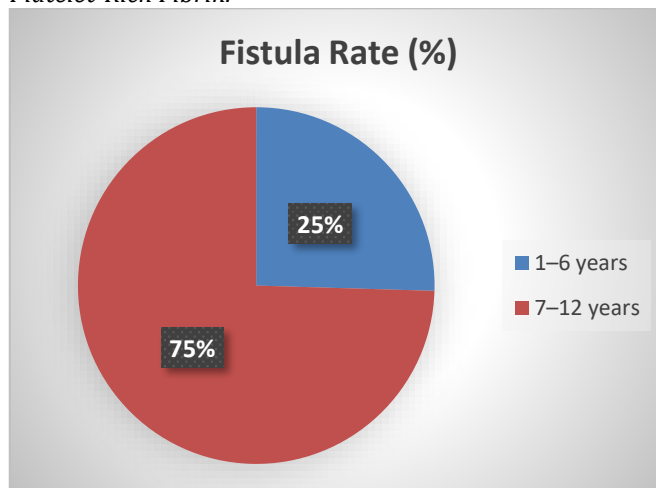
Table 1

Frequency of Urethrocutaneous Fistula by Age Group

Age Group	Number of Patients	Fistula Cases	Fistula Rate (%)
1–6 years	87	4	4.6
7–12 years	52	7	13.46

Figure 1

Bar Graph Showing Comparison of Urethrocutaneous Fistula Rates between Two Age Groups (1–6 Years vs 7–12 Years) following Hypospadias Repair using Autologous Platelet-Rich Fibrin.



DISCUSSION

Results of this study revealed the prevalence of urethrocutaneous fistula (UCF) rates to be higher among patients of 7–12 years age group (13.5%) than the 1–6 years age group (4.6%) after hypospadias repair with autologous platelet rich fibrin (PRF). Indeed, this indication demonstrates that there is an appreciably elevated risk of postoperative complications among the elderly. These findings agree with those of other studies such as Healy et al.'s, who observed an association between older age at hypospadias correction and an increasing UCF and wound dehiscence¹³.

Age-related differences in surgical outcome based on their biological meaning, have already been argued in literature. In younger children, the tissue is elastic, the tissue has relatively lower shaft tension, and fewer erections occur during the early postoperative period, resulting in better healing and decreased complications^{14,15}. By contrast, older children who undergo delayed repair have denser tissue, more wound tension, and psychosocial pressures that impact patient adherence to treatment and healing¹⁶. PRF has become one of the promising adjuvants in the field of reconstructive surgery because of its slow release of the growth factors and its scaffold characteristics which enhance angiogenesis and tissue regeneration¹⁷. The general fistula rate (7.9%) reported with this technique was even lower than that (between 10-30%) described after conventional repair without PRF in the literature^{18,19}. Nevertheless, the stratified analysis demonstrated that the preventive role of PRF in younger patients has a more important significance, probably because there is a synergistic effect with the level of regression of their healing ability.

A meta-analysis by Liu and colleagues supports the efficacy of PRF in cases of hypospadias surgery and describes an attenuation in the rate of UCF when PRF is applied as the second layer²⁰. However, only few of them stratified the outcomes according to age and therefore it is of relevance that a similar result is achieved, and that "age" is an "independent" risk factor also using more modern

"adjuncts" as for PRF.

Although all operations in this series were carried out by experienced paediatric surgeons according to a standard protocol, patient-specific variation in healing, the influence of nutritional status and parental compliance could not be entirely controlled. Moreover, although a 3-month follow-up time frame was already adequate to identify early complications, long-term surveillance might allow the delayed detection of fistula.

CONCLUSION

The present research indicates age of patient is a major

influence to postoperative status of hypospadias with autologous platelet rich fibrin (PRF) surgery. There was significantly more urethrocutaneous fistula formation in patients between age 7 and 12 years than in those between age 1 and 6 years, even though the operative technique had been standardized and PRF was used. These results demonstrate that early operative intervention before 1--6 years of age is associated with a low incidence of complications. Although PRF is still a useful adjunct, its efficacy seems to be influenced by tissue healing process that is age dependent. Early treatment is the key for excellent results in hypospadias surgery.

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