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Research Article

A Comparison of Snodgrass & Snodgraft Surgical Procedures for Treating Childhood Hypospadias

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Abstract

Background: Hypospadias is a congenital condition characterized by an abnormally positioned external urethral meatus, on the underside of the penis. Surgical repair is the usual course of treatment and more than 300 different surgeries have been described snodgras and snodgraft are among the repair techniques that have stood the test of time.

Methodology: This was a Randomized Controlled Trial conducted at the department of Plastic Surgery Department, Northwest General Hospital and Research Centre, Peshawar over a period of 06 months All hypospadias patients were enrolled in the outpatient department following patient consent. Nonprobability consecutive sampling was used. Cases were randomized into the following groups: the Snodgrass group and the Snodgraft group. The Incidence of postoperative fistula formation was compared between the two groups.

Results: In Snodgrass (Control group), 20 (17.40%) patients developed postoperative fistula. In Snodgraft (Interventional group), 06 (5.021%) patients had the presence of a fistula. The difference was statistically significant in the 3-6 year age group (P<0.008); but not in the 7-10 year age group (P=0.064)

Conclusion: In our study, Snodgraft repair was found to be significantly more effective than Snodgrass Repair.

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Introduction

Hypospadias is a congenital condition characterized by an abnormally positioned external urethral meatus, on the underside of the penis, rather than on the tip of the glans. It is among the most prevalent congenital anomalies in the development of male genital organs.[1] It is believed that hypospadias develop embryologically during urethral development between the 08th and 20th week of gestation. Males and females have similar external genital organs until the 8th week of gestation. Following that, Dihydrotestosterone (DHT) largely influences the development of a masculine phenotype in the genitalia of male fetuses.[2] The open urethral groove is present, as the phallus grows from its base to the level of the corona of the glans penis. Hypospadias is a result of aberrant urethral development brought on by a lack of testosterone. Hypospadias can be classified based on the location of an abnormal urethral meatus into the following three types i.e., Granular and sub-coronal in the anterior region, Distal penile, midshaft, and proximal

penile in the middle region or penoscrotal, scrotal and perineal in the posterior region.[3]

Surgical repair is the usual course of treatment except for the type of hypospadias most distal in location, where micturition is unobstructed. Nowadays, the majority of surgeons correct hypospadias in children between the ages of 4 and 18 months. However, the patient's age is less significant than the size of the phallus.[4] An enhanced emotional and psychological outcome has been associated with this. The development of complications, primarily the formation of the urethra-cutaneous fistula occurs in nearly half of the patients having more late correction of hypospadias in the pubertal and post-pubertal ages.[5] After the age of 5, hypospadias repair surgeries retain their psychological effects during reproductive age. Reports have shown a greater frequency of complications in patients of age 5 compared to those of age 1-year-old, indicating that earlier correction is usually preferred.[6]

Although more than 300 different kinds of hypospadias repair surgeries are described. However, only a handful of these techniques have stood the test of time.

When the urethral plate is too narrow, different techniques like the tubularized incised plate (TIP) urethroplasty, as described by Snodgrass, are used, a single-stage which is a readily reproducible technique for hypospadias repair[7]. It involves incising the urethral plate to widen it and then tubularizing it. When the defect is more than 1 cm, additional grafts such as a dorsal inlay graft or preputial graft may be necessary to ensure a functional and cosmetic outcome.[8,9]

However, postoperative complications such as meatal/neo urethral stenosis, bleeding, hematoma formation, edema, wound infection, skin necrosis, penile torsion, and bladder spasm are frequently encountered.[10]

Following hypospadias repair, the incidence of urethra-cutaneous fistula has been observed to range from 0 to 30%. The majority of fistulas (83%), which emerge within 3 days (11%) and 4-7 days (6%), follow the day of catheter removal[11]. To alleviate the stenosis and stress on the suture line, a dorsal inlay graft obtained from the inner side of the prepuce or buccal mucosa can be quilted to cover the longitudinal midline incision of the urethral plate. This modification of Snodgrass tubularized incised repair is called Snodgraft repair. Theoretically, this decreased suture line tension brought on by the dorsal inlay graft should result in a lower incidence of postoperative fistula formation.[12] Our goal is to study the impact of dorsal inlay.

Methodology

A randomized controlled study was designed to accomplish the objective of the research at the Plastic Surgery unit, Northwest General Hospital and Research Centre, Peshawar. The trial ran from 25 February 2021 to 26 August 2021 for 6 months. The study included Patients with primary, anterior, and middle hypospadias who were between the ages of 3 to 10 years while patients with a previous history of surgery for hypospadias, posterior hypospadias, and ages under three and over ten were not included in the study. Following approval from the IREB, all the patients with hypospadias who met the study's eligibility requirements were enrolled in the outpatient department. After describing the study methodology, informed consent was obtained from the parents of the children. Patients were assigned a control group (i.e., Snodgrass) and an Interventional (i.e., Snodgraft group) through non-probability consecutive sampling. All patients were operated under general anesthesia. Surgery in both groups was done by a consultant plastic surgeon. In Snodgrass only tubularized incised plate urethroplasty was done. In Snodgraft repair, a dorsal inlay graft obtained from the inner side of the prepuce or buccal mucosa was positioned following a urethral plate incision and was fixed to bed by a quilting suture. 5 mm incision leads to a 1 cm defect in the urethral plate. For defects measuring 1 cm or less, we typically perform a Snodgrass procedure. If the defect exceeds 1 cm, a Snod graft procedure is performed. In cases where the defect measures 1 cm and involves scarred surrounding tissue, grafting is employed to prevent secondary contracture. Silicon catheter remained for 1 week after surgery in both groups. The patient was followed up for 6 months specifically on the 7th day, the 21st postoperative day, and subsequently after 3 months. During micturition, the patient was visually inspected to see the presence of any urethrocutaneous fistula on each follow-up and the information was documented on a data-collecting sheet. The collected data from both groups was entered and a statistical

package for social sciences (SPSS) version 20 was utilized for data analysis. Qualitative variables such as efficacy and fistula presence were calculated as frequencies and percentages. For quantitative variables such as age, the mean and standard deviation were computed. To compare efficacy in both groups, the Chi-Square test was employed and was stratified among ages to see the effect of modification. A *p*-value of 0.05 or less was regarded as significant.

Results

There were 115 patients in each group. As per age-wise distribution, in the Snodgrass group, the number of patients between the age group of 03-06 years were documented as 65 (56.52%), and patients between 7-10 years age group 50 (43.48%) were recorded. In the Snodgraft group, the number of patients in the age group 03-06 years was also recorded as 65 (56.52%), and in the age group of 07-10 years, 50 (43.48%) patients were recorded. In Snodgrass, 20 (17.40%) had the presence of a fistula whereas in 95 (82.60%) patients there was no presence of a fistula. In the same way, in Snodgraft, 06 (5.021%) patients had the presence of a fistula whereas in 109 (94.79%) patients there was no presence of a fistula. As for the procedural outcome, in the Snodgrass technique, the Effectiveness of the procedure was recorded in 95 (82.60%) patients whereas in the Snodgraft, the Effectiveness of the procedure was recorded in 109 (94.79%) patients. The stratification of Effectiveness according to age is shown in Table 1. As per the results, a significant difference was seen in terms of the Effectiveness of the Snodgraft repair as compared to Snodgrass repair surgery in the age group of 03-06 years (p-value < 0.05) while there was no discernible difference between the Effectiveness of the two surgical procedures in the age group of 7-10 years (p-value > 0.05).

Table 1: *Stratification of Effectiveness according to Age Group (n=230)*

Age Group	Efficacy	Snodgrass technique	Snodgraft technique	Total	*p*- value
03-06 Years	Yes	54 (46.95%)	63 (54.78%)	117 (50.86%)	
	No	11 (9.56%)	02 (1.73%)	13 (5.65%)	**0.008**
07-10 Years	Yes	41 (35.65%)	47 (40.86%)	88 (38.26%)	
	No	09 (7.82%)	03 (2.60%)	12 (5.21%)	**0.064**

Discussion

To guarantee that the families of patients with hypospadias have a positive experience, parental education, and reassurance are crucial because the majority of patients undergoing surgery are very young at the time of surgery. Researchers' Data indicate that participating in online support groups can play a significant role in patients' and parents' ability to manage hypospadias.[13] Urethrocutaneous fistulation is a major concern for surgeons when repairing hypospadias. With most single-stage surgeries usually less than 10% fistulas form but it increases with the degree of severity of hypospadias, approaching 40% with complicated re-operative procedures. Fistulas rarely close spontaneously.[14] Fistulas reoccur in approximately 10% of patients after repair surgery. In cases where the patient is not yet of school age One-stage hypospadias repair surgeries are performed which offer the benefits of a single procedure utilizing an unscarred tissue. The most frequently reported complaints were repeated surgery, a high percentage of urethral fistulas and strictures, extensive scarring, and the presence of hairs in the neo-urethra.[15]

Previously, no comparative study was conducted in Peshawar between the prevalence of postoperative complications i.e uretherocutaneous fistula of two procedures i.e. Snodgrass and Snodgraft technique. As per our results, the frequency of development of postoperative urethrocutaneous fistula in the Snodgrass technique was found to be higher as compared to the Snodgraft technique in children undergoing primary hypospadias repair. An additional study carried out by (Sheng X *et al* [96]) reported that among the recruited patients, 39 patients (32.5%) experienced postoperative urethrocutaneous fistula formation.[16] According to their findings, there was a considerable correlation between the group with urethrocutaneous fistula and the group without urethrocutaneous fistula according to urethral defect length, age, and the history of urethral operation. In another study, (Ahmed et al, 2015) reported that the Snodgraft technique for hypospadias repair has shown outstanding practical, cosmetic, aesthetic, and functional outcomes attained in 96.09% of patients. There was no evidence of urethral diverticulum or meatal stenosis. An outstanding glanular location of a wide slit-like neo-meatus was attained using this technique. Similarly, the parents of the patients

reported excellent urine streams. Nine patients (3.91%) reported having urethrocutaneous fistula development.[17] In the current study, patients who had Snodgraft repair showed excellent results on follow-up i.e, No post-operative urethrocutaneous fistula was formed while the patients who received Snodgrass repair, the Effectiveness was lesser than the Snodgraft repair of patients who developed postoperative urethrocutaneous fistula. The patient was followed up for 6 months. Furthermore, a significant difference was seen in terms of the Effectiveness of the Snodgraft as compared to the Snodgrass technique for hypospadias repair in the age group of 03-06 years. However, there was no discernible difference in the post-operative Effectiveness of the two surgical procedures in the age group of 7-10 years.

Conclusion

To conclude, our study highlights that the Snodgraft procedure effectively reduces postoperative fistula formation, supported by both clinical observations and statistical analysis.

Conflict of Interest: None

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Author's Contribution

Muhammad Shadman: Conception and design of the study, data collection, analysis and interpretation, Drafting the work, Final approval of the version to be published and accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Muhammad Mudassir Mahboob: Conception and design of the study, critical revision of the article and final approval of the article to be published.

Irfan Ullah: Data collection, Article Editing, Manuscript Revision, analysis and interpretation of data.

Hussan Birkhez Shami: Article Editing, Manuscript Revision analysis and interpretation of data.

Mishkat Arbab: Documentation and Data Collection, Data Interpretation and Analysis.

Wajid Inam: Study design, drafting of work, Data Collection and analysis and interpretation.

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