ORIGINAL RESEARCH PAPER

UROLOGY

CLASSIC SNODGRASS VERSUS INNER PREPUTIAL INLAY GRAFTER SNODGRASS IN DISTAL PENILE HYPOSPADIAS REPAIR

KEY WORDS: Snodgrass, Snodgraft, Hypospadias,

Dr. R.Vijaya Suriya Senior Resident, Institute Of Nephro-urology Yenepoya Medical College Derlakatte Mangalore

Dr Altaf Khan Professor, Institute Of Nephro-urology Yenepoya Medical College Derlakatte Mangalore

Dr Mujeeburahiman Hod And Professor, Institute Of Nephro-urology Yenepoya Medical College Derlakatte Mangalore

Dr Nischith Dsouza Professor, Institute Of Nephro-urology Yenepoya Medical College Derlakatte Mangalore

ABSTRACT

Objectives: To compare the operative time and complications following classic snodgrass versus inner preputial inlay grafter Snodgrass repair of primary distal hypospadias **Materials and methods:** The study included 40 cases of distal hypospadias that were admitted to the department of urology, Yenepoya medical college & hospital, mangalore . Cases were divided into 2 groups; Group I: The Snodgrass group (20 cases) and Group II: The Snodgraft group (20 cases). **Results:** The mean operative time was longer for patients in Group II than in Group I (75.47±9.25 minutes versus 50.07±7.28 minutes). Postoperative urethrocutaneous fistula occurred in one patient (5.0%) in each group. Meatal stenosis developed in 2 cases (10.0%) in Group I versus 1 case (5.0%) in Group II. There was no significant difference in the complication rate among both groups. **Conclusions:** Snodgraft operation is more technically challenging and requires longer operative time than the original Snodgrass operation, so its indication should be tailored according to the patient condition. Both techniques have low complication rates.

INTRODUCTION

Hypospadias stands out as one of the most frequently occurring congenital anomalies affecting the male genitourinary system. The Snodgrass procedure has gained substantial popularity as a technique for addressing distal and mid-shaft defects. Nevertheless, it carries an elevated risk of various complications, such as meatal stenosis. A proposed alternative to mitigate these complications involves employing the Snodgraft repair method, which utilizes an inner preputial free graft. This study aims to compare the effectiveness of the Snodgraft and Snodgrass techniques in repairing distal hypospadias.

Beyond the abnormal meatal location, the classic triad of hypospadias presentation encompasses ventral curvature (chordee) and an abnormal prepuce with an excess of redundant skin hood on the dorsal aspect of the penis (Nurhadi and Saputra, 2018).

Hypospadias has a historical record dating back to ancient medical practice and was initially documented by Galen of Pergamon, a renowned physician during the second century, who gave the condition its name (Maitra et al., 2019).

Since its initial description, managing hypospadias has captured the attention of numerous surgeons, resulting in over 400 documented operations for hypospadias repair and an extensive body of literature on the subject. This anomaly remains challenging, and every surgeon faces a learning curve (Hadidi, 2017).

Hypospadias ranks as the second most prevalent congenital anomaly of the genitourinary system, following undescended testes, and it represents the most common congenital penile malformation (Van der Horst and De Wall, 2017).

The global incidence of hypospadias ranges from 1 in 200 to 1 in 300 live male births per year (Shah et al., 2018). Up to 70% of diagnosed cases are classified as mild, where the urethral opening is near its normal location, just below the glans (distal hypospadias) (Cripps et al., 2019).

Unfortunately, the etiology of hypospadias remains largely unknown in the majority of patients. Genetic and environmental factors are the primary susceptibilities (Chang et al., 2020). Additionally, factors such as advanced maternal age, maternal obesity, premature delivery, low birth weight, and multiple pregnancies have all been associated with a heightened risk of hypospadias occurrence (Chen et al., 2018).

While hypospadias is not life-threatening, it can lead to functional abnormalities in urination, intercourse, and sperm deposition (Van der Horst, 2017). As a result, the primary objectives of management include reconstructing the urethra with the meatus positioned at the glans tip to facilitate proper urinary flow, correcting penile curvature to minimize sexual dysfunction, and achieving satisfactory cosmetic outcomes to alleviate the psychosocial burden on affected individuals (Chan et al., 2020).

The TIP (Tubularized Incised Plate) repair method was introduced in 1994 and has brought about a revolution in hypospadias management. It offers numerous advantages, including improved cosmetic outcomes, placement of the meatus at the tip of the penis, and a straightened phallus. Many surgeons consider it the preferred procedure for managing distal hypospadias (Zain, 2017). The rationale behind this technique involves making an incision in the urethral plate to enable tension-free tubularization of the neourethra, which subsequently undergoes healing (Keays and Dave, 2017).

However, the mechanism of healing of the incised plate remains a subject of debate, with some authors suggesting that it heals through epithelial creeping. This theoretical approach could increase the risk of complications due to healing by primary intention if contraction is allowed to occur (Salah et al., 2019).

MATERIALS AND METHODS

The study included 40 cases of distal hypospadias that were admitted to the department of urology, Yenepoya medical college & hospital, mangalore . Cases were divided into 2

groups; Group I: The Snodgrass group (20 cases) and Group II: The Snodgraft group (20 cases).

Surgical Technique

Prior to anesthesia induction, intravenous antibiotic prophylaxis (cefotaxime 50mg/kg iv) was administered to reduce the risk of infection. Subsequently, a caudal block was performed to alleviate post-operative pain.

Snodgrass Surgical Technique

In the Snodgrass surgical technique, a 5-0 polyglactin traction suture was carefully placed at the glans tip. This was followed by a U-shaped incision made at the boundaries of the urethral plate, and a meticulous degloving of the penile skin to preserve an adequate mucosal collar. Dissection involved mobilization of the glans wings, and a midline relaxing incision was made within the meatus, extending to the urethral nub in patients undergoing the Snodgrass technique or to the end of the plate in the Snodgraft group. Closure of the neourethra was achieved using 6-0 vicryl continuous subcuticular sutures, reinforced with interrupted subepithelial sutures over a 6 or 8 F stent, secured to the glans traction suture. A local vascularized dartos fascia flap, either dorsal or ventral, was affixed to cover the entire neourethra. The glans wings, submucosal collar, and ventral shaft skin were then closed in the midline using interrupted simple 6-0 vicryl sutures. Finally, a gauze dressing was applied, and the stent was retained for 5-7 days.

Figure 1: Snodgrass technique

Snodgraft Surgical Technique

The Snodgraft surgical technique encompassed the same steps as the Snodgrass technique, with the addition of the following: A deep midline incision was made longitudinally in the urethral plate, followed by the harvesting of a small free graft from the inner preputial skin, with the removal of excess fatty tissue. The key principle in graft harvesting was to ensure full coverage of the incised area of the urethral plate by meticulously measuring the graft's size. Therefore, the dimensions of the graft were influenced by variations in the depth of the midline incision, urethral plate configuration, and meatal location. The graft was secured to the medial edges and the base of the incised plate using interrupted 6/0 polyglactin sutures.

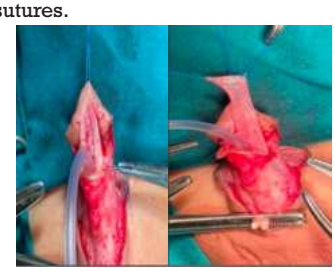

Figure 2: Snodgraft technique

Postoperative Care

All repairs were conducted on an outpatient basis, and patients were discharged on the same day. Following discharge, they received oral broad-spectrum antibiotics for the duration of the urethral catheter placement. Additionally, diclofenac sodium analgesics were administered to manage post-operative pain. Dressings were removed after 2-3 days, and the urethral catheter was removed 5-7 days post-operation.

Statistical analysis

Statistical analysis was done by PSPP. Shapiro-Wilks test and histograms were used to evaluate the normality of the distribution of data. Quantitative parametric data were presented as mean and standard deviation (SD) and were analyzed by unpaired student t-test. Quantitative non-parametric data were presented as median and range and were analyzed by Mann Whitney-test. Qualitative data were presented as number and percent and were compared by chi-square (X2) or Fisher's Exact test when appropriate. P value <0.05 was considered statistically significant

RESULTS:

Total of 40 patients were included in this study of which 20 patients had underwent classic Snodgrass (group I) and 20 underwent Inner Preputial Inlay Grafter Snodgrass (group II). The mean age of group I was (26.6 ±13.7) and (31.8 ± 19.5) for group II (P-value 0.492). Meatal location was coronal in 5 cases, sub coronal in 18 cases and distal in 17 cases. Mild chordea was found in 13 cases. The mean transverse glanular diameter was 14.5 mm in group I while 15.1 mm in group II (P-value 0.145), mean urethral plate length was 9.8 mm in group I while 10.9 mm in group II (P-value 0.103) and mean urethral plate width was 8.1 mm in group I and 7.7 mm in group II (P-value 0.231).

The mean operative time was longer for patients in Group II than in Group I (75.47±9.25 minutes versus 50.07±7.28 minutes. P-value 0.037). Postoperative urethrocutaneous fistula occurred in one patient (5.0%) in each group. Meatal stenosis developed in 2 cases (10.0%) in Group I versus 1 case (5.0%) in Group II. There was no significant difference in the complication rate among both groups. Both techniques have low complication rates.

Table 1

Results

Parameter (mean)	Group I	Group II	P-value
Age (years)	26.6	31.8	0.492
Transverse glanular diameter (mm)	14.5	15.1	0.145
Urethral plate length (mm)	9.8	10.9	0.103
Urethral plate width (mm)	8.1	7.7	0.231
Operative time (min)	50.07	75.47	0.037*
Postoperative complications (n)			
Urocutaneous fistula	1	1	1.000
Meatal stenosis	2	1	0.371
*significant			

DISCUSSION:

Duckett described hypospadias surgery as a humbling process, an intriguing task that often confounds the surgeon, highlighting the complex blend of art and science to perform a successful repair. And although there has been great progress since this description, there is still much work left to be done (Long and Canning, 2016). The incredibly increasing abundance of proposed techniques to manage hypospadias represents unmistakable evidence that no such operation is flawless and still there is no worldwide agreement on any of the known surgical techniques. As is true for all reconstructive procedures, the best chance of a good outcome is with the first operation. Certain factors like location of the meatus and the degree of proximal spongiosal hypoplasia, presence and degree of chordee, quality (width and depth) of the urethral plate, size of the glans, degree of ventral skin deficiency and penile length are all key factors for operative planning (Thakur, 2018).

Many authors prefer using the TIP technique advocating that it is versatile, highly standardized, and a learnable technique that provides favorable cosmetic outcome in addition to adequate functional short term and long term results

(Springer et al., 2017). While other authors report high incidence of complications as a result of gradual fibrosis of the neourethra that is reconstructed based on a raw area which heals causing narrowing of the segment (Abbas and Pippi Salle, 2018). Another factor that threatens the popularity of Snodgrass technique is that some surgeons believe it is inappropriate for cases with narrow urethral plate (<8mm). They imply that the urethral plate needs to be augmented or substituted for further tubularization especially in cases with insufficient local tissue or unfavorable urethral plate, particularly after trials of previous hypospadias repair (Pan, 2017).

Helmy et al. (2018) obtained similar findings regarding operative time in their study. They revealed that the sole statistically significant difference between the two groups was a longer operative time, with the Snodgraft group requiring 106 ± 12 minutes compared to only 79 ± 9 minutes for the Snodgrass group ($p = 0.005$).

As for the postoperative assessment of hypospadias, this comprehensive process involves multiple facets, including regular follow-ups to evaluate surgical outcomes, assess meatal shape and cosmetic appearance, and identify any potential complications. Many medical centers also incorporate supplementary techniques such as uroflowmetry and cystoscopy into their postoperative assessment protocols.

The results of our study diverged from those reported by Smitakahara et al., who conducted research on 100 patients and compared the outcomes of 50 cases undergoing the Graft procedure with 50 cases receiving the standard TIP procedure. They found that the incidence of stenosis was lower in the Graft group compared to the TIP group during a mean follow-up period of 3.6 years (Silay et al., 2021).

Regarding complication rates, our findings align with those of a systematic review and meta-analysis conducted by Alshafei et al. in 2020. Their analysis involved six studies with a total of 617 patients, aimed at comparing the outcomes of the Snodgrass and Snodgraft techniques. According to their meta-analysis, urethrocutaneous fistulas occurred in 9.4% (33/350) of Snodgrass repairs and 4.9% (13/267) of Snodgraft repairs, indicating a slightly higher incidence in the Snodgrass repair group but without any statistically significant difference ($p = 0.84$). Meatal/urethral stenosis was reported in all the studies they analyzed, occurring in 53/250 (21.2%) Snodgrass repairs and 11/267 (4.1%) Snodgraft repairs. However, the pooled analysis did not reveal a significant difference between the two groups ($p = 0.12$).

CONCLUSION

Snodgraft operation is more technically challenging and requires longer operative time than the original Snodgrass operation, so its indication should be tailored according to the patient condition. Both techniques have low complication rates.

REFERENCES

1. Manzoni G, Bracka A, Palminteri E, Marrocco G. Hypospadias surgery: when, what and by whom?. BJU international. 2004 Nov;94(8):1188-95.
2. Kurahashi N, Murakumo M, Kakizaki H, Nonomura K, Koyanagi T, Kasai S, Sata F, Kishi R. The estimated prevalence of hypospadias in Hokkaido, Japan. Journal of epidemiology. 2004;14(3):73-7.
3. Snodgrass W, Koyle M, Manzoni G, Hurwitz R, Caldamone A, Ehrlich R. Tubularized incised plate hypospadias repair: results of a multicenter experience. The Journal of urology. 1996 Aug;156(2S):839-41.
4. Abbas TO, Pippi Salle JL. When to graft the incised plate during TIP repair? A suggested algorithm that may help in the decision-making process. Frontiers in Pediatrics. 2018 Nov 14;6:326.
5. Alshafei A, Cascio S, Boland F, O'Shea N, Hickey A, Quinn F. Comparing the outcomes of tubularized incised plate urethroplasty and dorsal inlay graft urethroplasty in children with hypospadias: a systematic review and meta-analysis. Journal of Pediatric Urology. 2020 Apr 1;16(2):154-61.
6. Chen MJ, Karaviti LP, Roth DR, Schlomer BJ. Birth prevalence of hypospadias and hypospadias risk factors in newborn males in the United States from 1997 to 2012. Journal of pediatric urology. 2018 Oct 1;14(5):425-e1.
7. Springer A, Tekgul S, Subramaniam R. An update of current practice in hypospadias surgery. European Urology Supplements. 2017 Jan 1;16(1):8-15.
8. Helmy TE, Ghanem W, Orban H, Omar H, El-Kenawy M, Hafez AT, Dawaba M. Does grafted tubularized incided plate improve the outcome after repair of primary distal hypospadias: a prospective randomized study?. Journal of Pediatric Surgery. 2018 Aug 1;53(8):1461-3.
9. Pramod S, Prakash GS. Outcome of anterior hypospadias repair: A single center experience. Archives of International Surgery. 2018 Jan 1;8(1):10.