

Bracka's and Snodgrass Surgical Techniques for Hypospadias Correction: A Comparative Study

Bracka's and Snodgrass Surgical Techniques for Hypospadias

Sadia Rasheed¹, Rizwana Fazlani², Shahzad Shaikh³, Samra Irshad³, Mujtuba Pervez Khan³ and Sidra Memon³

ABSTRACT

Objective: To compare the surgical outcome of hypospadias repair using the Bracka's and Snodgrass techniques at Liaquat University Hospital, Jamshoro

Study Design: Prospective study

Place and Duration of Study: This study was conducted at the department of Plastic Surgery of Liaquat University Hospital, Jamshoro from January, 2021 to December, 2021.

Materials and Methods: Male pediatric patients aged 6 months to 12 years and primary cases of hypospadias, with good prepuce, and wide urethral plate were included. Patients were randomly divided according to the surgical (Bracka's and Snodgrass) method were performed. The post-surgical evaluation was also performed to evaluate any immediate or late post-operative complications.

Results: Out of 120 participating pediatric patients, a majority (56.0%) belonged to age < 5 years with the mean age of participating patients was 3.5±2.3. Post-operative complications were more common in Bracka's technique group (p<0.05). Comparing the postoperative length of stay and operative time, a significant difference (p<0.05) between both surgical techniques was witnessed

Conclusion: Snodgrass is much more advantageous compared to Bracka's method with minimal post-operative complications

Key Words: Congenital abnormalities, Hypospadias, Post-operative Complications

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INTRODUCTION

Hypospadias is a commonly occurring congenital anomaly categorized by inadequate or fragmentary development of the anterior urethra, an irregular placement of the urethral opening and a ventrally defective prepuce. ⁽¹⁾ It is affecting about 3 male children per 1000 live births (1 in 200-300 male children). There is a 13-fold increase in the incidence of hypospadias among first-degree relatives. ⁽²⁾

Over the past decade, hypospadias surgery has progressed toward the goal of a functionally and aesthetically normally reconstructed penis.

¹. Department of Plastic Reconstructive and Burns Unit, LUMHS, Jamshoro.

². Department of Plastic Surgery, Bilawal Medical College for Boys, LUMHS, Jamshoro

³. Department of Plastic Surgery, Liaquat University Hospital, Jamshoro.

Correspondence: Dr. Shahzad Shaikh, Senior Medical Officer of Plastic Surgery, Liaquat University Hospital, Jamshoro
Contact No: 03332697135
Email: drshahzad83@hotmail.com

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There are about two hundred distinct types of surgical repair procedures available to treat hypospadias, depending on the intricacy of the surgery. ⁽³⁾ The overall purpose of these repairing techniques is to achieve both good surgical management of hypospadias and the achievement of excellent functionality as cosmetic results without complications. Many children with distant hypospadias have no inadequacies in their functioning, lacking typical penile curvature, and may void in the regular position with a straight stream. ⁽⁴⁾ As a result, the primary goal of restoring the natural meatal location inside the glans is essentially aesthetic. For attaining surgical success with a positive outcome, all surgical techniques for hypospadias management successively apply the different basic phases. ⁽⁵⁾ Localization is the foremost and main predictor for the selection of surgical approach. Tubularized Incised Plate (TIP) urethroplasty or Snodgrass and Bracka's repair are the most common and widely performed hypospadias repair methods. In both TIP and Bracka's techniques, the urethral plate is used in the procedure, giving a near-to-natural post-repair appearance of the glans in terms of shape and external meatus. ^(6,7)

The initial stage of Bracka's repair consists of the replacement of the urethral bed and orthoplasty with free preputial graft. Six months after the initial stage, the free graft urethral plate is tubularized to form the neourethra. It can be used to treat all types of

hypospadias, and the results of the Bracka's procedure are considered superior, and the surgery is relatively simple, dependable, and reproducible.^(8, 9) On the other hand, Snodgrass technique, due to the low complication rate and excellent cosmetic outcomes is widely accepted and has become the procedure of choice that is frequently used for correcting both proximal and distal hypospadias. The vertical meatus is created by tubularizing the incised urethral plate in this technique. Few local studies are also being done to investigate this surgical technique because of the encouraging results.^(5, 10)

Despite the availability of different surgical approaches, none of the techniques is free the post-surgical complications. Like with other surgical approaches, Bracka's and Snodgrass can also result in fistula and stenosis.⁽¹¹⁾ For this purpose, the objective of this study was to compare the surgical outcome of hypospadias repair using the Bracka's and Snodgrass techniques among the pediatric patients.

MATERIALS AND METHODS

Prospective study was carried out from January-December 2021 at the department of plastic surgery, Liaquat University Hospital, Jamshoro. Male pediatric patients aged 6 months to 12 years, never operated previously for hypospadias, good prepuce, meatal position on proximal, coronal and/or sub-coronal site of penis, wide urethral plate and parents or guardian of patient gave consent of participation were included. Whereas, patients with associated anomalies, recurrent cases, didn't gave consent of participation were excluded. The LUMHS, Jamshoro's Ethical Review Committee gave the study its ethical seal of approval. The demographic details, diagnosis (type of hypospadias), associated chordee, of circumcision, final findings results of surgery and any complications were recorded in a pre-designed checklist. A complete clinical examination along with the abdominal ultrasound and baseline laboratory analysis was carried out prior to the surgery. Participants were divided randomly into two groups based on the surgical technique used decided by the plastic surgeon.

Patients having mild-moderate chordee were designated for the extended Bracka's staged repair and included in Group I whereas, patients with mild chordee were included in Group II (the Snodgrass procedure group). The last cases in both groups were performed in July 2021. Both the procedures were performed by the same senior surgeon under general anesthesia.

Bracka's Procedure: In the Bracka's group, initially a circular (crescent-like) urethral plate was incised at the volar aspect of the penis root by a 0.5cm diameter incision proximal to the meatus. Starting at the lateral ends of the sub-meatal incisions, two more vertical incisions were created to connect at the tip of the glans, generating a triangle shape surrounding the meatus and

the glanular groove. Using proline 4/0, a stay suture was placed at the meatal tip to aid with penile traction at the glans. A full thickness skin graft from a non-hair bearing area, such as the "prepuce, oral mucosa, post auricular area, medial arm," was applied over the urethral plate after the chordee was corrected, the fibrous scared tissue was excised up to the corpora, and a tie over dressing was placed over the graft.^(5, 10) In later phase, urethroplasty was carried out if the graft was soft and malleable six-month after stage one healing period. The corpus spongiosum was dissected and the urethra was released distally so that the urethra could be readily accessible from the top of the triangle incision. Finally, the incision was closed after a little drain was left in place. An absorbable suture is used to construct the urethra over a silicone catheter. After a week, the catheter is taken out.^(5, 10)

Snodgrass procedure: After measuring the distance of the meatal opening from the tip of the glans, a U-shaped skin longitudinal parallel incisions were made along the edges of the urethral plate to produce glans wings. A midline incision is made along the length of the urethral plate to widen it, a feeding tube of approximately 6-8 Fr size was passed in the meatal opening. Penile skin that is used to cover the neourethra (ventral or dorsal) is dissected to reveal a pedicle subcutaneous tissue. The penile skin's ventral aspect, mucosal collar, and glanular wings were all closed in the middle. A urethral stent was attached to the glans penis with a 3/0 silk suture after the repair was finished. Some patients underwent supra-pubic draining catheter urinary diversion. In every case, a penile tourniquet was applied, and it was taken off after glans reconstruction. Throughout, intravenous co-amoxiclav was administered. The analgesics used were intravenous paracetamol and oral ibuprofen.^(8, 11)

Following the surgery, all patients were immediately examined for any instantaneous surgical complications and urinary catheters were kept for 7-10 days before being calibrated and retested repeatedly. Patients were followed one month, three months and six months after surgery for evaluate any complications, stream of urine, calibration and the cosmetic results. Positive results were indicated by a vertically oriented slit, an oval meatus, and a conical-shaped glanular with a direct urine stream.

Data was analyzed in SPSS ver. 23. All quantitative variables are presented as mean \pm standard deviation and qualitative variable as frequency and percentage. Student t-test and Chi-square tests was performed for the comparative analysis. P-value <0.05 was set as the significance level.

RESULTS

Total 120 patients fulfilled the selection criteria, Out of these, a majority belonged to age <5 . The overall mean age of participating patients was 3.5 ± 2.3 (age range: 1.5

to 12 years). Whereas, the mean age of patients of Bracka’s repair procedure group was 3.6± 2.4 (1.6–12 years) and those in Snodgrass technique group was 3.7±2.3 (1.7 months–12 years). (Table I)

Table No.1: Age wise dissemination of study patients in Bracka’s and Snodgrass groups (n=120)

Age group	Group I		Group II		Total
	Bracka’s		Snodgrass		
	n (%)	n (%)	n (%)	n (%)	
< 5 years	32 (53.4)	35 (58.3)	67 (56.0)		
5-8 years	23(38.3)	19(31.7)	42 (35.0)		
9-12 years	5(8.3)	6(10.0)	11 (9.0)		
Total	60 (50.0)	60 (50.0)	120		

Table II shows the results of the patient's pre-operative clinical examination related to meatal location, circumcision status, and penile torsion status. No significant differences between the Group I and Group II has been observed. (Table 2)

Table No.2: Patient’s pre-operative clinical examination findings (n=120)

	n (%)	Group	
		I	II
		n (%)	n (%)
Meatal Position			
- Coronal	72(60.0)	31(51.7)	41(68.3)
- Sub-coronal	27(22.5)	20(33.3)	07(11.7)
- Distal Penile	21(17.5)	09 (15.0)	12(20.0)
Circumcision			
- Circumcised	55(45.8)	34(56.7)	21(35.0)
- Uncircumcised	65(54.2)	26(43.3)	39(65.0)
Penile Torsion			
- Present	14(11.7)	08(13.3)	06(10.0)
- Absent	106(88.3)	52(86.7)	54(90.0)

Mean operative time and length of stay in hospital was higher in Bracka’s repair compared to the Snodgrass technique. The difference between the two technique was statistically significant (p<0.05). (Table 3).

Table No.3: Surgical technique wise comparative analysis of operative time and post-surgical hospital stay (n=120)

Operative time (minutes)	Mean ± SD	Range	P value
Bracka’s Group (I)	71.5±8.10	61-94	<0.001*
Snodgrass Group (II)	66.1±7.23	50-74	
Post-surgical stay in hospital (days)			
Bracka’s Group (I)	3.1±0.6	3-7	0.003*
Snodgrass Group (II)	2.3±1.8	2-7	

* (t-test)

Comparative analysis of post-operative analysis between the two procedures is mentioned in Table IV. Higher complications were observed in Bracka’s repair method compared with Snodgrass technique. This difference in post-operative complications between the

two procedure was statistically significant (p<0.05). (Table 4).

Table No.4: Comparison of post-operative complications of surgery in both groups

	Total	Type of repair surgery		P value
		Group I	Group II	
		n (%)	n (%)	
Complications	34(28.3)	24(40.0)	10(16.7)	0.029*
Edema	4	3	1	
Hematoma	3	2	1	
Wound infection	4	3	1	
Urethrocutaneous Fistula	10	8	2	
Meatal stenosis	5	2	3	
Meatal retraction	3	2	1	
Urethral stricture	3	2	1	
Penile Torsion	2	2	0	
No Complications	86(71.7)	36(60.0)	50(83.3)	

* Statistically significant p<0.05 (chi² test)

DISCUSSION

Hypospadias is a congenital abnormality that can be treated surgically in a variety of ways, but the safest and most effective method has yet to be determined.⁽¹²⁾ Even by the most skilled surgeons, different complications can arise after surgeries for hypospadias.⁽¹³⁾ In this study, participants underwent through the Bracka’s repair method having mean age 3.5± 2.5 (1.6–12 years) and in Snodgrass group participant’s mean age was 3.7±2.3 (1.7 months–12 years). Hassouna AA et al., Shah et al. and Alngaar Y et al. also reported similar findings that are consistent with our study findings.^(5, 9, 10)

Following pre-operative clinical examination, 60.0% patients had coronal, 22.5% had sub-coronal and 17.5% had distal penile meatal position. While over half (54.5%) didn’t had circumcision. Poondla et al. and Hashish MS et al. also reported similar findings in their study report.^(13, 14) The duration of each surgery is a critical factor that can vary from technique to technique and surgeon expertise to surgeon expertise. Between the two surgical techniques that were used, there was a statistically significant difference in the length of the procedure (p <0.05), with the Bracka’s technique having longer duration (71.5±8.10 minutes) compared with that of Snodgrass approach (66.1±7.23 minutes). Hassouna AA et al. and Maitra et al. reported the similar duration of the Snodgrass technique, which supports our study results.^(5, 12) Additionally, Hashish MS et al. also reported the findings consistent with our study regarding the duration of Bracka’s technique.⁽¹⁴⁾

The length of the hospital stay is another crucial consideration, as it not only adds to the financial burden but also raises the risk of acquiring an infection while in the hospital. Patients who underwent the Snodgrass

technique had a mean hospital stay of 3.1 ± 0.6 days, compared to 2.3 ± 1.8 days for patients who underwent the Bracka technique. These findings are consistent with those reported by Hashish MS et al, Hassouna et al and Ali QA et al. in their studies. ^(5, 8, 14)

Post-operative complications may result from the surgical procedures applied for treatment of hypospadias.⁽¹⁵⁾ Total 28.3% of patients in this study presented with the immediate and late post-operative complications. Out of these patients, those underwent with the Bracka's technique reported higher complication proportion (40.0%) compared with Snodgrass technique group (16.7%). This difference between the two groups was found statistically significant ($p < 0.05$). Urethrocutaneous fistula was the most common complication in Bracka's group compared with the Snodgrass group. Poondla et al. and Hashish et al. reported the prevalence of fistula in their studies that consistent with the present study. ^(13, 14) Along with these, Shah et. al. and Ali QA et.al. also stated the higher rates of fistula as a complication among their study participants who underwent the Bracka's repair method in comparison with the Snodgrass technique.^(8, 9) On the other hand, Alngaar et. al., Makki et. al. and Roshandel et. al. found no such complication of Urethrocutaneous fistula in their study participants with these techniques.^(10, 15, 16)

Such disparity in incidence of fistula following these procedures may be due to the illiteracy and ignorance of the patient's family, which causes complications during the post-operative period owing to incorrect dressing management and a lack of sanitary care, culminating in fistula formation.⁽¹⁶⁾ Furthermore, Bracka's repair method, in which the repair line is reinforced by a flap, results in increased safety and a lower risk of fistula formation.^(3, 17)

The meatal stenosis among hypospadias patients was evaluated in the current study using variables such meatal calibration with a catheter, meatus appearance, and urine calibration during micturition. Findings of meatal stenosis in our patients are consistent with Koçak ÖF et al.⁽³⁾ Other problems seen in our research participants included infected surgical wound, edema, torsion of penis, meatal retraction, stricture of urethra, in some cases hematoma, in addition to Urethrocutaneous fistula and meatal stenosis. The majority of these problems were discovered in the early stages of recovery, whereas Urethrocutaneous fistula and meatal stenosis were discovered in the late stages of recovery. This study discovered several significant surgical outcomes that can be improved if addressed quickly. Our study was confined to a single environment and a few patients.

CONCLUSION

The study concluded that Snodgrass is much more advantageous compared to Bracka's method with

minimal post-operative complications. Because to meatal stenosis, the Snodgrass procedure would be far preferable to Bracka's method due to bigger scar quantity outcomes.

Author's Contribution:

Concept & Design of Study: Sadia Rasheed
 Drafting: Rizwana Fazlani, Shahzad Shaikh
 Data Analysis: Samra Irshad, Mujtuba Pervez Khan, Sidra Memon
 Revisiting Critically: Sadia Rasheed, Rizwana Fazlani
 Final Approval of version: Sadia Rasheed

Conflict of Interest: The study has no conflict of interest to declare by any author.

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