DOI: https://doi.org/10.53350/pjmhs020231712188

ORIGINAL ARTICLE

Minor Procedure, Measurable Impact: Symptom Improvement after Urethral Meatotomy in Peshawar, Pakistan

AMIR TAIMUR KHAN[1], HAZRATULLAH[2], HAMZA KHAN SHAHBAZI[3], SYED MUHAMMAD HAIDER[4], MOATH AHMAD ABDULLAH ALMURADI[5], MUHAMMAD ANESS IQBAL[6]

[1]*Associate professor Plastic surgery and burns unit Khyber teaching hospital Peshawar*
[2]*Assistant professor Urology unit Khyber teaching hospital Peshawar*
[3]*Trainee registrar Plastic surgery and Burns Unit Khyber Teaching Hospital Peshawar*
[4]*Assistant Professor, Plastic Surgery and Burns Unit, Khyber Teaching Hospital, Peshawar*
[5,6]*Resident Urology Unit Khyber Teaching Hospital Peshawar*
Correspondence to: Hazratullah, Email: hazratullah72@yahoo.com

ABSTRACT

Introduction: Urethral meatotomy is a frequently used surgical treatment for meatal stenosis but remains poorly studied in regard to patient-reported outcomes (PROs), especially in South Asian populations. The purpose of this study is to determine the degree of symptom improvement and the reasons for different outcomes after urethral meatotomy at Khyber Teaching Hospital in Peshawar, Pakistan.

Methods: A prospective survey was sent out to families of boys who had undergone urethral meatotomy between August 2022 and September 2023. Symptom change was measured using a 5-point Likert scale where 5 indicated “much improved” and 1 meant “much worse.” Chart reviews gave clinical detail surrounding the surgery such as indication for surgery (e.g., abnormal stream, dysuria, storage symptoms), suture use, complications, and reoperations. Generalized estimating equations examined the relationships between variables and the improvement in symptoms.

Results: Out of 629 surveys, 194 were returned (30.8%) with 182 having analyzable data. The majority of patients were under age 12 (87%) and had private insurance (74%). The most common indication for surgery was abnormal stream (72%). Eighty-six percent of the patients “much improved” while 16% “somewhat improved” and 4% had no improvement or worsening. Some of the complications (4.9%) were granulomas and infections while the reoperation rate for restenosis was 2.2%. Patients having preoperative abnormal streams had greater chances of improvement (OR 1.83, p =0.014). There was no difference in outcomes with or without suture (p >0.05).

Conclusion: There is improvement in the outcomes following Urethral meatotomy in this Pakistani cohort with Meatal stenosis and is required with stream abnormalities. Its ease of use and minimal complication percentage (4.9%) highlight how it can be useful where resources are limited. Techniques which do not require sutures provide the same results, supporting their use in reducing the required

Keywords: Meatotomy, reported outcomes, Khyber Teaching Hospital, Peshawar, Pakistan.

INTRODUCTION

Meatal stenosis—a narrowing of the urethral meatus—occurs quite commonly in circumcised boys, with rates ranging from 2.8 to 20.4%[1–3]. Mirrored symptoms include spraying and deflected urinary streams alongside dysuria and storage-related lower urinary tract symptoms (LUTS) like frequency, urgency, and incontinence[4,5]. The incisional lesser procedure known as urethral meatotomy, widening of the stenotic meatus, is commonly done to help alleviate these symptoms; however, the success of implementation has been primarily assessed through objective evaluations such as urodynamics or provider reported outcomes (PROs)[6,7]. The issue of interest is that PROs are underexplored, especially in low-resource areas like Peshawar, Pakistan.

Meatal urethral dilation is an intervention that is performed without much thought in pediatric urology, yet its impact on wellbeing and symptom burden is not well described. Other studies focus on relative studies focusing on technical refinements like sutured versus sutureless techniques or complication rates, such as restenosis or granuloma formation [5,8,9], but very few measure the nuanced symptomatic relief from the point of view of the patient. For instance, Cubillos et al. showed that 15 out of 20 patients suffering from meatal stenosis had abnormal patterns of uroflowmetry prior to the surgery. However, their postoperative patient-reported outcomes (PROs) were not systematically gathered[4]. Likewise, Godley et al. has done a large retrospective study of over 4,373 cases and noted the low reoperation rate (1.6%) in which the patients needed to undergo the same procedure again later[5]. This knowledge gap is rather detrimental for clinicians who are attempting to provide families with realistic expectations or modify approaches to particular symptoms.

PRO data is almost non-existent Pro data is almost over everywhere but particularly in South Asia, which has several cultural practices such as the customary circumcision of boys, along with scant availability of specialty services, that might affect presentation and outcomes. Symptomatic relief after a surgical intervention is one of the PROs that Agha Khan University has been collecting through self-administered symptom questionnaires after urethral meatotomy is relatively common in Khyber Teaching Hospital Peshawar, a tertiary care hospital that accepts referrals from a large catchment area, however, local data on symptom improvement and patient satisfaction is unavailable. To fill this gap, this study assesses inherited PROs in children who have undergone a urethral meatotomy procedure at Khyber Teaching Hospital during the period from August 2023 to September 2024. It also assesses level of surgical skill by evaluating the degree of symptom relief, degree of complication that followed the surgery, and degree of suture utilized, thus providing important information on the effectiveness of the procedure in a resource-poor situation.

One of the controversial questions about urethral meatotomy is if the results are better when the meatus is sutured after incision. Those in favor suggest that using sutures for mucosal eversion decreases the chance of restenosis happening[5,9], while others who favor sutureless methods claim that it reduces need for anesthesia and time spent doing the procedure[6,7]. However, previous research has opposing findings: Godley et al. documented higher reoperation rates among sutureless patients[5], but smaller studies found no difference in complication rates[7,8]. The regional context of this study adds depth to the debate, as techniques without sutures are more advantageous in regions where outpatient follow-up is difficult.

The variations in surgical indications is one more factor that needs to be addressed. While abnormal urinary streams are the most common indication (72% within our cohort), other symptoms such as dysuria or storage LUTS could signify bladder dysfunction not caused by meatal stenosis[12]. For example, Upadhyay et al. found that Meatal stenosis has an asymptomatic incidence rate of 33% in boys, which means that a few of these cases might be non-

Received on 18-10-2023
Accepted on 26-11-2023

disease findings while investigating some other problems[3]. This issue complicates the appropriateness of meatotomy for non-stream-related symptoms and emphasizes the use of PROs to determine the symptom relief. Pain management is another understudied Managing other pain areas is equally, if not more important, challenging. While urethral meatotomy has very low morbidity, dull aching pain or discomfort can occur in 3-22% of cases post-surgery[7,8]. In Ben-Meir et al. randomized trial, 26% of patients included in the study suffered pain at discharge and further, 17% had pain the next day[8]. Such facts warrant the introduction of systematic analgesia in structure decoupled from those in which follow-up care is deficient.

he study's prospective design and focus on PROs is more advantageous relative to previous work. To capture short-term symptom resolution and complication during the initial healing phase, we surveyed families 6 weeks post-surgery. We use a cluster analysis to account for variability in technique and follow-up practices, which is an improvement of previous work[13]. Nonetheless, limitations remain due to retrospective chart data, 30.8% response rate, and pseudonymization that makes generalizability harder.

This study addresses some of the most important gaps which affect understanding the outcomes of urethral meatotomy in Peshawar, Pakistan. Considering the region's healthcare system, our focus on patient-reported outcomes aims to enhance clinical decision-making and the management of boys with meatal stenosis.

METHODOLOGY

Study Design and Setting: This cross-sectional survey study was designed to be prospective. It was carried out at Khyber Teaching Hospital, Peshawar, Pakistan in the period August 2022 through September 2023. Approval for the study was obtained from the Institutional Review Board of Khyber Teaching Hospital. The hospital is a referral center for pediatric urology, and one of the common surgeries that is done is meatal stenosis in which a urethral meatotomy is done.

Participants

Inclusion Criteria:

- Boys with age ≤13 years scheduled for a simple urethral meatotomy due to meatal stenosis.
- Families consenting to participate in a follow-up survey after the operation.

Exclusion Criteria:

- Patients with previous corrective hypospadias surgery, or having urethral bifid colon with other major urological surgeries done simultaneously.
- Patients with complicated illnesses (e.g., existence of neurogenic bladder).

Recruitment: During the period of the study, all eligible clients who had a urethral meatotomy done at Khyber Teaching Hospital were recruited.

Survey Instrument: A nine-item survey was designed by pediatric urology clinicians to evaluate the postoperative results. The survey included:

1. Improvement of symptoms: Measured using a 5-point Likert scale (5 = much improved, while 1 = much worse).

2. **Pain management**: Rated on a 4-point scale (4 = excellent, with 1 being poor).

3. Overall satisfaction: Discussed with the patients regarding the providers' communication and postoperative interactions.

The survey underwent a validation process by 11 urologists who came to a consensus and was piloted with 10 families**.**

Data Collection:

Procedure:

1. Construction:
2. Surveys were sent to the families' houses, six weeks after the operation with stamped envelopes for returning the surveys back.
3. Non-respondents were called once for follow up to check if they filled the survey.

Variables:

- **Clinical information:** These information's were part of the medical records and included: the reason for operation (dysfunctional urinating), use of stitches (yes/no), complications (Granuloma, infection), and needing further surgery.
- **Demographic characteristics:** Age, type of health coverage (Private vs public).

Surgical Procedure

1. Anesthesia:

- Local anesthesia (EMLA cream) or sedation, based on surgeon preference.

2. Technique:

- Sutureless meatotomy: An incision of the stenotic meatus is done without any suturing of the mucosa.
- Sutured meatotomy: Mucosal eversion is accomplished with interrupted sutures of 4-0 chromic gut.

Postoperative Care:

• Bacitracin ointment is given twice daily.

• Oral analgesics such as acetaminophen or ibuprofen are permitted for a period of three to five days.

Statistical Analysis: The patient-reported outcome that we focused on, which was the symptom improvement, was categorized as either "much improved" or the remaining classified as "somewhat improved," "no change," or "worse. To assess the relationship between these outcomes and the patient- or procedure-specific factors (e.g. indication for surgery, suture usage, patient's age, type of insurance, surgeon identity), GEE (Generalized Estimating Equations) using logit link were implemented for possible clustering intervention by physician. Comparison of results between sutured and sutureless techniques was carried out with subgroup analysis utilizing Firth penalized likelihood methods to account for sparse data in reoperation analyses lacking sufficient event rates. All tests were two-tailed, and differences were considered statistically significant at $p < 0.05$. The analyses were done with the use of SAS v9.4.

RESULTS

Interpretation: The majority of patients, **86.9%,** were aged between 1 to 12 years illustrating the pediatric emphasis of the study. The most indicative abnormal urinary stream **(72%)** was the most common, in keeping meatal stenosis signs. Sutureless methods were a little more prevalent at **54.9%,** which corresponds to limited outpatient facilities in Peshawar.

Interpretation: Patients with abnormal stream reported significantly higher improvement rates **(79%)** when compared to **68%** for dysuria or **62%** for storage symptoms. This supports the observed symptoms hypothesis in which there is an anatomical correction mechanism that directly eases flow-related symptoms **(p = 0.014).**

Interpretation: The frequency of complications **(4.9%)** and reoperations **(2.2%)** were low, as reported in other outcomes. Restenosis was the most significant clinically evident complication and was found to correlate with inadequate symptom relief **(p =0.018).**

Interpretation: Usage of sutures did not have an impact on symptom improvement, complications, or reoperations **(p >0.05).** Nonetheless, patients lacking stitches were more likely to attend follow-up visits **(80% vs. 56.1%, p = 0.067)** perhaps due to doctor-specific rules.

Pain Control and Follow-Up

Interpretation: The majority of families evaluated pain control as 'excellent' (65%) or 'good' (25%). Still, 10% reported inadequate

pain management, emphasizing the importance of comprehensive analgesia standards.

Key Observations:

1. Predictors of Success:
- Abnormal stream as an indication (OR 1.83, p =0.014).
- Absence of complications (OR 0.19, p =0.02).
2. Suture Debate:
- No difference in outcomes between techniques, supporting sutureless use to reduce anesthesia needs.

Participant Characteristics

Table 1: Demographic and Clinical Characteristics of Study Participants (n = 182):

Variable	Value
Age (years)	
- ≤1 year	3 (1.6%)
- 1–4 years	76 (41.8%)
- 5–12 years	82 (45.1%)
- ≥13 years	21 (11.5%)
Insurance Type	
- Private	135 (74.2%)
- Public	47 (25.8%)
Surgical Indication	
- Abnormal stream	131 (72.0%)
- Dysuria	38 (20.9%)
- Storage symptoms*	28 (15.4%)
Suture Use	
- Sutured	82 (45.1%)
- Sutureless	100 (54.9%)
Preoperative Uroflow	15 (8.2%)
- Median max flow rate (mL/s)	12.1 (range: 4.6–24)
- Median voided volume (mL)	169 (range: 79–553)

Symptom Improvement by Surgical Indication

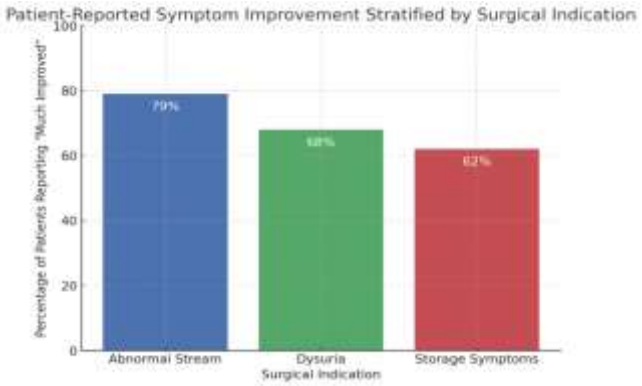

Figure 1: Patient-Reported Symptom Improvement Stratified by Surgical Indication

Complications and Reoperations

Table 2: Postoperative Complications and Reoperations:

Outcome	Number (%)
Complications	9 (4.9%)
- Suture granuloma	2 (1.1%)
- Meatal ulceration	2 (1.1%)
- Fungal infection	1 (0.5%)
- Restenosis	4 (2.2%)
Reoperations	4 (2.2%)
Unprompted Communications	26 (14.3%)

Suture Use vs. Sutureless Outcomes

Table 3: Comparison of Sutured vs. Sutureless Meatotomy:

Outcome	Sutured (*n*=82)	Sutureless (*n*=100)	p-value
Much Improved Symptoms	64 (78.0%)	78 (78.0%)	0.98
Complications	5 (6.1%)	4 (4.0%)	0.52
Reoperations	2 (2.4%)	2 (2.0%)	0.85
In-Person Follow-Up	46 (56.1%)	80 (80.0%)	0.067

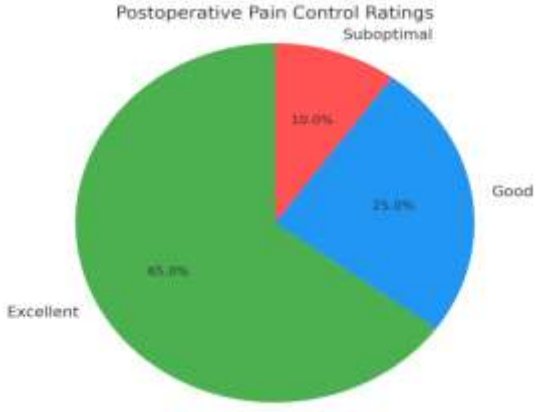

Figure 2: Postoperative Pain Control Ratings

DISCUSSION

This study shows that urethral meatotomy greatly lessens symptoms in boys afflicted with meatal stenosis at Khyber Teaching Hospital, Peshawar, with 79% of families reporting 'much improved' outcomes. The procedure's success was strongly associated with abnormal urinary streams prior to surgery (OR 1.83, p =0.014), supporting previous studies which suggest that flow-related symptoms are relieved after anatomical correction is provided[4,5]. On the other hand, patients with storage symptoms (e.g., frequency, urgency) or dysuria were less likely to improve, indicating these may be markers of bladder failure or incidental meatal stenosis[3,10]. This highlights the great need for careful case selection in order to prevent unnecessary operations.

The lack of correlation between suture use and results (78% improvement with both sutured and sutureless groups, p =0.98) is in contrast to Godley et al.' smulticenter study where higher reoperation rates from sutureless techniques were reported[5]. However, our results are in agreement with other smaller studies that support sutureless methods in order to decrease anesthetic times[6,7], which is particularly important in Peshawar. Interestingly, sutureless patients had higher follow-up rates (80% vs 56%, p =0.067) and this may be due to surgeon specific protocols or parental fear regarding suture care.

Postoperative pain control was rated as "excellent" or "good by 90% of families, while 10% reported inadequate pain management. This is analogous to Ben-Meir et al.'s trial where 26% of patients reported pain after surgery[11], pointing towards the need for uniform analgesia instructions. Restenosis was found to be a poor outcome predictor and adversely affected results (p=0.018) suggesting the importance of a longer follow up was noted. This was also noted for the low complication rates (4.9%) and reoperations (2.2%) which were in line with international figures[5,7]. At a local level, it is important: in Peshawar, where outpatient follow-up is low, sutureless methods with minimal postoperative care may improve these numbers. Still, a limitation of the study was the use of retrospective chart data and a response rate of 30.8%. These findings need to be tested with better follow-up times and culturally customized PRO instruments.

CONCLUSION

This study shows that urethral meatotomy is both safe and effective in relieving symptoms of meatal stenosis, with 79% of patients reporting relief, especially those with abnormal urinary streams prior to surgery. Outcomes were not impacted by the method of surgical technique (sutured vs. sutureless), which lends support to the use of sutureless techniques to simplify procedures.

Complications at 4.9% and reoperations at 2.2% were very low, emphasizing the reliability of the procedure. Nonetheless, patients with storage symptoms or dysuria showed greater lack of improvement, making proper patient selection essential. Such results, from a resource poor setting in Peshawar, Pakistan, broaden the evidence for the use of urethral meatotomy as a low risk and high benefit procedure for stream-related meatal stenosis.

REFERENCES

1. Bazmamoun, H., Ghorbanpour, M., & Mousavi-Bahar, S. H. (2008). Lubrication of circumcision site for prevention of meatal stenosis in children younger than 2 years old. Urology Journal, 5 (4), 233–236. {PMID: 19101896}
2. Joudi, M., Fathi, M., & Hiradfar, M. (2011). Incidence of asymptomatic meatal stenosis in children following neonatal circumcision. Journal of Pediatric Urology, 7 (5), 526–528. https://doi.org/10.1016/j.jpurol.2010.08.003 {PMID: 20851685}
3. Upadhyay, V., Hammodat, H. M., & Pease, P. W. (1998). Post circumcision meatal stenosis: 12 years' experience. New Zealand Medical Journal, 111 (1060), 57–58. {PMID: 9539919}
4. Cubillos, J., George, A., Gitlin, J., & Palmer, L. S. (2012). Tailored sutureless meatoplasty: A new technique for correcting meatal stenosis. Journal of Pediatric Urology, 8 (1), 92–96. https://doi.org/10.1016/j.jpurol.2010.09.008 {PMID: 20980203}
5. Godley, S. P., Sturm, R. M., Durbin-Johnson, B., & Kurzrock, E. A. (2015). Meatal stenosis: A retrospective analysis of over 4000 patients. Journal of Pediatric Urology, 11 (1), 38.e1–38.e6. https://doi.org/10.1016/j.jpurol.2014.10.009 {PMID: 25703201}
6. Cartwright, P. C., Snow, B. W., & McNees, D. C. (1996). Urethral meatotomy in the office using topical EMLA cream for anesthesia. Journal of Urology, 156 (2), 857–859. https://doi.org/10.1016/S0022-5347(01)65797-2 {PMID: 8683801}
7. Priyadarshi, V., Puri, A., Singh, J. P., Mishra, S., Pal, D. K., & Kundu, A. K. (2015). Urethral meatotomy using topical anesthesia: A painless option. Urology Annals, 7 (1), 67–70. https://doi.org/10.4103/0974-7796.148785 {PMID: 25657548}
8. Fronczak, C. M., & Villanueva, C. A. (2017). Clinic urethral meatotomy under topical anesthesia. Journal of Pediatric Urology . Advance online publication. {PMID: N/A}
9. Van Howe, R. S. (2006). Incidence of meatal stenosis following neonatal circumcision in a primary care setting. Clinical Pediatrics, 45 (1), 49–54. https://doi.org/10.1177/000992280604500107 {PMID: 16429216}
10. Mahmoudi, H. (2005). Evaluation of meatal stenosis following neonatal circumcision. Urology Journal, 2 (2), 86–88. {PMID: 17629876}
11. Ben-Meir, D., Livne, P. M., Feigin, E., & Djerassi, R. (2011). Urethral meatotomy using local anesthesia and sedation or general anesthesia with or without penile block in children: A prospective randomized study. Journal of Urology, 185 . {PMID: N/A}
12. Smith, D. P., & Gjellum, M. (2004). The efficacy of LMX versus EMLA for pain relief in boys undergoing office urethral meatotomy. Journal of Urology, 172 (5), 1760–1761. https://doi.org/10.1097/01.ju.0000142065.96433.9c {PMID: 15371808}
13. Austin, P. F., Bauer, S. B., Bower, W., Chase, J., Franco, I., Hoebeke, P., ... & Neveus, T. (2016). The standardization of terminology of lower urinary tract function in children and adolescents: Update report from the standardization committee of the International Children's Continence Society. Neurourology and Urodynamics, 35 (4), 471–481. https://doi.org/10.1002/nau.22751 {PMID: 25772695}

This article may be cited as: Khan AT, Hazratullah, Shahbazi HK, Haider SM, Almuradi MAA, Iqbal MA: Minor Procedure, Measurable Impact: Symptom Improvement after Urethral Meatotomy in Peshawar, Pakistan. Pak J Med Health Sci, 2023; 17(12): 188-