

Management of Meatal Stenosis in Port Harcourt: A Ten-Year Retrospective Study

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Abstract

Background: Circumcision is the removal of the fore skin of the penis. It is one of the commonest operations performed worldwide. Meatal stenosis is an uncommon long-term complication of circumcision that can lead to problems voiding. **Aim:** To identify the clinical presentations and management of meatal stenosis in Port Harcourt. **Materials and Methods:** This was a retrospective study of patients who presented with features of meatal stenosis between January 2012 and December 2021. The patients' history, physical examination findings, investigations and treatment received were analysed. **Results:** A total of 52 patients with features of meatal stenosis were recruited for the study. The number of patients less than a year old, between a year and 5 years, between 6 and 10 years and greater than 11 years were 8, 12, 28 and 4 respectively. Only 8 patients presented within 6 months of onset of symptoms. The most common symptom was poor urine stream, followed by straining. Meatotomy was the most commonly performed procedure for meatal stenosis 24 (46.15%). The patients were followed up for at least 6 months. Six patients had recurrence after treatment of meatal stenosis. Three patients each had a recurrence following dilatation and meatotomy. No patient had recurrence after meatoplasty. **Conclusion:** Meatal stenosis is an uncommon complication post circumcision. Patients usually present late to the hospital in our study. Meatoplasty had the best outcome. After treatment of meatal stenosis patients should be followed up for 6 months.

Keywords

Circumcision, Meatal Stenosis, Poor Urine Stream

1. Introduction

Circumcision has a long history and is a ritual for such religions as Judaism,

Christianity, and Islam, and it is probably no accident that all of these arose in the Middle East.

Circumcision is one of the commonest surgical operations performed worldwide and it is a subject of considerable debate [1] [2]. Circumcision is carried out for religious reasons, hygienic reasons, control of Human Immunodeficiency Virus (HIV) [3] [4], recurrent urinary tract infection [5], recurrent balanitis [5], phimosis, paraphimosis [5] and prevent penile cancers [6].

Circumcision in newborns almost entirely eliminates the risk of penile cancer [5] [6]. Circumcision before puberty may reduce the risk of penile squamous cell carcinoma but men circumcised after puberty has the same risk of penile SCC as uncircumcised men [6]. Therefore, circumcision during the neonatal period is very important and also more cost effective [7].

Circumcision is largely free of complications in majority of patients, but can result in mild complications such as excessive or inadequate skin removal, pain, haemorrhage, wound infections, skin bridge, meatal stenosis, meatal ulcers and loss of penile sensitivity [8]. Severe complications such as urethrocutaneous fistula, sexual dysfunction and penile amputation may also occur [8].

Meatal stenosis is believed to be a complication of circumcision [1]. Meatal stenosis is defined to be a change in the appearance of the delicate lips of the urinary meatus, with loss of the elliptical shape to circular shape because of fibrosis or scarring, with visually apparent narrowing [1] [9]. Injury to the frenular artery is largely believed to be the culprit of post circumcision meatal stenosis [1]. Meatal stenosis is almost never seen in uncircumcised men [10]. This study aims to identify the clinical presentations and management of meatal stenosis in Port Harcourt.

2. Materials and Methods

This was a retrospective study. All patients who presented with features of meatal stenosis between January 2012 and December 2021 were included in the study. Port Harcourt is a major capital city in the Niger Delta, the oil and gas zone in Nigeria. Data was obtained from ward admission registers, theatre, and discharge records. The information gotten included history, duration of symptoms, examination findings and treatment received. Patients who were circumcised outside the neonatal period were excluded from the study. All patients with incomplete records were also excluded from the study.

All the boys were circumcised using an appropriately sized plastibel. Urine microscopy culture and sensitivity were done and an appropriate antibiotic given to the boys before repair of meatal stenosis. Patients who had dilatation and meatotomy had a penile block with plain lidocaine for anaesthesia with sedation using diazepam. Dilatation is done to the size appropriate for the child's age (10 French for 6 months to 3 years and 12 French for 4 to 10 years. Patients who had meatotomy had a hemostat applied to the ventral aspect of the stenosed orifice for about 5 mins before a ventral slit was made with sharp scissors to widen the

meatus. Meatoplasty involved suturing the slit meatus after a meatotomy to prevent restenosis using fine delayed absorbable sutures (vicryl 4 0). All patients who had meatoplasty were admitted before surgery, evaluated by an anaesthetist and all had general anaesthesia and were discharged a day after surgery. After the treatment all patients were instructed to apply a lubricating gel (vaselin) and had paracetamol for pain relief. Patients were followed up weekly for 6 months after treatment to assess for possible restenosis.

The data from the folders were collated and entered using Microsoft Excel 2016 version and transferred into the statistical package for social sciences (SPSS) for windows (version 20) (IBM SPSS Inc. Chicago, IL) for analysis. Categorical data was presented in the form of frequencies and percentages using tables. Continuous variables were presented in means and standard deviation. Results were presented in tables and charts.

3. Results [Tables 1-5]

The total number of boys delivered in the hospital during the study period was 8095. Thirty-four were uncircumcised for religious reasons and 42 were not circumcised for health reasons. A total of 8019 boys were circumcised during the study period. Fifty-two of the boys circumcised had meatal stenosis and this puts the incidence of meatal stenosis in University of Port Harcourt Teaching Hospital (UPTH) as 6.48 per 1000.

4. Discussion

The diagnosis of meatal stenosis is clinical. With changes to the urethral meatus

Table 1. Age range of respondents who presented with features of meatal stenosis, the 6 to 10 years old group had the highest frequency.

Age range	Frequency (n)	Percentage %
Less than 1 year	8	15.38
1 year to 5 years	12	23.08
6 to 10 years	28	53.84
11 to 15 years	4	7.70
Total	52	100

Table 2. Duration of symptoms before presentation at the hospital, only 8 (15.38%) respondents presented within 6months of onset of symptoms.

Duration of symptoms	Frequency (n)	Percentage %
Less than 6 months	8	15.38
6 to 12 months	32	61.54
13 to 18 months	12	23.08
Total	52	100

Table 3. Clinical features of patients presenting with meatal stenosis, most patients presented with poor stream.

Clinical features	Frequency (n)	Percentage %
Straining	32	32
Poor stream	40	40
Post micturition dribbling	12	12
Incidental at catheterization	16	16
Total	100	100

Table 4. (a) Treatment received by patients with meatal stenosis, 24 (46.15) patients had meatotomy. (b) Table showing treatment received and patients with restenosis following treatment. Meatoplasty had the lowest percentage of re-stenosis (0%), followed by meatotomy (12.5%) and dilatation had the highest percentage of re-stenosis. (c) Table showing the hospital stay after the different procedures.

(a)

Treatment received	Frequency (n)	Percentage %
Dilatation	16	30.77
Meatotomy	24	46.15
Meatoplasty	12	23.08
Total	52	100

(b)

Treatment received	Restenosis	Percentage
Dilatation 16	3	18.75%
Meatotomy 24	3	12.5%
Meatoplasty 12	Nil	0%
No restenosis	46	88.46%
Total	52	

(c)

Procedure performed	Hospital stay
Dilatation	Day case
Meatotomy	Day case
Meatoplasty	3 days

Table 5. Associated anomalies in the respondents with meatal stenosis. Most patients had no associated anomaly.

Associated anomalies	Frequency (n)	Percentage (%)
Hernia	12	23.08
Undescended testes	8	15.38
No associated anomaly	32	61.54
Total	52	100

from scarring patients may present with symptoms or may remain asymptomatic. In our study an incidence of 6.48 per 1000 was noticed. This is low compared to studies carried out in Iran by Joudi *et al.* [11] who had an incidence of 27 out of 132 boys between five and 10 years. Another author in sacramento, California had an incidence rate of 3 to 8 percent [12]. Sometimes it takes a while for symptoms to develop. In our study, the six to ten-year-old patients had the highest frequency with 53.84% of patients with meatal stenosis presenting within that age group and an age range of 10 months to 14 years. In a study carried out in New Zealand by Upadhyay *et al.* [9] the mean age of presentation was 48 months, with a range of 3 months to 13 years. Our study had a similar age range with the New Zealand study but however the mean age at presentation was different. The difference in age of presentation may be because of the poor health seeking behavior in many developing countries. In Africa, many people who are ill present to patent medical vendors, herbalists, churches or mosques over a health care professional because of lack of money for adequate healthcare [12] [13] [14] [15] [16]. So many patients may have presented early elsewhere with their symptoms before coming to the hospital. Also, young boys with meatal stenosis wear diaper and so parents and caregivers may not notice the characteristic urine stream.

In our study 32 (61.54%) patients presented to the hospital after enduring their symptoms for about 6 to 12 months. Only 8 (15.38%) of patients presented within 6 months of onset of symptoms. The health seeking behavior can also explain the reason for the late presentation. Some authors have explained that the symptoms of meatal stenosis may be unnoticed in boys who are not toilet trained, since they use diapers these symptoms may not be picked up [9] [12].

Boys with meatal stenosis present with lower urinary tract symptoms which are classified based on the phase of urination into storage, voiding and post micturition symptoms [17]. The storage symptoms prevent adequate storage of urine and they include frequency, urgency, nocturia, urgency incontinence and nocturnal enuresis. The voiding symptoms occur during voiding phase and include hesitancy, poor stream, straining, intermittency and post micturition symptoms include feeling of incomplete emptying and post micturition dribbling.

Poor stream or weak stream is a reduced urine flow compared to previous performance or to others [17]. Poor stream is due to reduced stream of urine secondary to the outlet obstruction [18]. Straining is the use of the muscles of the abdomen to initiate, maintain or improve urine stream thereby overcoming the bladder outlet obstruction [17]. The most common symptom in our study was poor stream which was followed closely by straining. Another author also noted that patients with meatal stenosis present with an upward, thin, poor urine stream [19]. With the scarring at the urethral meatus leading to fibrosis and narrowing of the meatus the urine stream becomes progressively poorer. The bladder initially compensates and hypertrophies to enable it empty ade-

quately but later the bladder muscle decompensates and can no longer empty its contents completely [20] [21]. This leads to significant post void residual urine. The bladder continues to decompensate till its contraction can no longer completely empty the bladder [18] [20]. This can lead to changes in the upper tract such as hydronephrosis, urinary tract infection, urosepsis and renal failure and even death [22]. In boys with an obstruction at the urethra, at the end of micturition the urine between the sphincters and the obstruction trickles out as post micturition dribbling [18]. In our study, post micturition dribbling was the least prevalent symptom. We also noted that some patients presented without symptoms and were only diagnosed during examination before catheterization.

Adequate preoperative investigation is very important. Due to obstruction in the flow of urine some patients may present with features of urinary tract infection. The flow of urine helps to prevent stasis and colonization of urine by microorganisms [20] [23]. Adequate culture directed preoperative antibiotics are important in preventing and treating Urinary Tract Infection (UTI) in patients with meatal stenosis. We avoided the use of fluoroquinolones in children because of premature closure of the epiphyseal plates.

Treatment for patients with meatal stenosis include any form of treatment that will make the meatus elliptical, prevent further narrowing and allow better flow of urine from the urethra. In our study, the three-treatment employed were dilatation (30.77%), meatotomy (46.15%) and meatoplasty (23.38%) as shown in **Table 4(a)**.

Dilatation is the use of serial dilators to widen the meatus and aid better egress of urine. However, it may result in minor tears in the mucosa and lead to restenosis of the urethra. In our study three patients out of 16 (18.75% restenosis) who had urethral dilatation had restenosis following urethral dilatation. Meatotomy involves making an incision on the ventral surface of the urethral meatus. This helps widen the stenosis and was done as an office procedure. Re-stenosis following meatotomy is also possible [23]. In our study three patients out of 24 (12.5% restenosis) who had meatotomy had restenosis. We carried out meatal dilatation and meatotomy as office procedures using penile block and without general anaesthesia as seen in **Table 4(c)**. This considerably reduced the hospital stay and cost of treatment. Another author also noted low cost of treatment with meatotomy without general anaesthesia [12]. The drawback is that some patients may have a restenosis which may require a meatoplasty [24]. Meatotomy with local anaesthesia is believed to be 10 times cheaper than a meatoplasty or meatotomy with general anesthesia [25], it is also a good form of treatment if the child cooperates and the anatomy is appropriate [12].

Patients who had meatoplasty needed general anaesthesia in theatre and this made treatment more expensive [12]. Patients who had meatoplasty had a low re operation rate [12]. In this study no patient who had meatoplasty developed a restenosis as shown in **Table 4(b)**.

After treatment for meatal stenosis, patients were advised to use a lubricating gel to prevent adhesion of the edges. They were also followed up for 6 months.

Some authors have acknowledged the need for follow up genital examination even after circumcision to identify meatal stenosis [11]. Follow up should also be instituted after treatment of meatal stenosis to identify re-stenosis.

The prognosis seemed to be better for patients who had meatoplasty, than meatotomy and worse for patients with meatal dilatation as shown in the study in **Table 4(b)**. The suturing of the mucosa to the skin tends to prevent re-stenosis since healing will be by primary intention with minimal scarring. In meatotomy the healing is by secondary intention and can cause excessive scarring and hence re-stenosis.

Most patients who presented with meatal stenosis had no other associated anomaly as shown in **Table 5**. However, 12 had hernia and 8 had undescended testes. A hernia may have resulted from the increased intraabdominal pressure used to aid voiding in these patients with meatal stenosis. No association was found between the patients with undescended testes and meatal stenosis.

In medical practice prevention is always better than cure. Post circumcision meatal stenosis can be avoided by application of petroleum jelly after circumcision [26] [27] [28]. Some authors have advocated the use of steroid based agents but this has been controversial. Some say it is not successful [29] while others believe that it can be useful [30]. In our study steroid based creams were not used because of the potential complications of steroid use such as weight gain, roundness of the face, mood changes, slower growth rate, osteoporosis and cataracts. Human amniotic membrane is believed to prevent meatal stenosis [31]. Human amniotic membrane is unavailable for use in our centre. Its use may be associated with a number of ethical issues. Some authors have argued that meatal stenosis is rarely present in uncircumcised boys but others have reported the fact that meatal stenosis following circumcision is low [26]. The advantages of circumcision seem to outweigh the disadvantages. The authors tend to favor circumcision because of its numerous advantages. A recent study carried out in Algeria found out that meatal stenosis is more common when circumcision is carried out in the first week, there is use of healing agents and when there is prior adhesion of the foreskin to the glans [32]. In our hospital we used petroleum jelly after circumcision and also after surgery for meatal stenosis. This is believed to prevent the edges from sticking back together thereby, preventing meatal stenosis after circumcision or restenosis after repair of meatal stenosis.

5. Limitations of the Study

This was a retrospective study and we could not get some of the information sought. Different cadres of health professionals carried out the circumcision, meatal dilatation, meatotomy and meatoplasty. These included junior residents, senior residents and consultants. The skill and experience of more qualified doctors will lead to a better outcome compared to the less experienced doctors.

6. Conclusion

Meatal stenosis is an uncommon complication post circumcision. Patients usually

present late to the hospital. Voiding symptoms were the most common form of presentation. Treatment was either by dilatation, meatotomy or meatoplasty. Meatoplasty even though more expensive had a better prognosis. After treatment of meatal stenosis patients should be followed up for 6 months.

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This study was self-funded by the authors.

Conflicts of Interest

The authors declare there was no conflict of interest in this study.

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