

## Meatal Stenosis in circumcised males – Is it preventable?

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Meatal stenosis is most commonly seen among the circumcised males. The true incidence of this post circumcision complication is not known. The most favored hypothesis regarding the etiology is ammoniacal fumes produced in the wet diapers, which cause meatitis of unprotected glans. It is treated by meatoplasty. 26 pediatric patients suffering from meatal stenosis were treated between Jan. 2003 and Dec. 2005 both inclusive (Mean age was 4.36 years and ranging 2 - 10) and mean follow up was 4 months. Patients were studied for presenting symptoms, size of meatus, perimeatal balanitis, pyuria and postoperative complications such as bleeding, infection and recurrence. They were advised postoperative dilatation with ophthalmic ointment nozzle for one month. Patients with prior history of circumcision were included in the study. The most common symptom in our study was thinning of urinary stream 17 (65.4%) cases. Other common symptoms were painful micturition in eight and bloody spotting in seven cases. Eight patients were having pin hole meatus and three cases were having pyuria. Compliance for post operative dilatation was 76.9% (20 cases). No case of recurrence was seen. It can be concluded that meatal stenosis is related to infant circumcision. It is treated by meatoplasty with satisfactory outcome. Whether we would be able to prevent this post circumcision complication? There is no obvious solution to this problem for the time being.

**Key words:** Meatal stenosis, Circumcision, Meatoplasty.

Meatal stenosis is usually an acquired condition<sup>1</sup> seen among circumcised males<sup>2</sup>. It has been reported by some to be the commonest complication of circumcision<sup>3</sup>, while others have refuted it<sup>4,5</sup>. Although the exact incidence is unknown<sup>6,7</sup>, some have reported it to be as high as 31% among circumcised males<sup>8</sup>. There are various theories given to explain the pathophysiology of this condition. The widely accepted concept is that it is due to meatitis which results from exposure of the unprotected glans to ammonia. Ammonia is being produced by the action of bacteria on urine soaked diapers<sup>9</sup>. Other conditions which can lead to meatal stenosis are trauma, unsuccessful hypospadias repair, prolonged catheterization and Balanitis xerotica obliterans. Meatal stenosis is treated by meatoplasty which can be accomplished under local anaesthesia<sup>10</sup>.

Meatoplasty may be associated with bleeding, infection and recurrence.

### Material and methods

Between Jan. 2003 and Dec. 2005 both inclusive a total of 26 patients, underwent meatoplasty for meatal stenosis. Mean follow up was four months (range 2-7 months).

In this retrospective review the patients were selected on the basis of following criteria:

- Circumcised males.
- Age below 12 years.
- Patients with normal anatomical position of the meatus (cases of hypospadias were excluded from the study).

During the preoperative evaluation the parameters noted were; presenting symptoms and examination including size of meatus, perimeatal balanitis and pyuria. All patients were treated with ventral meatoplasty by using pointed scissors. We did not crush the tissue by applying mosquito

forceps. In patients with pinhole meatus prior dilatation was done with lacrimal probes. This was a necessary adjunct for the introduction of scissors which was not feasible otherwise. Mucocutaneous 4/0 chromic catgut sutures were applied. Antibiotic ointment was applied to the wound surface and wound was left open. Patients were not catheterized. Post operatively the patients were advised meatal dilatation with the help of ophthalmic ointment nozzle. This was advised 1-2 times / day for one month. Following postoperative complications were noted; bleeding, infection and recurrence. The patients were followed for 4 months on monthly basis. The symptomatic improvement and improvement of flow was noted as witnessed by mother or the patient himself. In the follow up size of meatus was assessed with feeding tubes. Meatitis and recurrence of meatal stenosis was noted. For statistical evaluation mean was used as a measure of central tendency for age of patients and follow up period.

### Results

Of the 26 patients studied the age range was 2 – 10 years (mean 4.36 years). The most common symptom was thinning of urinary stream which was noted in 17(65.4%) cases. In our study other presenting symptoms seen predominantly were painful micturition in eight (30.76%) and hematuria in the form of bleeding spots on undergarment in seven (26.9%) cases.

In all patients the size of meatus was less than 4F and eight (30.76%) of these were having pinhole meatus. Perimeatal balanitis was seen in two (7.7%) cases whereas pyuria was present in three (11.5%).

For prevention of recurrence post operative meatal dilatation was advised. Patients compliance was not satisfactory regarding the dilatation as only 20 (76.9%) cases carried it out.

There was no case of postoperative bleeding and only one patient presented with postoperative infection which responded well to antibiotics. The meatal size was satisfactory in 97 cases and symptomatic improvement was seen in all patients except two i.e. 92.3%.

### Discussion

Meatal stenosis has been commonly attributed to neonatal circumcision<sup>2</sup>. Following circumcision meatitis is seen in 8-31% of cases<sup>8</sup>. As regards the incidence of meatal stenosis, true incidence is not known<sup>6,7</sup>. While some investigators have stated it to be eight<sup>6</sup> percent. Thomas et al have not reported any case of meatal stenosis<sup>5</sup> in 10000 neonatal circumcisions.

Different theories have been proposed regarding the pathophysiology of this problem. Commonly accepted theory is that meatitis occurs as a result of chemical inflammation due to ammonia. Ammonia fumes are produced by bacterial action in the wet diapers<sup>9,11</sup>. While some believe that it results from frenular artery injury<sup>6</sup>.

Meatal stenosis has variable symptomatology and the patient may present with any of the following complaints; i.e. deflected high velocity urinary stream, pain at initiation, dysuria, urgency, frequency and bleeding spots on underwear. In our study majority of patients 17 (65.4%) presented with thinning of urinary stream. The next most common symptoms in our patients were painful micturition in 8(30.76%) and bleeding spots on undergarments in 7(26.9%) cases. Meatal stenosis has been suggested to be a common cause of bloody spotting<sup>12</sup>. In another study it has been reported that pain on initiation was present in 100% of cases<sup>6</sup>.

Controversies are not limited only to pathophysiology but the issue of preoperative evaluation also remains unsettled. One view is that meatal stenosis is neither a cause of urinary tract infection nor hydronephrosis. Therefore no further urological investigation is warranted<sup>6</sup>. While others believe that ultrasound is necessary in all and voiding cystourethrogram in cases of urinary tract infection<sup>1</sup>. It has been our practice to limit these investigations to those cases which would remain symptomatic postoperatively. As visual appearance of the meatus can be misleading<sup>11</sup>, it is recommended to assess the meatal size with infant sounds<sup>1</sup>. Meatal size increases in the boys as the age advances<sup>12</sup>. Meatus < 5 F in a child of 10 is a definite indication for repair<sup>11</sup>. In our cases we have assessed the size of meatus with the help of feeding tubes.

Many surgeons carry the procedure under local anaesthesia in the office settings<sup>13</sup>. It has been our practice to treat all these cases under general anaesthesia due to various reasons. Firstly to avoid psychological trauma to children as majority of our cases were 3-4 years. Secondly we can assess the urinary stream by filling the bladder and applying suprapubic pressure. Moreover in cases of suspicion of urethral pathology, cystoscopy can be carried

out in the same sitting as cystoscopy is indicated in cases of obstructive symptoms<sup>1</sup>.

It has been our routine to apply mucocutaneous sutures in all cases. This has been advocated by some<sup>1</sup>, while others use the technique of crushing the tissue in hemostat before division<sup>14</sup>. Post meatoplasty dilatation is mandatory in all cases. Patient compliance was poor in our study. Only 20 (76.9%) of cases carried it. Therefore we have routinely been applying mucocutaneous sutures to decrease the incidence of recurrence.

Having said that certainly meatal stenosis can be treated by simple surgical procedure with encouraging results. Regarding the incidence of post circumcision meatal stenosis; the results of some of the series may have been affected by selection bias. Neonatal circumcision is performed either as a ritual or due to medical indication e.g. phimosis. Therefore the conflicting results regarding the incidence may be because of the different groups studied. To establish the relation between meatal stenosis and circumcision, a study needs to be conducted which excludes cases of medical indications. As the medical conditions affecting the prepuce may have involved the glans and this may influence the results.

It is estimated that one-sixth of world's men are circumcised<sup>15-16</sup>. If we are able to prevent meatal stenosis this will relieve the strain on health budget considerably. To summarize we can deduce various hypotheses regarding the prevention of meatal stenosis. Is it a complication related to the technique? If so then improving the techniques will be helpful. Majority of the authors believe that it is caused by ammoniacal fumes produced in wet diapers. If it is so, could this problem be solved by manufacturing new materials with higher absorptive capacity? Certainly the disposable nappies have decreased the incidence of ammoniacal inflammation of nappy area<sup>17</sup> but what about the communities not using it at all e.g. South Asian children below the poverty line. Usually such children develop voiding habit at an earlier age. If it is true then; is meatal stenosis a problem related to western life style?

These are some of the questions which would be answered if we could identify the etiological factors accurately and find a solution to this surgical complication.

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