

OUTCOMES OF TRANSURETHRAL AND SUPRAPUBIC URINARY DIVERSION FOLLOWING HYPOSPADIAS REPAIR IN CHILDREN

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ABSTRACT

Objective: To determine the outcomes and efficacy of transurethral urinary diversion/stenting with size six feeding tube and that of suprapubic cystostomy after hypospadias repair in children.

Methodology: An 8-year prospective experience at the University of Benin Teaching Hospital on the outcomes of suprapubic urinary diversion (2000-2002) and transurethral diversion/stenting (2003-2007) after hypospadias repair in children.

Results: During the study period, a total of 196 children had urinary diversion following hypospadias repair, 69 (35.2%) suprapubic and 127 (64.8%) transurethral. They were aged between 6 months and 12 years. Children who had transurethral diversion were relatively younger (mean age 2.3 ± 2.1 years) compared to suprapubic (3 ± 3.8 years). Although anchorage to the glans penis and bed restriction in 115 (90.6%) children were required, urinary diversion was more effective, postoperative complications were rare, no trigone irritation, and excellent cosmetic results [121(95.3%)] were recorded following transurethral diversion with a size six feeding tube. Conversely, the creation of suprapubic cystostomy increased operation and hospitalization duration with higher incidences of trigone irritation, 28 (4.6%), fistula formation, 18 (26.1%), catheter blockage, 10 (14.5%), soiling of operation site with urine and fewer number of children [48 (69.6%)] with excellent cosmetic results.

Conclusions: Transurethral urinary diversion/stenting with a size six feeding tube was very effective and gave better results than suprapubic cystostomy. The feeding tube is cheap, readily available and may provide a better means of post hypospadias repair urinary diversion in children where an ideal transurethral paediatric catheter is not available.

KEYWORDS: Hypospadias repair, Children, Transurethral urinary diversion, Suprapubic diversion.

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INTRODUCTION

Hypospadias repair which is usually done before the age of five years requires the need for urinary diversion and urethral stenting to reduce the incidences of urethrocutaneous fistula, urethral stenosis or complete breakdown of the repair.^{1,2} However, hypospadias repair in children poses a lot of challenges especially in developing countries where there may be a lack

of basic facilities such as adequate catheter required for transurethral diversion. The prevention of urine from making contact with the repair site remains a major challenge because of the toxic effect it has on exposed raw tissues which results in cells death and subsequent fistula formation or complete breakdown of the repair.^{3,4}

Different methods of post operative urinary diversion and associated complications have been described.^{1,3-8} Non availability of adequate size of paediatric urethral catheter in many developing countries makes suprapubic cystostomy a common method of post operative urinary diversion despite the associated drawbacks reported with its use.^{8,9} The use of inappropriate transurethral catheter gives poor results irrespective of the type of hypospadias repaired. This is due to pressure necrosis that results in breakdown of the repair when the catheter is too large or urethral stenosis if too small.⁸⁻¹⁰ This necessitates the need to get a method of diversion and/or stenting that would give satisfactory urinary diversion and minimal complications after hypospadias repair in a resource poor region.

This is an 8-year experience on post hypospadias repair urinary diversion in children comprising of three years of suprapubic cystostomy diversion (group A) and five years of transurethral urinary diversion/stenting with a size 6 FG feeding tube (group B).

METHODOLOGY

This prospective experience on urinary diversion/urethral stenting after hypospadias repair was undertaken at the University of Benin Teaching Hospital Benin City, Nigeria, after ethical approval was granted by the Local Ethics Committee of the hospital. The study period covered January 2000 and December 2002 during which suprapubic urinary diversion with size 12 Foley's catheter was done (group A), and January 2003 to December 2007 during which transurethral diversion/stenting with size 6 feeding tube (group B) was done.

Children in both groups were operated by the same team of surgeons who employed similar

methods of repair based on the types of hypospadias. Single stage Snodgrass', Mathieu's, Duckett's and Barcat's were the surgical options in children who presented before circumcision whereas paraurethral plate, non-hair bearing scrotal skin and tunica vaginalis flaps were additional options in those already circumcised. The size 6 feeding tube was anchored to the tip of glans penis with a single non absorbable stitch to prevent spontaneous dislodgement and serve both as urinary diversion and urethral stenting (Figures I-IV). On the other hand, hypospadias repair was done over an improvised urethral stent that did not extend to drain the bladder in those with suprapubic cystostomy. Each method of urinary diversion were employed for between seven to fourteen days and intraoperative dressing with petroleum jelly impregnated with antibiotics followed by twice daily topical application of chloramphenicol ointment. Other variables such as types of hypospadias, surgical materials, antibiotics and follow-up were similar between both groups. The mean age at hypospadias repair, duration of operation, hospitalization, mean cost of treatment, acceptance of the methods, adequacy of diversion, ease of nursing, complications and outcome were collated using a structured pro forma.

Statistical Analysis: The data obtained were analyzed using SPSS version 13 software package (SPSS, Chicago, IL, USA) and presented as count, frequency and percentage. Continuous data were expressed as mean/standard deviation while categorical data were analyzed using Chi-square test with a p-value < 0.05 regarded as significant.

RESULTS

During the period, a total of 196 children had urinary diversion following hypospadias repair, 69 (35.2%), suprapubic versus 127 (64.8%) transurethral diversions/stenting. They were aged between 6 months and 12 years with those who had transurethral diversion slightly younger (mean age 2.3 ± 2.1 years) than suprapubic diversion (mean age 3 ± 3.8 years). Hypospa-

Table-I: Frequency and outcomes of suprapubic and transurethral urinary diversion/urethral stenting over 8 years

<i>Variables</i>	<i>Suprapubic</i>	<i>Percentage %</i>	<i>Transurethral</i>	<i>Percentage %</i>
Number of children	69	35.5	127	64.8
Mean age at hypospadias repair	3 years \pm 3.8		2.3 years \pm 2.1	
Mean duration of operation	2 hours \pm 0.7		1.5 hours \pm 0.2	
Mean length of hospitalization	9 days \pm 1.9		7 days \pm 1.3	
Satisfactory urinary diversion	59	85.5	121	95.3
Painful trigone irritation	28	40.6	2	1.2
Easy nursing care	63	91.3	12	9.4
Wound infection	21	30.4	3	2.4
Child's restriction to bed	6	8.7	115	90.6
Urethrocutaneous fistula	18	26.1	3	2.4
Urethral stricture	6	8.7	5	3.9
Meatal stenosis	3	4.3	2	1.6
Accidental disruption of repair	1	1.4	3	2.4
Satisfactory cosmetic result	48	69.6	121	95.3

dias was mainly an isolated lesion in both groups excepting three children who had associated inguinal hernia and a child with undescended testes. The distribution of anterior, middle and posterior hypospadias were similar in both groups with anterior types accounting overall for about 40%. Size 6/0 polyglactin sutures and a combination of gentamicin and cefuroxime were the antibiotics of choice commenced intraoperatively and continued for 72 hours after operation in both groups.

As shown in Table-I, the addition of suprapubic cystostomy to hypospadias repair increased the duration of operation and the mean length of hospitalization. Transurethral feeding tube gave a more effective urinary diversion in 121 (95.3%) children unlike the 59 (85.5%) success recorded with suprapubic diversion. This was because ten (14.5%) children who had suprapubic cystostomy experienced leakage of urine by the side of the stent that resulted in wound contamination due to suprapubic catheter blockage at the immediate postoperative period. Similar incidence occurred in six (4.7%) of the children who had transurethral diversion after 72 hours post repair. Bladder discomfort and painful trigone irritation by catheter balloon or stent was common and

distressing in 28 (40.6%) with suprapubic diversion. This resulted in earlier removal of the suprapubic catheter in seven children and subsequent development of urethrocutaneous fistula by five of them with posterior hypospadias. This also influenced high wound infection rate recorded following suprapubic diversion mainly among children with middle and posterior variety.

However, postoperative nursing care was easier in children who had suprapubic diversion because they did not require bed restriction and the occurrence of accidental disruption of the repair was rarely encountered. The non self retaining nature of the feeding tube necessitated anchorage of the tube to the glans penis, bed restriction, and securing of the children's fingers in loose plaster bandage. Despite this, three children with transurethral diversion pulled on the tube which resulted in accidental disruption of their repair. Postoperative dressing, antibiotics and parenteral pentazocine administered in the first 72 hours were effective irrespective of the type of hypospadias and urinary diversion. Urethral and meatal stenoses were recorded respectively in six (8.7%) and three (4.3%) children with suprapubic diversion but rarely encountered among those with



Figure-1: Pre-operative photograph of a year old boy with mid penile hypospadias. Note the penile chordee and hooded prepuce.



Figure-2: Immediate post-operative photograph, just before dressing. Note the feeding tube used for transurethral diversion

transurethral diversion ($P < 0.0001$). Although no serious postoperative morbidity was recorded following the types of diversion, post repair cosmetic results were excellent in [121(95.3%)] with transurethral feeding tube diversion/stent compared to [48 (69.6%)] with suprapubic diversion.

DISCUSSION

Findings in this study which corresponded with earlier reports³⁻⁷ revealed that transurethral urinary diversion was a more cost effective and

convenient means than suprapubic diversion after hypospadias repair in children. The importance of urine diversion after hypospadias repair cannot be over emphasized because of the necrotizing and macerating effects it has on raw surfaces and the possibility of introducing infection into the wound which would result in breakdown of the repair.^{1,3-7} Of the 196 children that had hypospadias repair during this period, urinary diversion through suprapubic and transurethral routes were successful in 180 (91.8%) children with transurethral route accounting for the majority of successful cases.



Figure-3: Same patient 8th day after operation, just before removal of size 6 FG feeding tube used as transurethral catheter. Note suture anchoring it to glans penis.



Figure-4: Same boy a month after operation during follow-up visit at the surgical outpatient clinic.

Complications recorded were higher among those who had failed urinary diversion in both groups especially in children with middle/posterior hypospadias. In the absence of adequate paediatric urethral catheter designed for the purpose, transurethral diversion using a size six feeding tube in this study gave equally good and more satisfactory urinary diversion than suprapubic diversion. This was obvious and partly explained the higher complications recorded with suprapubic diversion after hypospadias repair as also reported by others.^{3,4,11} Also, diversion with a size six feeding tube made early hypospadias repair possible as the children in group (B) were relatively younger than those in group (A) who were placed on the waiting list until a large penile and wide urethral plate were achieved with increasing age. This was because the size six feeding tube was found to be very adequate for the paediatric and even the neonatal urethra especially when the diversion was for a brief period as similarly observed in other reports.^{11,12} The major drawback to the use of the feeding tube, however, was that it was not self retaining, which necessitated anchoring it with a stitch to the glans penis to prevent its dislodgement.

Although hypospadias repaired in both groups were mainly isolated lesions, the extra operating time spent in creating suprapubic cystostomy resulted in corresponding increment in hospital bill, length of hospitalization, and the presence of suprapubic scar which were similar to the experiences of other authors.^{3,4,13} In addition to these drawbacks, bladder pain and discomfort were experienced mainly by children who had suprapubic cystostomy. The catheter balloon impinging on the trigone resulted in bladder spasm and pain, and the presence of large foreign body in the bladder was reported to encourage the growth of pathogenic organisms that could worsen the pain and discomfort.¹⁴⁻¹⁶ Size six feeding tube that has no balloon triggered lesser trigone irritation, accounted for the rare and very mild pain and discomfort. Methods aimed at alleviating trigone irritation described by others were tried

without success which led to too early removal of the catheter that relieved the pain but increased complications rate.^{3,4,15,16} This experience influenced the total switch from suprapubic to transurethral urinary diversion during this study.

Other authors^{3-6,17} however, reported, that the feeding tube, being a foreign body could, be complicated by infection irrespective of its small size. Moreover, post operative care following the use of non self retaining feeding tube was more demanding because the children had to be restricted to bed with their fingers fistled and held in loose plaster bandage to prevent them from pulling on the catheter that could result in disruption of the repair as seen in three children.^{3,6} Unlike what was recorded in this study, earlier authors^{1,3,4} did not record any significant differences in the rate of urethrocutaneous fistula, meatal stenosis, and urethral stricture between children who had suprapubic and those who had transurethral diversion after hypospadias repair. However, cosmetic results of the penis after repairs assessed by combining visual and serial photography assessments as done by other authors during follow-up in the surgical outpatient clinic was better for transurethral urinary diversion.¹⁸ Consequently, of the 127 children with transurethral diversion, cosmetic result was excellent in 121 (95.3%) whereas it was excellent in 48 (69.6%) of the 69 children who had suprapubic diversion. The limitation of this study was that both methods of diversions were not done simultaneously but at different periods which did not qualify the results for a proper statistical comparison.

In conclusion, transurethral urinary diversion with sizesix6 feeding tube after hypospadias repair in children was very effective in this study and had many advantages over the commonly done suprapubic diversion. The reduction in the length/cost of operation and hospitalization, the more excellent cosmetic results, and the absence of bladder discomfort/pain as well as the ready availability and cheapness of size six feeding tube made it a cost effective method of post hypospadias repair urinary

diversion in these children. Size 6 feeding tube could be a useful tool for post hypospadias repair urinary diversion to surgeons in resource-scarce regions where an ideal transurethral paediatric catheter may not be available.

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