

## Vesicostomy as a Protector of Upper Urinary Tract in Long-Term Follow-Up

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**Introduction:** The aim of this study was to analyze the results of vesicostomy in children as a protector of the upper urinary tract and assess the adjustments taken by the caregivers.

**Materials and Methods:** Twenty-one children who had undergone vesicostomy with the Blocksom technique were evaluated. Their mean age was 3.7 years (range, < 1 to 10 years). The evaluation consisted of kidney function tests, cystography, and analysis of complications. Twenty parents or caregivers were interviewed about their attitudes towards vesicostomy and its outcomes.

**Results:** The main causes of the vesical dysfunction were posterior urethral valve in 7 (33.3%) and myelomeningocele in 5 patients (23.8%). Ten children (58.8%) showed improvement and 7 (41.2%) showed cure. Hydronephrosis observed in 17 children was alleviated or cured following the procedure. Kidney function, tested by creatinine clearance calculation, remained stable or improved in 20 patients (95.2%). Episodes of urinary tract infection and vesicoureteral reflux lowered in 8 of 21 (38.1%) and 10 of 14 patients (71.4%), respectively. Subjective evaluation of 20 cases showed that 18 children (90.0%) remained dry during the day and 14 caregivers/parents (70.0%) felt they had acquired the skills necessary to handle a patient with vesicostomy. The mean global rate of satisfaction of the results of the surgery ranging from 0 (worst result) to 10 (best result) was 8.7.

**Conclusion:** Vesicostomy is a simple surgery that protects the upper urinary tract, decreases hydronephrosis, and improves kidney function. There was adequate adjustment to vesicostomy and a positive global evaluation as reported by the parents and caregivers.

*Keywords: cystostomy, overactive detrusor, neurogenic urinary bladder, patient satisfaction, child, caregiver*

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### INTRODUCTION

Voiding dysfunction in childhood, either neurogenic or functional, represents a great challenge for the physician. Among the patients with neurological disease, over 90% will demand regular urological follow-up and between 20% and 30% may need associated operations such as bladder augmentation.<sup>(1)</sup> Once

voiding dysfunction is detected, the priorities are preservation of the upper urinary tract, promotion of continence, and reducing episodes of urinary tract infection (UTI).<sup>(2)</sup> In order to achieve these, clinical measures are most frequently utilized. These include physiotherapy, clean intermittent catheterization (CIC), and anticholinergic

drugs. Surgery should be considered if clinical treatment has failed.<sup>(3)</sup> Considering the infancy as a critical phase in kidney development with great susceptibility to renal scars and loss of kidney function, permanent diversion has been the first surgical option to permit renal maturing.<sup>(3)</sup>

The use of vesicostomy in children was proposed by Michie and colleagues and Duckett in 1960s.<sup>(4,5)</sup> Queipo Zaragoza and associates studied 43 children with neurogenic bladder and vesicostomy.<sup>(6)</sup> They observed that 100% and 90% presented improvement in hydronephrosis and kidney function, respectively. On the other hand, 20% of the patients had urinary infection, calculus, or stenosis during follow-up. In another study, Alexander and Kay described children with cloacal anomalies submitted to vesicostomy after primary reconstruction. They observed that vesicostomy was technically simple to perform, easily reversed, and effectively preventive from urinary sepsis.<sup>(7)</sup> The upper urinary tract protection by vesicostomy and the caregiver's opinions towards the procedure and its repercussions on the patient's quality of life have been little explored in the current literature. This study's purpose was to verify the results of vesicostomy on the upper urinary tract in patients affected by voiding dysfunctions as well as the caregiver's lifestyle adjustments.

## MATERIALS AND METHODS

The charts of 21 children who had undergone vesicostomy between 1992 and 2007 were analyzed. Vesicostomy had been done according to the technique proposed by Blocksom.<sup>(8)</sup> The indication for applying this procedure was failure in clinical treatment defined by worsening hydronephrosis, recurrent UTI, stable high-degree vesicoureteral reflux (VUR), worsening kidney function, and noncompliance with CIC and anticholinergics. In these situations, we always perform lower urinary tract diversion. If decrease in kidney function or recurrent UTI occurs after the procedure, the upper tract diversion is considered. Although those patients presenting with posterior urethral valve (PUV) were submitted to previous valve ablation, bladder impairment was not avoided.

Ultrasonography, voiding cystourethrography, static renal scintillography, blood tests, and urine cultures were performed every 6 months during the follow-up period. Reduction in grade of hydronephrosis or VUR was considered as improvement. On the other hand, absence of disorders on evaluation was considered as cure. The antibiotic prophylaxis was discontinued in the absence of UTI and VUR.

The creatinine clearance value was calculated by the following formula:  $k \times H/C$ , where  $k$  is a constant ( $k = .55$  for child,  $0.45$  for infant, and  $0.7$  for adolescent),  $H$  is height in centimeters, and  $C$  is serum creatinine concentration in mg/dL.<sup>(9)</sup> Caregivers or their parents who were involved in the care of their children were interviewed at the last follow-up visit (before closure of the vesicostomy, if applicable) to complete a questionnaire for self-evaluation of the surgical procedure at the last follow-up (Appendix). In one question we asked for a global score ranging from 0 (worst) to 10 (best) based on Lickert scale. The questionnaires were originally designed by the investigators in Portuguese.

## RESULTS

Twenty-one children with a mean age of 3.7 years (range, < 1 to 10 years) were evaluated. The most frequent diagnoses were PUV in 7 (33.3%) and myelomeningocele in 5 patients (23.9%; Table 1). Before vesicostomy, 3 patients (14.3%) showed decrease in kidney function due to inadequate neobladder function after the correction of bladder extrophy. Seventeen children (81.0%) had hydronephrosis on ultrasonography before the procedure. The mean follow-up was 6.9 years (range, 1 to 15 years), with only two children with less than 2-year follow-up.

**Table 1.** Diagnoses in Patients With Voiding Dysfunction

| Diagnosis                      | Patients (%) |
|--------------------------------|--------------|
| Posterior urethral valve       | 7 (33.3)     |
| Myelomeningocele               | 5 (23.9)     |
| Vesical extrophy               | 3 (14.2)     |
| Idiopathic hyperactive bladder | 3 (14.2)     |
| Sacral agenesis                | 1 (4.8)      |
| Prune belly syndrome           | 1 (4.8)      |
| Imperforated anus              | 1 (4.8)      |

Ten children (58.8%) showed improvement and 7 (41.2%) showed cure. There was no worsened case. Static renal scintillography with dimercaptosuccinic acid scan registered a kidney function deficit prior to the operation in 9 patients (42.9%), while there was no postoperative impairment in 20 children (95.2%). Creatinine clearance was less than 90 mL/min/1.72 m<sup>2</sup> in all the patients before the procedure, and it improved in 11 (52.4%) reaching more than 90mL/min/1.72m<sup>2</sup>. Therefore, creatinine clearance stabilized in 9 (42.9%) and worsened in 1 (4.8%). Urinary tract infection prior to surgery was frequent (more than 1 time per year) in all the children. After vesicostomy, 8 children (38.1%) demonstrated a decrease of this morbidity without suppressive antibiotic therapy. The others needed continuous antibiotic therapy because of more than 1 UTI episodes per year. Fourteen patients (66.7%) presented VUR before the operation (10 bilateral and 4 unilateral), all with grades 3 or 4. Complete resolution (cure) was observed in 4 unilateral cases and improvement to grades 1 or 2 in 6 bilateral cases. We observed no impairment in 4 bilateral cases which maintained grade 3 or 4.

The complications of the surgery were stenosis in 8 patients (38.1%), dermatitis in 5 (23.8%), and mucosal prolapse in 6 (28.6%). Among children with prolapse, 5 presented dermatitis. On the other hand, 3 patients with stenosis presented prolapse after surgical correction. We did not observe bladder or upper urinary tract calculus. All complications occurred around 6 months after the operation (range, 4 to 10 months).

A total of 20 caregivers answered the survey at the last follow-up visit or the visit before closure of vesicostomy. They classified 18 children (90.0%) as dry (when the skin around the vesicostomy was parched and only the pad was continuously

wet). Fourteen (70.0%) caregivers considered vesicostomy to be manageable (Table 2). When asked if the caregivers would like to close vesicostomy even if catheterization would be necessary, 12 (60.0%) answered “no” and 8 (40.0%) answered “yes.” The interviewees gave a mean global score of 8.7 (range, 3 to 10) to vesicostomy.

Six patients (28.6%) had their vesicostomies closed after a mean period of 2.4 ± 1.3 years. Among these, 3 (14.2%) experienced augmentation enterocystoplasty and 1 required ureterovesical re-implant at the same time as vesicostomy closure. Fifteen patients (71.4%) preserved their vesicostomies until the end of this study. The reasons for this were caregiver refusal in 5 (23.8%) or children being under school age in 10 cases (47.6%).

## DISCUSSION

Vesicostomy is considered a temporary urinary diversion. Some authors suggested it be a permanent diversion, mainly in patients who refuse CIC or those who choose an incontinent diversion.<sup>(10)</sup> While most of the studies only evaluate patients with neurological voiding dysfunctions, we evaluated a larger number of children that had urinary tract malformations such as PUV.<sup>(11)</sup> This different sampling approach may have caused surfacing of infection and VUR in these patients which in turn may justify the lower resolution and high complication rate. In spite of the high complication rates, most of these are minor and present modest impact on the quality of life.

Following vesicostomy, an objective improvement of hydronephrosis ranging from 85% to 100% and stabilization of kidney function, evaluated by scintillography, of around 88% have

**Table 2.** Survey Results Applied to 20 Children's Caregivers

| Survey Question                                   | Main Answer                           | Frequency (%) |
|---|---------------------------------------|---------------|
| Family income                                     | 1 to 5 minimum wage                   | 18 (90)       |
| Children's level of education                     | First-degree incomplete               | 14 (70)       |
| Caregivers' level of education                    | First-degree incomplete               | 14 (70)       |
| Social interpersonal relation with other children | “Get along with children of same age” | 16 (80)       |
| State of the child during the majority of the day | Dry                                   | 18 (90)       |
| Description of the work required                  | “Difficult, but I am used to do it”   | 14 (70)       |

been detected.<sup>(3,10-12)</sup> These were reproduced in our study by improving rates of 81% and 95%, respectively. However, reduction in frequency of UTIs and improvement of VUR that were shown in this study were lower than the ones demonstrated up to this point (38% and 58%, respectively, versus 85% and 73%).<sup>(11)</sup>

In a study comparing 2 groups of patients operated on in childhood and adolescence using Blocksom technique with 5-year and 13-year follow-up periods, both groups presented a similar percentage of complications ranging between 15% and 25%.<sup>(10)</sup> In the present study, using the same surgical technique, the mean age of the patients at the time of surgery was 3.7 years with a scheduled follow-up not exceeding 15 years following the surgery; the percentage of complications was found to be between 23% and 38%. The complications described to date occurred in 20% to 35% of the cases and the most frequent ones are dermatitis, mucosal prolapse, and vesicostomy stenosis.<sup>(10,12)</sup> It is noteworthy that there were no cases of urinary tract lithiasis in our study. No observation of calculus formation may be due to the short length of follow-up. In the case of dermatitis, there is great variation in the incidence mainly because of difficulty in classifying its intensity. The Blocksom technique emphasizes on the importance of dissecting vesical cupula after removing the urachus in tailoring the vesicostomy and lowering chances of postsurgical prolapse.<sup>(8)</sup> There is no study comparing complication rates between different techniques. By the way, all these complications have relatively simple solutions.<sup>(11)</sup> With regard to dermatitis, it is important to inform the patients of proper care of the stomas, and a topical treatment is usually sufficient. In the case of stenosis, dilations may be performed and a new surgery should be done only if all others fail. Finally, the prolapse constitutes a technical problem and probably will require a surgical revision of the procedure.

During the bibliographical review that supported this study, we were unable to identify any other study that had given credit nor evaluated caregivers' opinions towards the procedure and its repercussions on the patients' quality of life. Even though we used a survey not yet

generally accepted by the scientific community, we were able to observe the good receptivity of the method by caregivers once a dry state was achieved throughout the day.

## CONCLUSION

We conclude that vesicostomy is a simple urinary diversion, showing encouraging results towards safeguard of kidney function. Furthermore, the procedure has received rave reviews from the caregivers, and therefore, it has become a viable choice for children with neurological or other voiding dysfunctions or those that do not respond to conservative treatment.

## CONFLICT OF INTEREST

None declared.

## APPENDIX

### Interview Questionnaire of Vesicostomy Survey

- Family income:

- (a) 1 minimum wage
- (b) 1 to 5 minimum wage
- (c) 6 to 10 minimum wage
- (d) 10 minimum wage

- Level of Education

- *Patient:*

- (a) Literate/illiterate
- (b) First degree complete/No formal education
- (c) Second degree complete/incomplete
- (d) Third degree complete/incomplete

- *Caregivers:*

- (a) Literate/illiterate
- (b) First degree complete/No formal education
- (c) Second degree complete/incomplete
- (d) Third degree complete/incomplete

- Body weight?

- Height?

- How is the patient's social interaction with other children?
  - (a) Get along with children of same age
  - (b) Get along with older children
  - (c) Get along with younger children
  - (d) Unable to get along with other children
- How is the child in the majority of day?
  - (a) Dry, without signs of leaking outside the container
  - (b) Wet, with signs of leaking outside the container
- How do you (caregiver) evaluate taking care of a child with a vesicostomy?
  - (a) Daunting
  - (b) Difficult, but I am used to it and it does not mess up my daily activities
  - (c) Not difficult
- Would you like the child to switch from vesicostomy to clean intermittent catheterization by closing the former?
  - (a) Yes
  - (b) No
  - (c) Has already closed it
- What score would you give to this surgery (select between 0 and 10)?
- Would you like to close vesicostomy?
  - (a) Yes
  - (b) No

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