

Protective Temporary Vesicostomy in Children: Evaluation of 23 Patients

Çocuklarda Geçici Koruyucu Vezikostomi: 23 Hastanın Değerlendirilmesi

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University of Health Sciences Türkiye, Ankara City Hospital, Clinic of Pediatric Urology, Ankara, Türkiye

ABSTRACT

Background: Vesicostomy in children is a surgical procedure performed to temporarily empty the bladder. It is usually performed to protect upper urinary tract function in patients with neuropathic bladder, and bladder outlet obstruction. This study aims to evaluate the results of patients who had vesicostomy in the study center within ten years.

Materials and Methods: We evaluated retrospectively the treatment results and complications of vesicostomy on twenty-three children who were operated in our center from 2009 to 2019.

Results: There were sixteen (69%) boys and seven (31%) girls. Their mean age was 4.74±4.67 (1 month-16 year) years old when they underwent vesicostomy. Twelve (52.2%) of them had neurogenic bladder and one (4.3%) of them had an intact neuronal pathway which is defined as dysfunctional voiding. Six (26.1%) boys had posterior urethral valves, prune belly syndrome in two boys (8.7%) and vesicoureteral reflux in two patients. All patients had severe hydronephrosis before vesicostomy. After the operation, upper urinary tract dilatation improved in nineteen patients. The creatinine level reduced after vesicostomy in 18 patients. Sixteen patients needed additional surgery. Complications after vesicostomy were stoma stenosis in two patients, mucosal prolapse in one patient (5.05%), dermatitis in two patients, and febrile urinary tract infection in two patients. Two patients needed vesicostomy revision.

Conclusion: In selected patients, vesicostomy is beneficial to prevent upper urinary tract deterioration and stabilize renal function. Nevertheless, most of children need for additional major surgery.

Keywords: Vesicostomy, renal function, children, urinary tract infection

ÖZ

Amaç: Çocuklarda vezikostomi mesanenin geçici olarak boşaltılmasını sağlamak için uygulanan bir cerrahi işlemdir. Nöropatik mesane ve mesane çıkım obstrüksiyonu olan hastalarda genellikle üst idrar yolu fonksiyonunu korumak için yapılır. Çalışmamız on yıl içinde vezikostomi uygulanan hastaların sonuçlarını değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntemler: 2009-2019 yılları arasında merkezimizde opere edilen 23 çocukta vezikostominin tedavi sonuçlarını ve komplikasyonlarını retrospektif olarak değerlendirdik.

Bulgular: On altı (%69) erkek ve yedi (%31) kız hastanın vezikostomi yapıldığında ortalama yaşları 4,74±4,67 (1 ay-16 yaş) idi. On ikisinde (%52,2) nörojenik mesane, birinde (%4,3) nöronal yolağı sağlam olan disfonksiyonel işeme söz konusu idi. Altı (%26,1) erkek çocukta posterior üretral valv, iki erkek çocukta (%8,7) prune belly sendromu ve iki hastada vezikoüreteral reflü mevcuttu. Tüm hastalarda vezikostomi öncesi şiddetli hidroüretonefroz vardı. Ameliyat sonrası 19 hastada üst üriner sistem dilatasyonu düzeldi. On sekiz hastada vezikostomi sonrası kreatinin düzeyi düştü. On altı hastanın ek cerrahiye ihtiyacı vardı. Vezikostomi sonrası gelişen komplikasyonlar iki hastada stoma stenozu, bir hastada (%5,05) mukozal prolapsus, iki hastada dermatit ve iki hastada ateşli idrar yolu enfeksiyonu idi. İki hastada vezikostomi revizyonu gerekti.

Sonuç: Seçilmiş hastalarda vezikostomi, üst üriner sistem bozulmasını önlemek ve böbrek fonksiyonunu stabilize etmek için faydalıdır. Bununla birlikte, çoğu çocuğun ek majör cerrahiye ihtiyacı vardır.

Anahtar Kelimeler: Vezikostomi, renal fonksiyon, çocuk, üriner sistem enfeksiyonu



Address for Correspondence: Gökhan Demirtaş, University of Health Sciences Türkiye, Ankara City Hospital, Clinic of Pediatric Urology, Ankara, Türkiye

Phone: +90 506 634 02 17 E-mail: drgokhandemirtas@gmail.com ORCID ID: orcid.org/0000-0003-0787-2330

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Introduction

Vesicostomy is a simple, well-tolerated, and reversible procedure that provides temporary drainage of the bladder and is rarely used as a surgical procedure in children (1). It is usually performed to protect upper urinary tract function in patients with neuropathic bladder, and bladder outlet obstruction (1,2,3,4). Vesicostomy is not a first-line treatment modality in pediatric urological practice. If conservative treatment modality fails, vesicostomy is performed to stabilize kidney function, prevent urinary tract infection and save time for definitive surgery (1,2). Conservative treatment may include; medicine for relaxing the bladder, clean intermittent catheterization (CIC), botulinum toxin injection, subureteric injection and/or valve ablation.

Generally, after upper urinary system stabilization, vesicostomy closure is planned with a definitive surgery. There is a controversy about the effect of vesicostomy on bladder capacity and function. If drainage is performed with vesicostomy for a long time, it is seen that the bladder capacity is reduced and definitive surgery becomes very difficult or impossible (5,6). Therefore, the timing of vesicostomy closure is very important. However, some authors claim that vesicostomy has no negative effect on the bladder function and reduces the need for definitive surgery in patients (1,2,3,7,8,9).

In this retrospective study, we evaluated effect of the vesicostomy on renal function, ultrasonography appearance of the upper urinary tract, and complications of vesicostomy on children in a 10-year period.

Material and Methods

Twenty-three children underwent cutaneous vesicostomy at our clinic from January 2009 to December 2019. Medical records of the patients were evaluated the records retrospectively after the approval of the Hospital Ethics Committee of University of Health Sciences Türkiye, Ankara City Hospital (E2-21-799). The indications for vesicostomy in our clinic were bilateral severe hydronephrosis with decreased renal parenchymal thickness, worsening kidney function with hydronephrosis despite optimum medical treatment using CIC and anticholinergic drugs and patients who cannot be performed CIC due to hypersensation, urethral anatomy, or age. First line therapies such as intermittent catheterization and anticholinergic drugs failed in all patients in this series.

The Blocksom technique was preferred for vesicostomy in our clinic. With this technique, a small opening is made

in the lower abdomen through the bladder dome to allow the outflow of urine. Patients age, gender, vesicostomy indication, pre and postvesicostomy laboratory/radiological findings, incidence of febrile urinary tract infection, and complications were recorded from hospital records. Before deciding to close the vesicostomy, bladder capacity was measured and voiding cystourethrography was performed in all patients.

Statistical Analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) Software Version 25.0 (SPSS Inc., Chicago, IL, USA). Results were evaluated using the Wilcoxon signed-rank test and Mann-Whitney U test. Any p-value <0.05 was considered significant.

Results

Twenty-three patients [16 (69%) boys and 7 (31%) girls] who underwent vesicostomy in our clinic included the study. The patient's age was between 1 month to 16 years mean 4.74 ± 4.67 at the time they underwent vesicostomy. Mean length follow-up was 47.56 ± 29.82 months with the range 11.5 months-7.8 years.

Twelve (52.2%) of them had neurogenic bladder due to neural tube defects, and one (4.3%) of them had dysfunctional voiding without neurologic problem. Six (26.1%) boys had posterior urethral valves (PUV) and two boys (8.7%) had prune belly syndrome. Two patients (8.7%) had vesicoureteral reflux (VUR). These two patients are under one year old with unremitting urinary tract infection and one of them had solitary kidney (Table 1).

Severe hydronephrosis was noted in all patients before vesicostomy. The right kidney anterior posterior diameter decreased in 18 patients, stayed

Table 1. Demographic values

| | | n | % |
|---|--------------------------|----|------|
| Gender (n=23) | Male | 16 | 69.5 |
| | Female | 7 | 30.5 |
| Diagnosis (n=23) | Neurogenic bladder | 12 | 52.2 |
| | Dysfunctional voiding | 1 | 4.3 |
| | Posterior urethral valve | 6 | 26.1 |
| | Prune belly syndrome | 2 | 8.7 |
| | VUR | 2 | 8.7 |
| Postoperative complication (n=7) | Stoma stenosis | 2 | 28.6 |
| | Mucosal prolapsus | 1 | 14.2 |
| | Dermatitis | 2 | 28.6 |
| | fUTI | 2 | 28.6 |

VUR: Vesicoureteral reflux, fUTI: Febrile urinary tract infection

stable in five patients after vesicostomy [pre-vesicostomy mean 20.0±18.37 mm (4-90 mm); post-vesicostomy mean 11.05±5.35 (4-24 mm)] p=0.005; left kidney anterior posterior diameter stayed on stable in four patients and decreased in 19 patients [pre-vesicostomy mean 18.89±8.69 mm (9-36); post-vesicostomy mean 13.63±5.55 mm (4-29)] p=0.002. There was no significant difference between preoperative and postoperative parenchymal thinning (right kidney p=0.060, left kidney 0.161) (Table 2).

Creatinine levels decreased after vesicostomy in 18 patients. Creatinine level was stable in five patients. Mean serum creatinine levels pre and post-vesicostomy were 1.58±0.81 mg/dL (0.45-3.64 mg/dL) and 0.93±0.54 mg/dL (0.29-1.96 mg/dL), respectively. The decrease in creatinine level was significant after vesicostomy (p<0.001) and remained stable during follow-up (Table 2).

A total of seven complications were encountered in 23 patients. Stoma stenosis was noted in two patients, mucosal prolapse in one patient, dermatitis in two patients, and febrile urinary tract infection in two patients. Two patients needed vesicostomy revision.

Three patients underwent ureteroneocystostomy, six patients had augmentation with appendicovesicostomy, three patients appendicovesicostomy, three patients PUV resection, one patient nephrectomy on follow-up. Additional surgical procedure was performed in 16 (69.5%) patients. Vesicostomy was closed without any problem in 20 patients. The reason for prolonged vesicostomy in two patients is lack of social support to adequate bladder management and in one patient is waiting for definitive operation. No complication was noted after vesicostomy closure. No renal function deterioration was observed in any patient after vesicostomy.

Discussion

Since vesicostomy was described in the 1960s (10,11), this technique has been used as a temporary diversion for limited conditions until bladder function improves. Today there is a debate going on about the role of vesicostomy for the treatment of some issue. Vesicostomy is recommended patients with bilateral severe hydronephrosis with decreased parenchymal thickness, worsening kidney function and hydronephrosis despite medical treatment using CIC and anticholinergic drugs, symptomatic bilateral high-grade VUR, recurrent and symptomatic urinary tract infection or patients refusing to do CIC due to hypersensation, urethral anatomy, or age. But, since the temporary defunctionalization of the bladder will cause a decrease in bladder capacity (5,6) and is an incontinent solution, vesicostomy is not a treatment option unless it is mandatory. On the other hand, there are papers stating that vesicostomy does not affect bladder function and resulted increases bladder capacity and compliance (7,8,9).

Vesicostomy application in PUV patients after valve ablation facilitates upper urinary tract drainage, resulting in significant improvement in PUV outcome (12). On the contrary, some authors believe that although vesicostomy delays progression to end-stage kidney disease, no long-term benefit was noted in the incidence of end-stage kidney disease (13). Vesicostomy should be an option for PUV treatment. Vesicostomy has significantly better results in decreasing serum creatinine level, ore often dry and had on average higher GFR compared with valve ablation (14). In another study, primary valve ablation and vesicostomy for PUV treatment were compared. When the one-year creatinine level, glomerular filtration rate and grade of hydronephrosis were evaluated, there was no significant difference. Although there is no significant difference, they

Table 2. Comparison of the radiologic and laboratory findings

| | | Median | Min-max | p |
|---|------------------|------------|-----------|--------|
| Right kidney AP (mm) | Pre-vesicostomy | 20.0±18.37 | 4-90 | 0.005 |
| | Post-vesicostomy | 11.05±5.35 | 4-24 | |
| Left kidney AP (mm) | Pre-vesicostomy | 18.89±8.69 | 9-36 | 0.002 |
| | Post-vesicostomy | 13.63±5.55 | 4-29 | |
| Right kidney parenchymal thickness (mm) | Pre-vesicostomy | 6.93±3.70 | 2-17 | 0.06 |
| | Post-vesicostomy | 7.97±3.87 | 4-14 | |
| Left kidney parenchymal thickness (mm) | Pre-vesicostomy | 18.89±5.33 | 3-26 | 0.161 |
| | Post-vesicostomy | 9.05±3.55 | 3-15 | |
| Serum creatinin level (mg/dL) | Pre-vesicostomy | 1.58±0.81 | 0.45-3.64 | <0.001 |
| | Post-vesicostomy | 0.93±0.54 | 0.29-1.96 | |

Mann-Whitney U test

recommended vesicostomy due to less complication that might be a better treatment choice in newborns (15).

In our series if upper tract deterioration after PUV resection is went on and CIC is not able to use, we prefer vesicostomy for bladder drainage. Or if hydronephrosis increases despite CIC and overnight catheterization, we recommend again performing vesicostomy to stabilize the renal function. Vesicostomy was performed in six patients with PUV in our series. On follow-up, vesicostomy closed in all patients with PUV. UNC was performed in a PUV patient as an additional surgical procedure. Upper urinary tracts stabilized in all PUV patients after vesicostomy. Vesicostomy was used temporarily for stabilization of renal functions before major surgery in neurogenic bladder cases in our series. Patients underwent augmentation cystoplasty and appendicovesicostomy after stabilization. In the literature, initial vesicostomy is performed in infants younger than six months old with primary bilateral high-grade VUR (16,17). In this series two patient under one year old with recurrent urinary tract infection underwent vesicostomy for primary VUR. Vesicostomy was used in these two patients, one of them had solitary kidney, which could not be stabilized with medical therapy and was closed after one year of age when UNC was performed.

The most important problem in cases with vesicostomy is the decrease in bladder capacity over time. It becomes very difficult or impossible to perform definitive surgeries to bladder with reduced capacity. Therefore, harm-benefit balance should be carefully considered in patients with vesicostomy. In our series, no reducing in bladder capacity has been noted in patients with PUV. Patients with neurogenic bladder and primary VUR, had already low bladder capacity pre-vesicostomy. There are not bladder capacity decreasing except one in our series. Additional surgical procedures were performed without problems in all patients. While low bladder capacity is not a problem with planned bladder augmentation in patients, in patients who are scheduled for antireflux surgery due to primary VUR should be very careful. Severe hydronephrosis improved in 19 patients after vesicostomy, stable in four patients. Serum creatinine level decreased after vesicostomy in 18 patients. However, there is no improvement in parenchymal thinning after vesicostomy. Vesicostomy cannot reduce additional major surgeries in our series. Major surgery was required in 70% of our patients.

Conclusion

Vesicostomy should be performed as a temporary treatment option to protect the upper urinary system in a selected group of patients with neurogenic bladder

and bladder outlet obstruction. This is a simple, reversible, uncomplicated, and well-tolerated procedure. Serum creatine level and upper urinary tract dilatation showed a significant improvement after vesicostomy. **Acknowledgements:** This study is based on the retrospective data evaluation of patients treated in University of Health Sciences Türkiye, Ankara City Hospital Pediatric Urology Clinic.

Ethics

Ethics Committee Approval: Medical records of the patients were evaluated the records retrospectively after the approval of the Hospital Ethics Committee of University of Health Sciences Türkiye, Ankara City Hospital (E2-21-799).

Informed Consent: Retrospective study.

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: G.D., T.H.T., Concept: S.T., T.H.T., Design: B.K., T.H.T., Data Collection or Processing: G.D., S.T., T.H.T., Analysis or Interpretation: S.T., T.H.T., Literature Search: B.K., T.H.T., Writing: G.D., T.H.T.

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