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Vesico-cutaneous fistula: A simple method for continent urinary diversion

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Abstract *Introduction:* Patients with lower urinary tract anomalies or neurogenic disorders often suffer from voiding difficulties. Clean intermittent catheterization (CIC) is effective for bladder drainage; however, this is often painful. Transurethral catheterization is also impossible in patients with urethral stricture. A Mitrofanoff conduit may solve some of these problems, but a few disadvantages have been reported, including: difficult surgical techniques and frequent operative complications. A vesicostomy is easy to perform but persistent urine leak over the abdomen and diaper rash can be annoying. A better way to achieve continent urinary diversion is indicated.

Method: Between December 01 1998 and December 31 2013, six patients underwent a vesico-cutaneous fistula for CIC. The etiologies included urethral stricture ($n = 2$) and neurogenic bladder ($n = 4$). The fistula was created at the bladder dome with only the muscle layer of the bladder sutured to the skin. A Foley catheter was left in place for at least two weeks to prevent stoma stricture. After removing the Foley catheter, regular CIC from the fistula was performed every 2 h during the daytime with a Fr. 10–12 feeding tube, depending on the patient's age. Further stenting during the night in the first six months was necessary to prevent early closure of the fistula. Patients were followed with periodic renal ultrasonography, blood tests and urinalysis in the outpatient department.

Results: Follow-up ranged from 6 months to 16 years. All patients showed improvements in hydronephrosis. Decreased UTI frequency was seen in five patients. Renal function was normal in five patients, whilst the other suffered from chronic renal failure preoperatively. Only one patient had occasional mild urine leakage from the stoma at night, which was once in two weeks. No patient experienced painful or difficult catheterization and CIC becomes easy, even by young children.

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Conclusions: The vesico-cutaneous fistula is a simple, effective and tolerable method for CIC. It may be a substitute for or a transition to a Mitrofanoff conduit in some patients.

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Introduction

The optimal treatment for children with neurogenic bladder and other urinary difficulties has not been established. Renal function deterioration may be related to VUR, hydronephrosis and recurrent UTI. End-stage renal disease can develop if a child is left untreated [1]. Clean intermittent catheterization (CIC) has been used widely in patients with neurogenic bladder (NB). Although a low complication rate and good tolerance of CIC have been reported after long-term follow-up, bleeding, urethral stricture or a false tract can still occur [2,3]. A subgroup of patients can suffer from recurrent UTI, even under regular CIC and prophylactic antibiotic treatment [4]. In patients with lower urinary tract anomalies, such as urethral stricture, performing CIC is impossible.

A urinary diversion with a Mitrofanoff conduit has disadvantages, including: difficult surgical techniques and a high rate of operative complications. A traditional vesicostomy, although preserving upper urinary tract function, is often difficult for patients to accept due to the resulting urinary incontinence and risk of diaper dermatitis [5,6].

In the present study, a simple and nearly continent vesico-cutaneous fistula (VCF) was performed instead of a traditional vesicostomy in children who were under the CIC program. The present study reports on the experiences of six cases.

Materials and methods

After obtaining Institutional Review Board approval, a retrospective chart review of all patients who underwent a VCF between December 01 1998 and December 31 2013 was conducted.

Patients

Sixty-six neurogenic bladder patients were treated at the present hospital between December 1998 and December 2013. Five of these patients underwent VCF procedures. Indications included: recurrent UTI, despite regular CIC from the urethra and prophylactic antibiotics ($n = 3$), and worsening hydronephrosis and renal function ($n = 2$). For patients who suffered from neurogenic bladder, a bladder capacity exceeding 150 ml should be proved during CIC. Another two urethral strictures were recruited due to difficulty with CIC from the urethra.

Operation method

A 2.0 cm incision was made at the midpoint between the umbilicus and the pubic bone. The underlying fascia was incised and the rectus was retracted laterally until the

peritoneal reflection could be seen. After pushing away the peritoneum and the perivesical fat, the bladder was grasped at the dome and pulled through the wound. The bladder was opened and evacuated through a 0.5 cm longitudinal incision. Four to six stitches were used to fasten the outer layer of the bladder wall to the Scarpa's fascia and the skin; the mucosa should not be sutured to the skin. A French 12 Foley catheter was left in place for two weeks in order to prevent early closure of the VCF. After removing the Foley catheter, regular CIC from the fistula was performed every 2 h during the daytime with a 10–12 Fr. feeding tube, depending on the patient's age. The tube was inserted as a stent and left open for drainage at night for the first six months after the VCF had been created. Once the fistula had stabilized, no further stenting was required after the first six months.

Follow-up

Patients were followed with periodic renal ultrasonography, blood tests and urinalysis in the outpatient department. VCUG, urodynamic studies and magnetic resonance urography (MRU) were performed as needed. Improvement was defined as improved hydronephrosis and hydroureter on renal echo, decreased frequency of febrile UTI or improving creatinine level. The severity of hydronephrosis was evaluated using the Society for Fetal Urology grading system [7].

Results

Four males and three females underwent the procedure; one was excluded as lost to follow-up. The characteristics and results of the six patients are described in Table 1. The mean age at surgery was 7.17 years (range 18 days–22 years). Two patients (33.3%) had congenital urethral strictures. Four patients suffered from bladder dysfunction for the following reasons: meningomyelocele ($n = 2$), cerebral palsy ($n = 1$) and non-neurogenic neurogenic bladder (Hinman syndrome, $n = 1$). Although CIC and prophylactic antibiotics were used for all patients with neurogenic bladders, febrile UTI that needed hospitalization for treatment (more than two episodes in six months) remained a common problem.

All of the patients who underwent the operation showed improved hydronephrosis in the follow-up renal echo assessments. The frequency for febrile UTI declined and the nocturnal diuresis decreased gradually during the first six months of nocturnal stenting.

One patient suffered from chronic renal failure and had a creatinine level around 7.0–8.0 mg/dl before the operation. The creatinine level improved to 5.0 mg/dl after three-months of regular CIC from the VCF. The rest of the

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