Journal of Pediatric Surgery 52 (2017) 2070–2073

Contents lists available at ScienceDirect

Journal of Pediatric Surgery

journal homepage: www.elsevier.com/locate/jpedsurg

Sigmoidocolocystoplasty for neurogenic bladder reviewed after 20 years

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ARTICLE INFO

Article history:
Received 12 August 2017
Accepted 28 August 2017

Key words:
Augmentation cystoplasty
Neurogenic bladder
Long-term follow-up
Carcinogenesis

ABSTRACT

Background/purpose: We report the current status of patients who underwent augmentation cystoplasty (AC) at least 20 years previously.
Methods: Surgical history, incidence of urinary tract infection (UTI) and bladder stones, vesicoureteral reflux (VUR), urine cytology, renal function, a colon cancer tumor marker (carcinoembryonic antigen: CEA), and patient outcomes were assessed.
Results: Forty patients who underwent AC (mean age: 34.4 years; mean follow-up time: 24.3 years) were analyzed. Mean age at AC was 11 years. Incidence of bladder stones was 30%. There were no incidences of carcinoma after AC, and CEA levels were not increased. Ureteral reimplantation (URI) was performed in 21 patients. URI performed at the same time as AC was successful in 14 cases (93%) and unsuccessful in 1 (7%) because of persistent VUR. UTI developed after AC in only 1 patient (2.5%) with persistent VUR. This patient required unilateral nephrectomy 18 years after the AC because of repeated UTIs. Thirty-four patients (85%) were employed, and 4 (10%) were married. Two of the 19 female patients (11%) had experienced pregnancy and delivery. Five patients (13%) had mental disorders.
Conclusion: Ultra long-term follow-up suggests that AC is a safe procedure with manageable sequelae, although some mental health issues remain.
Type of study: Case series with no comparison group.
Level of evidence: Level IV.

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Since first being carried out by von Mikulicz in 1889, augmentation cystoplasty has gained popularity as an important armamentarium in the management of patients with neurogenic bladder, small contracted bladder, or detrusor overactivity [1]. This procedure aims to protect the upper urinary tract by restoring a low-pressure bladder and to improve quality of life by achieving continence [2]. We previously reviewed the state of patients who underwent augmentation cystoplasty more than 10 years previously [3]. Several studies have reported the long-term follow-up data of patients after enterocystoplasty [4], but there are few reports on the state of patients 20 years or longer after undergoing augmentation cystoplasty [2]. Thus, the aim of this study was to review our ultra long-term follow-up data on patients who previously underwent augmentation cystoplasty.

1. Materials and methods

This study was approved by the institutional review boards. The records of 95 consecutive patients with myelodysplasia and neurogenic bladder who underwent augmentation cystopasty at our institution with a follow-up time of longer than 20 years were reviewed retrospectively. Fifty-five cases were excluded because of incomplete follow-up, leaving 40 available for this review (Fig. 1). Previous surgical history, incidence of urinary tract infection and bladder stones, presence of vesicoureteric reflux (VUR), urine cytology, renal function, presence of a colon cancer tumor maker (carcinoembryonic antigen: CEA), and patients' outcomes were assessed.

1.1. Bladder augmentation and ureteral reimplantation

The details of our augmentation cystoplasty method have been reported previously [5]. We used sigmoid colon for augmentation cystoplasty, because myelodysplasia patients also had bowel dysfunction and one of the purposes of augmentation cystoplasty was the improvement of constipation. Indications for augmentation cystoplasty were (1) bladder capacity of less than 2 SD of

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http://dx.doi.org/10.1016/j.jpedsurg.2017.08.029
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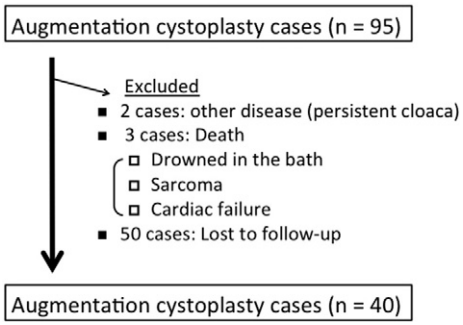

Fig. 1. Flowchart of the selection of patients in this study. Augmentation cystoplasty was performed on 95 patients. Fifty-five patients were excluded because of other diseases, deaths, and loss to follow-up. Finally, 40 augmentation cystoplasty cases were reviewed.

normal bladder capacity, calculated according to the following formula: 30 + (patient age [years] × 30), (2) low bladder compliance (less than 10 mL/cm H_2O), (3) urinary incontinence unresponsive to conservative therapy for at least 6 months, or (4) receiving treatment for VUR. Of these, VUR and urinary incontinence were the strongest indications. Indications were not assessed individually. Indications for ureteral reimplantation were grade III or greater VUR in at least 1 ureter, or ureterovesical junction obstruction (UVJO). If a lower grade of VUR was present in the contralateral ureter and the ureteral orifice on that side was abnormally shaped on cystoscopy, bilateral ureteric reimplantation was performed. Ureters were reimplanted into the native bladder or the colon cap based on the condition of the bladder mucosa. Our preference was to actively perform ureteral reimplantation if VUR was present, to prevent future renal dysfunction.

1.2. Postoperative bladder management

Continuous neobladder suction drainage through an indwelling urethral catheter was performed for 1 week after the surgery. During this time, saline bladder irrigation was performed from days 2 to 5. Cytourethrography was performed on postoperative days 7 to 10, and the catheter was removed if the anastomosis was normal. Patients were taught clean intermittent catheterization and strongly advised to continue bladder irrigation after being discharged [5].

1.3. Histopathology, cytodiagnosis, and presence of a tumor marker

The timing of cystoscopy was arbitrary but based on the concept that early diagnosis and early treatment will enable a rapid recovery. Every 1 to 2 years after the operation, cystoscopy was performed to identify bladder stones and to obtain biopsies. If the patient could not undergo cystoscopy, we performed cytology every 6 months to 1 year. In addition, we analyzed the presence of tumor markers, carcinoembryonic antigen (CEA), every 6 months to 1 year after the operation.

1.4. Renal function and scintigraphy

For preoperative and postoperative assessment of renal function, creatinine and blood urea nitrogen levels were examined regularly. Renal scarring was assessed postoperatively with 99mTc-dimercaptosuccinic acid scintigraphy if urinary tract infection occurred.

1.5. VUR and UVJO after augmentation cystoplasty

All patients underwent cystourethrography every 1 to 2 years after augmentation cystoplasty to assess their neobladder size and recurrence of VUR/UVJO.

1.6. Patients' outcomes

From the medical records, we collected information about the patients' employment, marriage status, pregnancy and delivery, and mental condition.

2. Results

Of the 40 patients, 21 were men and 19 were women. Augmentation cystoplasty was performed for neurogenic bladder secondary to myelomeningocele ($n = 35$) or spinal lipoma ($n = 5$). The patients' age at augmentation cystoplasty was from 2.2 to 25.8 years (mean: 11 years); 6 patients were 2 to 5 years old, 17 were 6 to 10 years old, 8 were 11 to 15 years old, 5 were 16 to 20 years old, and 4 were 21 years or older (Fig. 2). At the time of writing, the patients' ages were between 24.0 and 48.7 years (mean 34.4 years). Follow-up time was between 20.4 and 32.3 years (mean 24.3 years), including 27 patients with 20 to 25 years' follow-up, 10 patients with 25 to 30 years' follow-up, and 3 patients with longer than 31 years' follow-up (Fig. 3).

There were 2 deaths unrelated to augmentation cystoplasty; one was owing to severe convulsions 24 years after augmentation cystoplasy, and the other was of unknown causes 22 years after augmentation cystoplasty (Table 1).

The incidence of bladder stones was 30% (12 out of 40 patients). Approximately 67% of cases were diagnosed within 3 years of augmentation cystoplasty (Fig. 4). The patient who developed bladder stones 18 years after augmentation cystoplasty developed a bladder perforation 2 years previously. All patients underwent bladder stone removal by transurethral lithotripsy. No incidences of carcinoma after augmentation cystoplasty were detected on histopathological analysis and cytodiagnosis. Furthermore, no patients showed an increase in CEA levels.

Patient details regarding VUR or UVJO are summarized in Fig. 5. Ureteral reimplantation was performed in 21 patients, of whom 20 had VUR affecting 35 ureters and 1 had bilateral UVJO. Ureteral reimplantation was performed into the native bladder in 17 patients (29 ureters) and into the colonic cap in 4 patients (8 ureters). At the time of review, ureteral reimplantation that had been performed at the same time as augmentation cystoplasty remained successful in 14 of 15 patients (93%; 28 of 29 ureters or 97%) and unsuccessful in 1 (7%; 1 of 29 ureters or 3%) because of persistent VUR. Only 1 patient (2.5%) with persistent VUR developed urinary tract infection after augmentation cystoplasty. This patient required unilateral nephrectomy 18 years after the augmentation cystoplasty because of repeated urinary tract infections, resulting in kidney atrophy and renal dysfunction (Table 1).

Details regarding the patients' outcomes are summarized in Table 2. Thirty of the 40 patients (85%) were employed, and 4 (10%) were married. Two of the 19 female patients (11%) had experienced

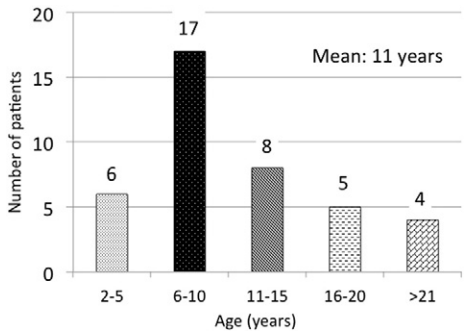

Fig. 2. Patient age at time of augmentation cystoplasty. Patients were grouped into age ranges at the time of augmentation cystoplasty, of 2–5, 6–10, 11–15, 16–20, and >21 years. The largest number of patients was in the 6- to 10-year group. The mean patients' age at augmentation cystoplasty was from 11 years.

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