International Journal of Surgery 46 (2017) 158–163

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original Research

Ureteric-urethral engraftment as a new surgical technique for management of incontinence in bladder exstrophy complex: A retrospective cohort

Abdol-Mohammad Kajbafzadeh*, Shabnam Sabetkish, Nastaran Sabetkish

Pediatric Urology and Regenerative Medicine Research Center, Section of Tissue Engineering and Stem Cells Therapy, Children's Hospital Medical Center, Tehran University of Medical Sciences, Tehran, Iran

HIGHLIGHTS

- A novel surgical technique for achieving urinary continence in bladder exstrophy.
- Ureteric-urethral engraftment technique in bladder exstrophy.
- A practicable, safe, and reproducible option for achieving urinary continence.

ARTICLE INFO

Article history:
Received 28 June 2017
Received in revised form
8 August 2017
Accepted 21 August 2017
Available online 6 September 2017

Keywords:
Bladder exstrophy complex
Urinary incontinence
Pediatrics

ABSTRACT

Objectives: To report the results of a novel surgical technique for achieving urinary continence in patients with bladder exstrophy complex (BEC) by ureteric-urethral engraftment (UUE) technique.

Patients and methods: Sixteen female patients with BEC and a mean ± SD age of 3.48 ± 1.75 years were referred for primary exstrophy repair from 2009 to 2012. From these, 9 patients were operated by single-stage bladder closure (group I); while 7 patients underwent the novel technique of UUE to compare the continence achievement (group II). In UUE technique, distal ureter was applied for total urethral replacement while the lower part of engraft was fixed in external genitalia. No osteotomy was performed in none of the groups. Continence and upper urinary tract evaluation were performed in the follow-ups with 3 months intervals for the first year and biannually thereafter. The patients were followed-up for a mean ± SD duration of 72 ± 6 months.

Results: All patients in both groups experienced an uneventful postoperative period. In group II, 5 patients were continent day and night and voided per urethra without need for augmentation or intermittent catheterization technique (71.42%); while 55.55% of patients in group I achieved total continence (n = 5). Partial continence was achieved in 4 (44.44%) and 2 (28.57%) patients in group I and II, respectively. However, 3 patients in UUE group had postoperative vesicoureteral reflux that was successfully managed by Deflux injection.

Conclusion: The eventual clinical outcomes of BEC children undergoing the UUE technique were promising. This practicable, safe, and reproducible option will add one complementary stage to the previously used reconstruction techniques. These patients would necessitate further surveillance with upper urinary tract evaluations during the adult life.

1. Introduction

The surgical management of bladder exstrophy complex (BEC) has extremely developed in the course of time. Several techniques have been applied to address the challenges of BEC reconstruction. Trendelenburg has first described his technique with initial success and early failure in 1906 [1]. Sufficient bladder capacity and

Abbreviations: Bladder Exstrophy Complex, BEC; Bladder Neck Reconstruction, BNR; ureteric-urethral engraftment, UUE.

* Corresponding author. No. 62, Dr. Qarib's Street, Keshavarz Boulevard Tehran, 1419433151 Iran.
E-mail address: kajbafzd@sina.tums.ac.ir (A.-M. Kajbafzadeh).

http://dx.doi.org/10.1016/j.ijsu.2017.08.581
1743-9191/

eventual development of continence can be obtained by successful initial bladder closure [2]. Successful reconstruction at the first attempt is extremely associated with spontaneous voiding. Relatively, 75% of children with successful primary closure and 30% of children with failed initial repair will gain eventual urinary continence [3]. Another study showed that only 18% of children with failed primary closure were eventually continent and voiding per urethra [4]. So, it is of great importance to apply the best surgical technique in the first attempt in order to obtain satisfactory results in terms of eventual continence.

Urethral replacement with ureter was first described by Mitchell et al. in 1988 in which proximal or total urethral replacement was executed in 7 patients with classical/cloacal bladder exstrophy and 1 patient with imperforated anus and hypoplasia of the bladder neck and urethra [5]. In the study of Feng et al. the double tunnel ureteral pedicle was applied as an option in the urological armamentarium in order to construct a catheterizable stoma (ureteral Mitrofanoff) [6]. In another pilot study, ureteral grafts were applied as tube and patch segments in urethral reconstruction in order to form a continent catheterizable stoma [7]. In spite of promising results achieved in terms of continence grade in our earlier studies [8–14], the hopeful outcomes of ureteric-urethral engraftment (UUE) in previous investigations [6,7,15] encouraged us to evaluate the continence outcomes of this surgical technique in females with BEC with more long-term follow-ups.

The objective of this study is to describe a new surgical technique for obtaining eventual urinary continence at a urology center of excellence with over 20 years of experience in the reconstruction of BEC. Specific focus was placed on comparing the incontinence grade in patients undergoing single-stage bladder closure with female patients in whom UUE technique was applied.

2. Patients and methods

All female patients with BEC referring to our institution between June 2009 and October 2012 for primary exstrophy repair formed the cohort of the present study after obtaining institutional approval and informed consent from the parents. To obtain medical, surgical, and radiologic data, retrospective chart review was applied. Premature patients or children with failed primary reconstruction performed at other institutions were excluded from the study. The mean ± SD follow-up period was 72 ± 6 months (range 52–93 months).

A total of 16 female patients with BEC were referred for further management. Patients were randomly divided in 2 groups. Patients of group I (N = 9, aged 3.15 ± 1.25 years) were operated by single-stage bladder closure without osteotomy. Individuals of group II (N = 7, aged 3.68 ± 1.5 years) underwent the novel technique of UUE to compare the continence achievement. Osteotomy was not performed in this group, neither.

In patients undergoing the UUE technique (group II), distal left ureter accompanied with the vascular pedicle and a part of detrusor muscles was applied as a flap for total urethral replacement. We performed this technique by the application of distal part of the left ureter in all patients as the ureteral orifice was more near to the bladder neck. The ureteral segment was based solely on a vascular pedicle arising from the internal iliac artery. After opening the bladder, distal ureter (approximate length of 2–2.5 cm). We performed this technique by the application of distal part of the left ureter in all patients as the ureteral orifice was more near to the bladder neck. The flap was reimplanted transtrigonally on the lower edge of the trigone, and the lower part of the ureteral segment was fixed in external genitalia. Reimplantation was performed in a submucosal tunnel in urethral plate and the edge of the flap was sutured to the rim of the urethral plate. The proximal portion of the flap was sutured to the edge of trigone by a fish mouth appearance in order to avoid funneling. The end part of proximal portion of the ureteral segment was sutured to the ureteral orifice. Dissected distal ureter was supposed to be reimplanted from the bladder neck down to the external genitalia and not just the distal part of the urethra. The length was adjusted in order to avoid the creation of bladder outlet obstruction. If the segment is too long, the bladder was wrapped around the segment proximally at the level of the bladder neck. A single-stage complete functional reconstruction of the whole length of the urethra, bladder neck, and external genitalia was performed. Figs. 1 and 2 depicts different stages of UUE technique.

The patients were discharged after 35 ± 3 days. No ureteric stent was used in any of the patients. However, urethral catheter was used for drainage of the urine which was approximately used for 10 days. Antibiotics were continued for 2 weeks after surgery and then the patinas were placed on prophylactic antibiotics for 6 months after the surgery.

All the patients were followed up with 3 months intervals for the first year and biannually thereafter for evaluation of continence and upper urinary tract performance. If needed, endoscopic injection of dextranomer/hyaluronic acid (Dx/HA) copolymer (Deflux, Q-Med, Uppsala, Sweden) in periureteral or subtrigonal region was conducted for treatment of vesicoureteral reflux.

As described in our previous study [16], if the patient was dry at night and continent for a minimum of 6 h throughout the day, it was considered as a total continent patient (Grade 0, socially continent). However, occasional nighttime leakage and dryness of at least 3 h during the day was defined as grade I of continence (occasionally wet). Children with dry intervals of lasting less than 3 h during day were considered as grade II of continence (frequently wet). Those patients with urinary bothers that needed further reconstruction were defined as incontinent (Grade III).

The bladder outlet patency was examined before discharge. An ultrasound study was performed to rule out hydronephrosis after removal of urethral catheter. Residual urines were then measured during few days after clamping the suprapubic tube. The suprapubic tube removal was performed if the residual urines were low. Before the removal of the suprapubic tube, a urine culture was sent to ensure the sterility of the bladder urine. Cystoscopy was performed in the case of high residual urines. Urine cultures accompanied with renal and bladder ultrasounds were performed for monthly monitoring.

Statistical Package for Social Sciences (SPSS for Windows 18.0 Chicago, USA) program was used for data analysis. Results were presented as frequency and mean ± standard deviation. Pearson's chi-squared test was used for the analysis of categorical data. A p value < 0.05 was considered to be significant.

3. Results

All operative reconstructive procedures were undertaken by one pediatric urologist in our institution (AMK). All patients underwent bladder closure at a mean ± SD age of 3.48 ± 1.75 years (range 18–65 months) with no significant difference among groups ($p = 0.08$). Reasons for delayed closure included a poor prenatal diagnosis of BEC, coexistent neonatal problems, and low socioeconomic status of some patients.

Complete primary closure was successful in all children of both groups in which the bladder and posterior urethra were safely placed in a closed bony pelvis without any major complication including anastomotic stricture, obstruction, wound dehiscence and chronic renal failure. Even though, an isolated distal segment of ureter was applied in each individual of group II, all segments remained viable with no difficulty in catheterization.