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**CONSTRUCTION OF NEOURETHRA USING FLIPPED ANTERIOR BLADDER WALL
TUBE IN A PREPUBERTAL GIRL WITH COMPLETE DISRUPTION OF URETHRA**

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Abstract

A rare case of urethral construction using flipped anterior bladder wall tube in 8 year-old girl with complete disruption of the urethra and vagina accompanying pelvic fracture was reported. Following a split of the pubic symphysis, the vagina was reconstructed with end-to-end anastomosis. The neourethra was constructed tubularizing and flipping anterior bladder wall flap caudally to proximal site of the original urethra after fascial sling procedure. After catheter removal, this girl has been continent and voided normally. In conclusion, flipped anterior bladder wall tube technique for urethral construction is suitable in prepubertal girls with complete disruption of the urethra.

Introduction

Urethral injuries occur secondary to blunt abdominal trauma with pelvic fracture, although pediatric female urethral disruption is extremely rare¹. The low incidence has resulted that managements of urethral injury accompanying pelvic injury in females, especially complete disruption of the urethra in prepubertal girls, remain controversial. Herein, we report our experience of neourethra construction via symphysiotomy using flipped anterior bladder wall tube in a prepubertal girl with complete urethral and vaginal disruption.

Case Report

8-year-old girl was stuck between a car and a wall and suffered from pelvic and right femoral fractures with an urethrovaginal injury. After initial managements in a different hospital, she was referred to our hospital 6 months later with cystostomy to reconstruct the urethra and vagina. Cystography and cystourethroscopy were performed under anesthesia, which revealed the completely obliterated urethra between 1.5cm proximal site from the meatus and bladder neck (Fig.1-A). Vaginoscopy also showed the completely obliterated vagina.

At surgical reconstruction through longitudinal abdominal approach, the bladder and vagina were exposed extraperitoneally with separation of symphysis pubis to confirm previous findings². Muscular tissue of the urethral sphincter was not identified. Following

excision of fibrous tissue carefully, the vagina was reconstructed with end-to-end anastomosis. Fascial sling was harvested from the superior leaf of rectus fascia, measuring 8cm in length and 1.5cm in width to perform sling procedure with tension free (Fig.2-A). A 4cm-long and 2cm-wide segment of the bladder was isolated in anterior wall, and bladder flap was tabularized (Fig.2-B) and then flipped caudally to proximal site of the original urethra (Fig.2-C). Mitrofanoff appendicovesicostomy was also created as safety valve of postoperative difficulty in voiding. A 12-Fre Foley catheter and 10-Fre catheter through appendicovesicostomy were left before routine bladder closure (Fig. 2-D). After bladder closure, the symphysis was reapproximated with nonabsorbable tape through obturator foramen.

Since removal of catheters at 3 weeks postoperatively, this girl has been continent and voided normally without intermittent catheterization for 8 months, which was objectively confirmed by postoperative voiding cystourethrography (Fig.1-B) and uroflowmetry (Fig.3). Further, she subjectively does not have lower urinary tract symptoms such as urgency, stress urinary incontinence and voiding difficulty.

Comments

Managements of complete urethral disruption accompanying pelvic injury in prepubertal girls remain controversial, because they are extremely rare¹ and case reports regarding procedures are very small. The low incidence of urethral injury in prepubertal girls is believed to be due to the short length of the urethra, protected

location under the pubic symphysis and greater mobility. In this case that the bladder neck and proximal urethra were completely obstructed and the urethral sphincter was destroyed, urethral reconstruction, which could achieve normal voiding and continence, was considered as ideal procedure compared with urinary diversion. In addition, urethrovaginal fistula must be avoided because of concomitant vaginal reconstruction. As a consequence, we successfully performed reconstruction of the urethra and vagina without complications in one stage.

Ahmed reported a procedure of neourethra construction using flipped anterior bladder wall tube for girls with complete loss of the urethra³. This procedure is suitable for female urethral injury and allows placement of bladder tube in normal anatomic position and advantages of urethrovaginal fistula because of the dorsal suture line⁴, compared with Tanagho's procedure with ventral suture line⁵. Actually, uroflowmetry showed continuous flow pattern without post-void residual urine (Fig. 3) and this patient does not have lower urinary tract symptoms. Thus, our case has been successfully managed with normal voiding after surgery without complications such as urethrovaginal fistula.

Fascial sling was performed in this case to improve urinary continence based on postoperative urethral pressure profile⁴ and concomitant bladder neck suspension in previous reports⁶, although bladder tube could have satisfactory function as the sphincter⁷. Since urinary incontinence is not observed in this case, fascial sling seems to work well. Further, our case fortunately could void immediately after removal of catheters, although appendicovesicostomy was also created concomitantly. We still believe that appendicovesicostomy would be better to be created for girls in case of difficulty in voiding or possible urethral stricture with long-term follow-up.

To access the urethra and vagina in prepubertal girls, vaginal approach in urethral reconstruction is difficult because of small vaginal caliber. Further, although formal pelvic resection such as partial and complete pubectomy have provided satisfactory access for a narrow and deep pelvis in children, there is a reasonable complication rate of hernia and abnormal gate caused by a ventral gap in bony pelvis continuity⁸⁻¹⁰. In the present case, symphysiotomy, splitting the pubic symphysis, was performed to access the bladder neck, urethra and vagina. Symphysiotomy provided satisfactory approach to the deep pelvic organs (Fig. 2), and then this patient has not had complications such as excessive perioperative bleeding, osteitis pubis, bladder herniation, gait disturbance, pelvic instability or pelvic and sacroiliac pain. Previous reports also showed that symphysiotomy was safe and effective procedure for repairing the urethra and vagina². Thus, this procedure can be performed to approach the urethra and vagina without severe complications in the pediatric population.

In conclusion, flipped anterior bladder wall tube technique for construction of the female urethra via symphysiotomy is suitable in prepubertal girls with the closed bladder neck and proximal urethra.

Legends

Fig. 1 Pre-operative cystography and Post-operative voiding cystourethrography

A: Cystography via cystostomy showed complete obliteration of the urethra on the bladder neck. Loss of the urethra was approximately 3cm-long.

B: Voiding cystourethrography showed the satisfactory neourethra (arrows).

Fig. 2 Operative photographs

A: Fascial sling on the vaginal wall

B: Neourethra constructed by the tabularized anterior bladder wall

C: Neourethra flipped caudally to the proximal site of the original urethra

D: Mitrofanoff appendicovesicostomy and closure of the bladder

Fig. 3 Post-operative uroflowmetry

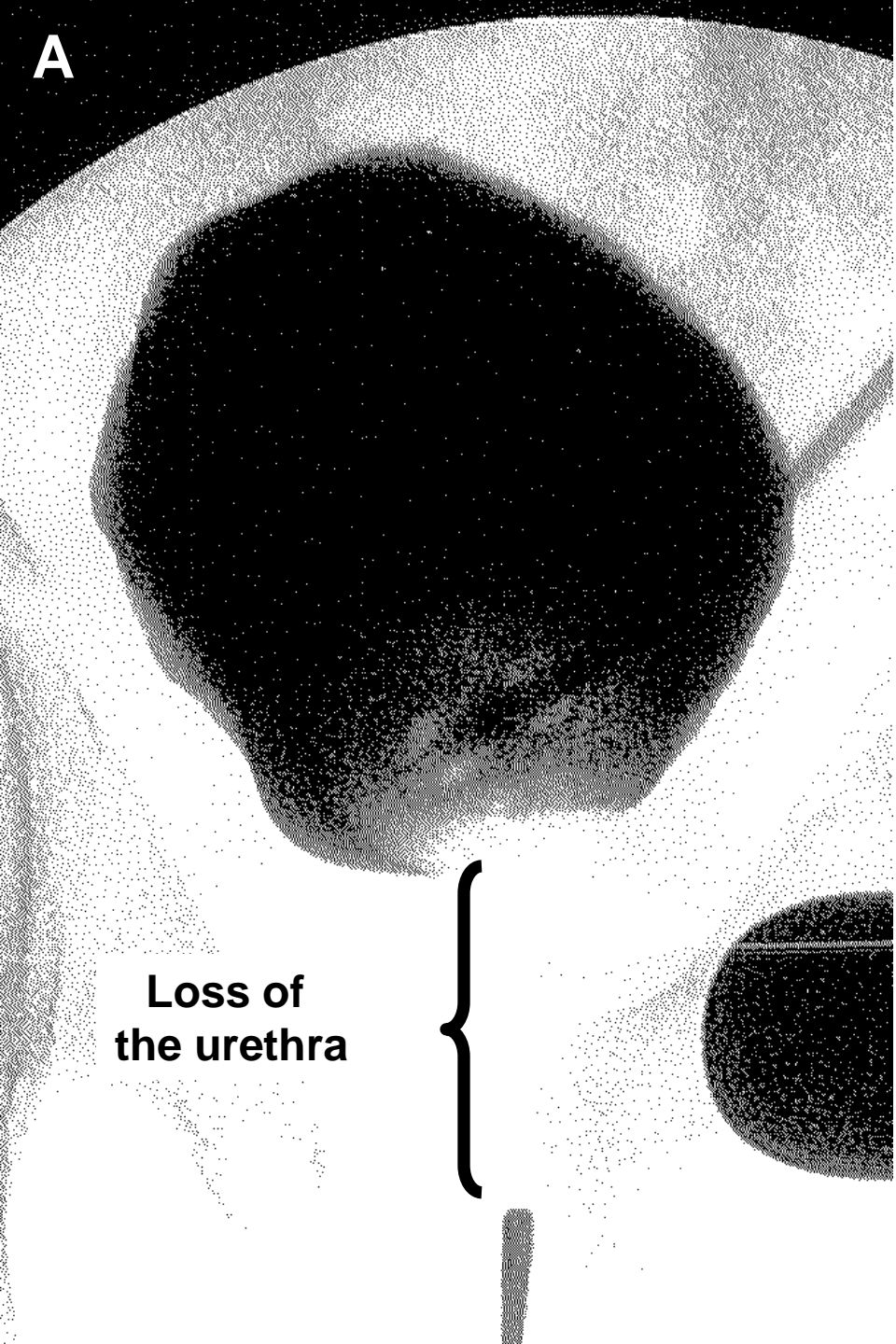
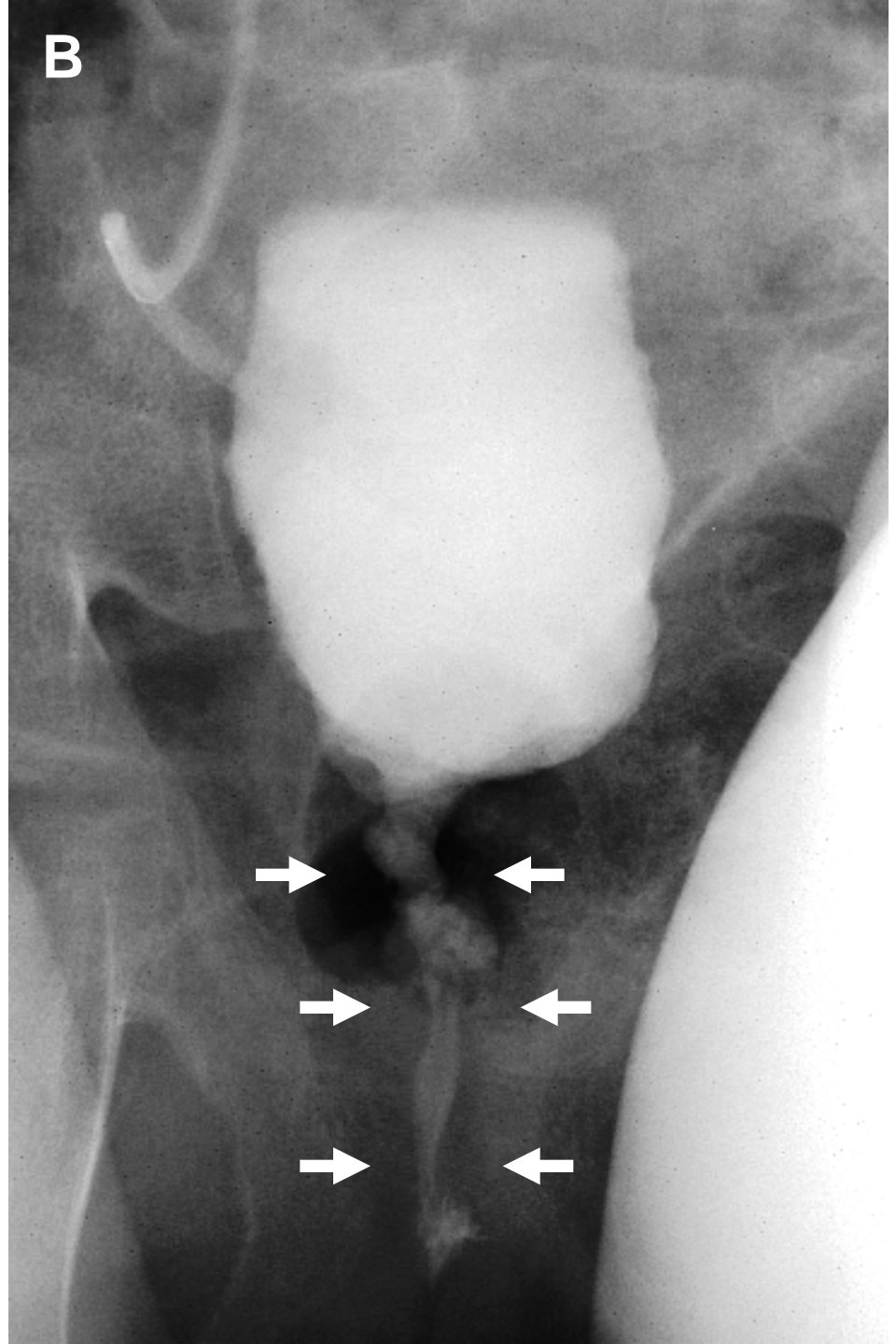
Uroflowmetry showed a satisfactory voiding function without post-void residual urine.

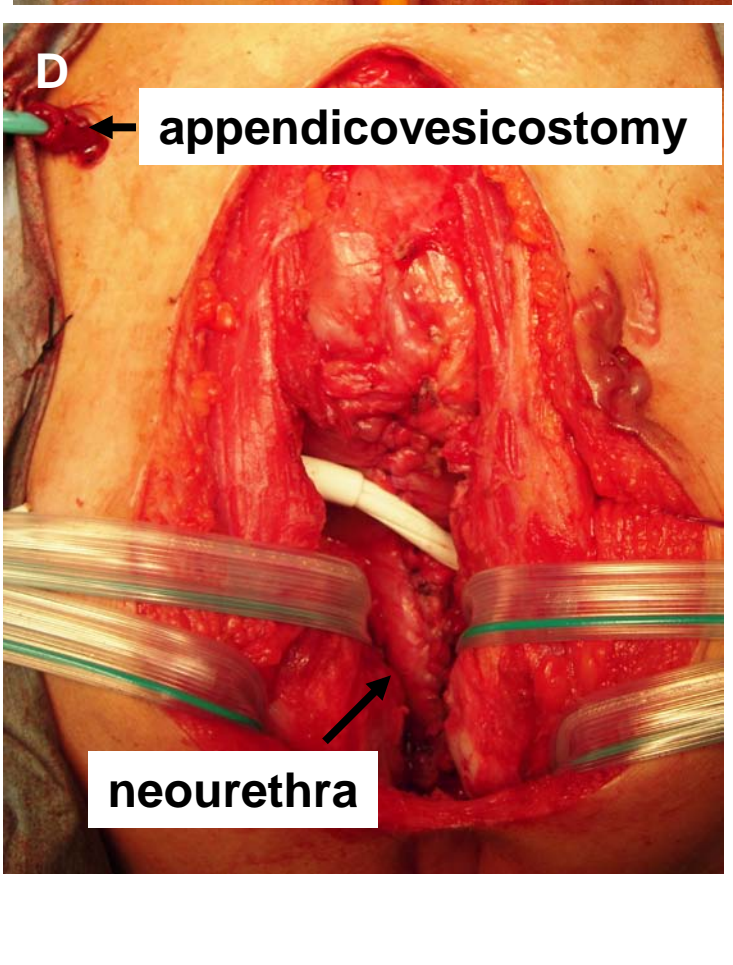
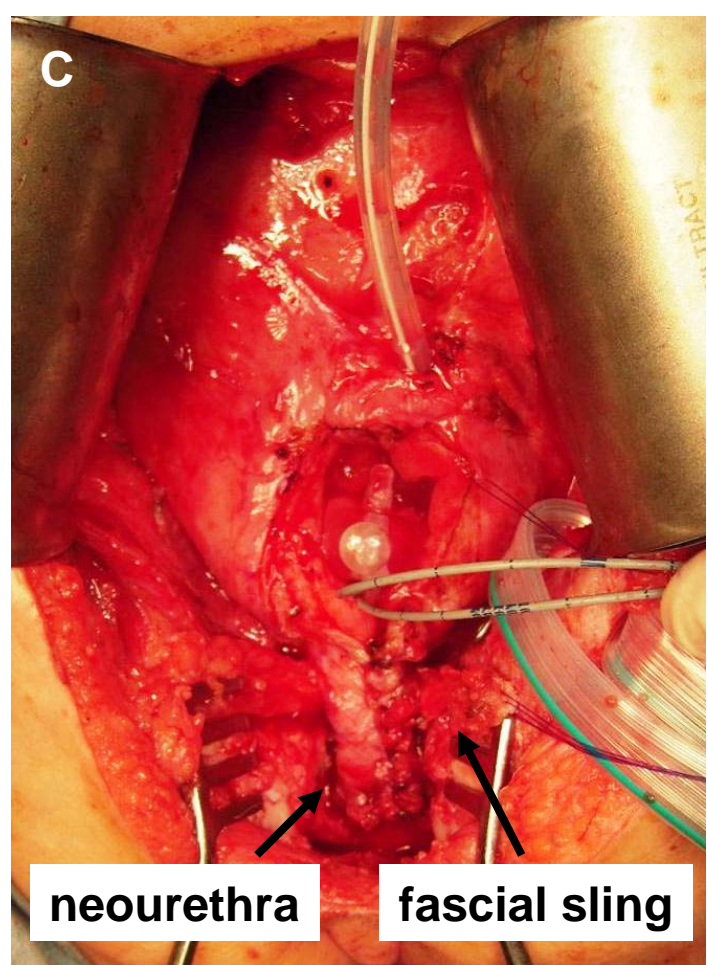
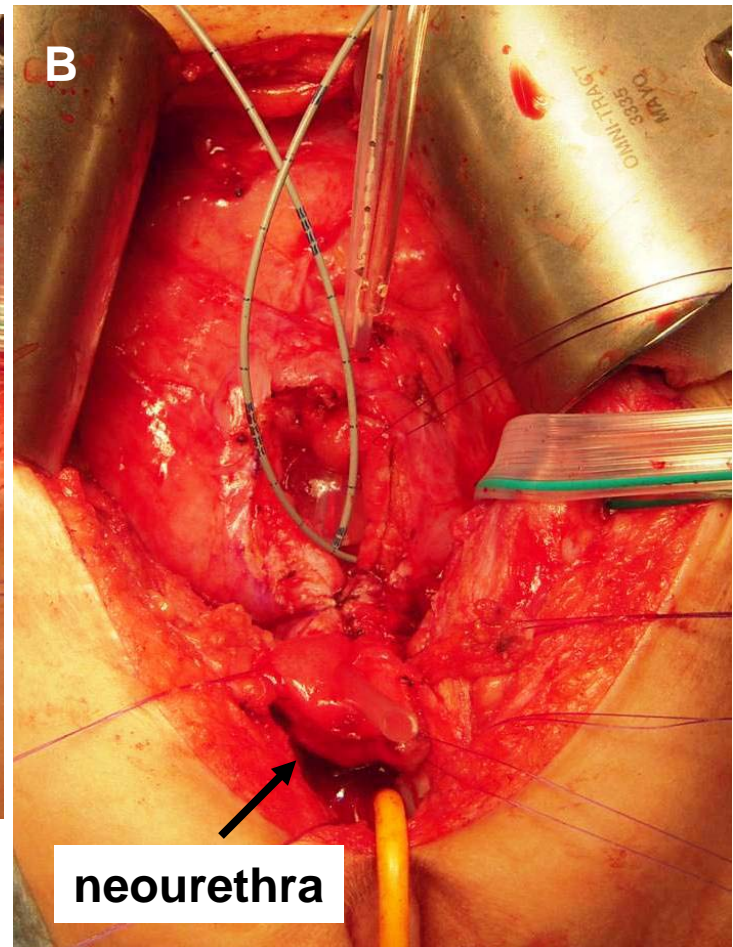
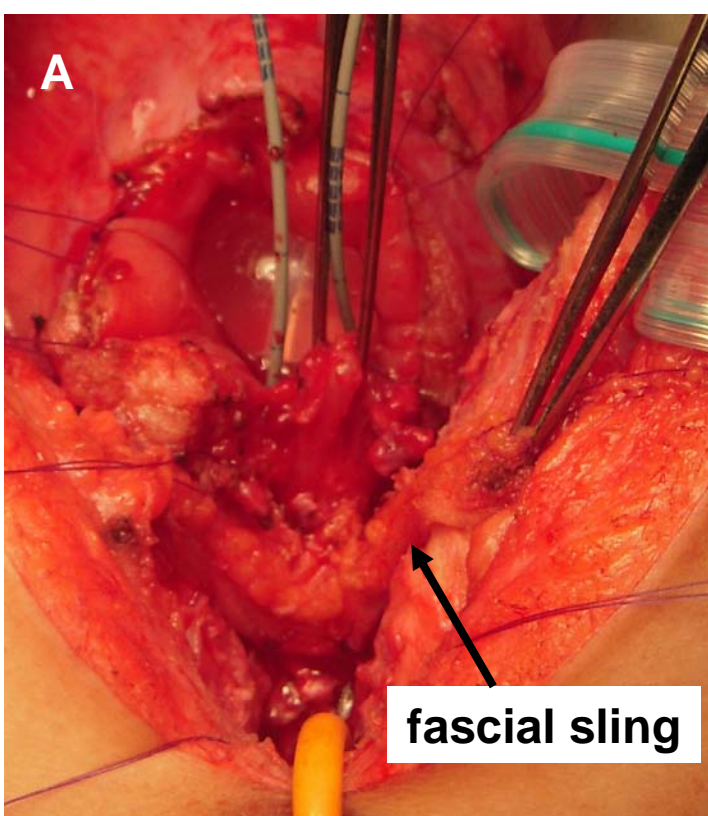
v.v.: voided volume, Qmax: maximal urine flow rate, Qave: average urine flow rate,

PVR: post-void residual urine volume

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A**B**



V.V. **78 ml**
Qmax **9.1 ml/sec**
Qave **5.2 ml/sec**
P-VR **0 ml**

