

ORIGINAL ARTICLE

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Can the modified Heitz-Boyer-Hovelacque rectal bladder technique be used as a rescue method in patients with bladder exstrophy?

Halil Tosun¹, Ibrahim Untan², Hasan Deliaga³¹Erciyes University, Faculty of Medicine, Department of Urology, Kayseri, Türkiye²Ahi Evran University, Training and Research Hospital, Department of Urology, Kirsehir, Türkiye³University of Health Sciences, Bursa City Hospital, Department of Pediatric Urology, Bursa, Türkiye

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Abstract

Bladder exstrophy is a rare and severe congenital anomaly of an open bladder and urethral sphincter deficiency. Some of these children continue to live with urinary incontinence despite reconstructive surgery performed in specialized centers. This study aimed to present the results of the modified Heitz-Boyer-Hovelacque rectal bladder technique in patients with previous unsuccessful reoperation. Our study included two female and one male foreign patient who had previously undergone unsuccessful surgery. These patients had scarred, low capacity, contracted, and collapsed open bladders. All surgical procedures, including those requiring clean intermittent catheterization as a salvage operation, were explained to the patients and their families. The modified Heitz-Boyer-Hovelacque rectal bladder technique, which is thought to provide the highest level of continence in a single operation, was applied to patients at the request of their families. No complications were observed in our patients in the early postoperative period. At the end of the 2-year follow-up, patients with normal blood electrolyte values underwent proctoscopic biopsy protocol and no neoplastic or metaplastic changes were found. The modified Heitz-Boyer-Hovelacque rectal bladder technique is considered a convenient and straightforward one-stage surgical technique for patients with bladder exstrophy who have previously undergone unsuccessful surgery abroad. Considering the minimal mixing of urine and feces in the rectum, the risk of rectal neoplasia seems to be much lower than with ureterosigmoidostomy. However, they should be followed up with proctoscopy-biopsy in the long term.

Keywords: Bladder exstrophy, continent reservoir, cystectomy, urinary incontinence, continent urinary diversion

Introduction

Bladder exstrophy is a rare, complex anomaly of the urinary system, with an incidence of 1 in 30,000-40,000 [1]. In classical bladder exstrophy, abnormalities are associated with the abdominal wall, pelvic bones, genital organs, and bladder [2]. Due to these anatomical defects, the primary treatment method is surgical correction. Multi-stage and single-stage methods have been proposed in bladder exstrophy repair over the years [3,4]. Despite advancing surgical techniques and established centers, it has been observed that urinary incontinence persists in many children [5]. Also, it is often impossible to create a natural bladder that can be used as a reservoir, especially after

unsuccessful surgical interventions. Urinary diversions that will provide continence should be planned for these patients. Lumbosacral nerves, posterior pelvic wall, and anal sphincter are often normal in children with bladder exstrophy, and the anus is located just behind the urogenital diaphragm and in the anterior [6]. The intact anal sphincter suggested that the rectum could be used to create a reservoir bladder.

In our study, the modified Heitz-Boyer-Hovelacque rectal bladder technique, performed in three cases referred to our clinic with an open and scarred bladder following unsuccessful repeated repairs, was presented. The results were discussed in light of the existing literature.

CITATION

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Corresponding Author: Ibrahim Untan, Ahi Evran University, Training and Research Hospital, Department of Urology, Kirsehir, Türkiye
Email: ibrahimuntan@erciyes.edu.tr

Material and Methods

This study was approved by the Erciyes University Faculty of Medicine Clinical Research Ethics Committee on 05/02/2025 (Decision No: 2025/56). Three patients (2 females and one male) presented to our clinic with an open and scarred bladder after repeated unsuccessful bladder exstrophy surgeries were included in our study. They had no other anomalies except bladder exstrophy; their upper urinary systems were standard, and they had competent intact anal sphincters. The bladders of all patients were low-compliant, low-capacity, cicatrized, and dehiscent from the abdominal wall. For these reasons, it has been concluded that they did not have a functional bladder that could be closed. An anorectal manometer and anorectal muscle EMG checked anal sphincter function. Anal sphincter resting and contraction pressures were measured and then compared with normal values (anal sphincter resting pressure of 50-86mm Hg, maximum contraction pressure of 150-390mm Hg) [7].

The patients and their families were informed regarding all surgical methods. Orthotopic bladder methods that require clean intermittent catheterization were explained. Upon the family's request, rectal neobladder reconstruction was decided in which continence could be achieved at the highest level in a single operation, and the patients were less likely to use diapers. Detailed informed consent forms were read, and approvals were obtained. In the preference of families, the fact that the surgical method used, which required the least repetitive interventions and, at the same time, had the highest rate of continence since the families came from abroad and had multiple unsuccessful surgeries, was significant. Postoperative serum biochemistry values of the patients were examined, and early and late-term continence levels were evaluated after the surgery. Additionally, they were evaluated for potential complications.

Operative Technique

Colonic bowel cleansing was administered to the patients one day prior to surgery, and a combination of metronidazole and broad-spectrum antibiotics was used as prophylaxis. The patients were placed in the supine position under general anesthesia, and a midline sub-umbilical incision was made. The scarred, low-capacity open bladder was excised and removed. The sigmoid colon was mobilized, and the rectum was slung with sutures into the abdomen. The sigmoid colon was incised above the rectum per the Hartman procedure and then passed through the back of the rectum. The anal canal was anastomosed end-to-side into the posterior rectal wall above the dentate line and internal sphincter. Thus, a new rectal pouch was created. Two ureters separated from the bladder were catheterized with the help of a 6F feeding tube. A subserosal tunnel was created through the posterolateral wall of the rectal pouch and anastomosed 10-15 cm above the anal margin (Figure 1). Anti-reflux mechanisms were not constructed during the rectal pouch anastomosis of the ureters. The proximal rectum was closed and repaired in two layers, and a hemovac drain was placed in the abdomen. The caudal block was performed with one µg/kg ropivacaine-clonidine for postoperative anesthesia.

The patient started oral feeding on the fourth postoperative day. Bilateral ureteric catheters were removed on the 14th day, and patients were discharged on the 18th to 20th day after surgery.

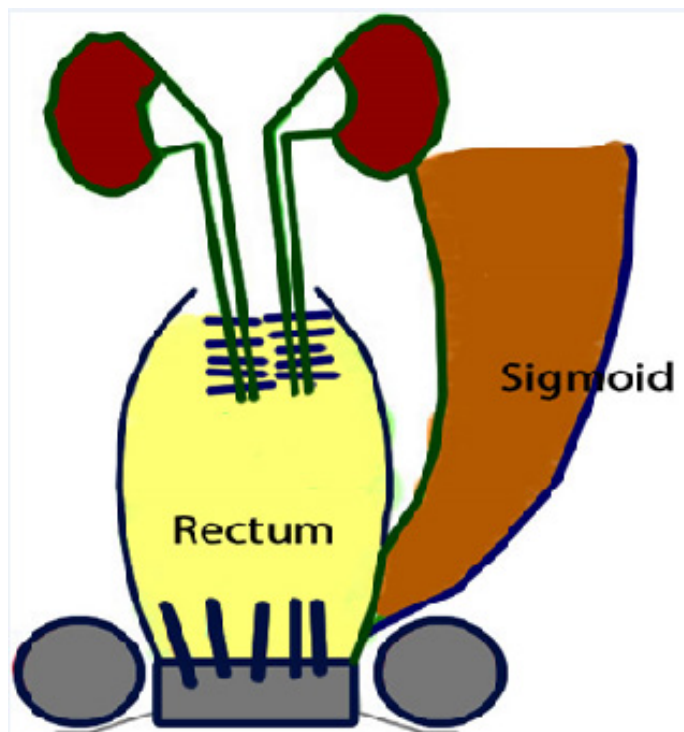


Figure 1. Ureteral implantation in the rectal pouch created by the modified Heitz-Boyer-Hovelacque technique

Results

Our study included one 8-year-old male patient and two female patients aged 8 and 10 years who were operated on using the modified Heitz-Boyer-Hovelacque technique. The mean operation time was recorded as 4.5 ± 0.4 hours. There was no need for blood transfusion in the patients, as their hemoglobin levels and hematocrit values remained within the normal range during the postoperative period. Urinary tract infection was not observed in any patient. Blood serum analyses (Blood urea nitrogen, creatinine, creatinine clearance, serum electrolytes, and acid/base balance) were within normal limits (Table 1). Intensive toilet training was initiated in the postoperative first month to support the pelvic floor. Daytime urinary incontinence was not observed in any of the three patients 4-6 weeks after starting training. Patients performed rectal bladder discharge between 3 and 5 hours, but nocturnal urinary incontinence was seen in the 8-year-old boy. Urination journals were recorded for three patients, and min-max values ranged from 200 to 400 mL were noted. The mean storage volume was observed as 260ml (240-300) in proctography performed with a contrast agent. Proctoscopy and biopsy were performed on the patients at the end of 1 year, and their pathology results were normal histologically. The rectal pouch is illustrated in Figure 2, and the new sigmoid colon anastomosis images obtained during the 1-year follow-up, which were made to the rectum, are shown in Figure 3.

Table 1. Biochemical data of 3 patients followed for 18 months represented by median (min-max)

Biochemical Datum	Normal values n=3	3 months n=3	6 months n=3	12months n=3	18months n=3
pH	7.38-7.48	7.37 (7.35-7.4)	7.4 (7.4-7.41)	7.39 (7.38-7.42)	7.41 (7.4-7.43)
PCO ₂ mm Hg	35-45	37 (36-38)	40 (38-41)	39 (37-42)	41 (39-42)
PO ₂ mm Hg	>80	95 (96-98)	94 (92-97)	94 (92-96)	93 (92-95)
Bicarbonate mmol/L	22-29	24 (23-27)	24 (23-26)	25 (24-27)	24 (22-25)
Sodium mmol/L	135-145	138 (136-139)	135 (135-136)	136 (135-138)	138 (137-139)
Calcium mg/dl	8.5-10.3	9.4 (8.7-10.2)	8.7 (8.5-9.5)	8.9 (8.8-9)	8.7 (8.6-8.9)
Chloride mmol/L	98-106	100 (99-101)	102 (99-103)	100 (99-101)	100 (99-101)
Potassium mmol/L	3.5-5.5	3.8 (3.8-3.8)	3.8 (3.6-4.1)	3.9 (3.9-4)	3.8 (3.7-4)
Creatinine μmol/L	60-125	70 (67-74)	70 (66-72)	70 (65-74)	69 (66-75)
Creatinine clearance mL/min	97-137	110 (99-113)	105 (100-113)	100 (99-103)	100 (98-105)
BUN mmol/L	1.8-7.1	3-5 (4)	3.5 (3-4)	5 (5-5)	4 (3-5)

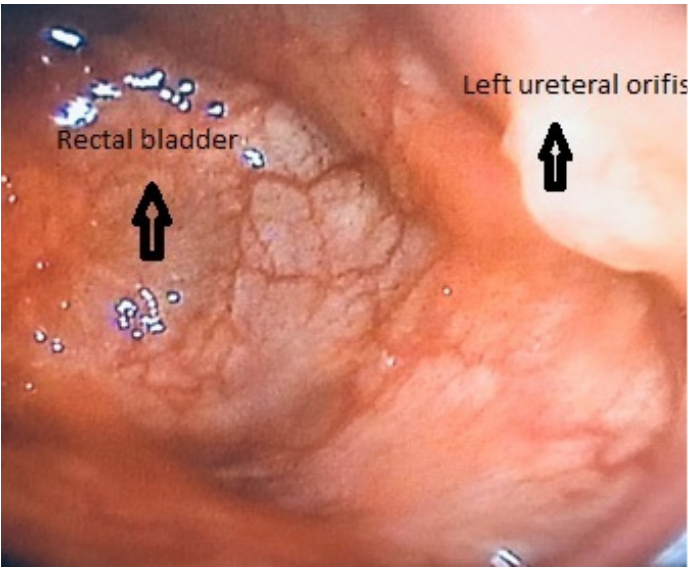


Figure 2. Proctographic image showing the rectal neobladder pouch one year postoperatively



Figure 3. Endoscopic image of the sigmoid-rectal anastomosis and ureteral orifices at one-year follow-up

Discussion

The purpose of the treatment of bladder exstrophy is to perform a safe abdominal wall closure to protect kidney function and ensure urinary continence [8]. Surgical reconstruction can be performed with one-stage or multi-stage procedures. The one-stage technique, as applied by Grady and Mitchell, yields satisfactory results in the short term, while multi-stage techniques demonstrate urine continence rates of up to 88% [9]. Nonetheless, due to the small bladder capacity in around 10-30% of the patient group, incontinence can be seen even if multi-stage techniques are applied [10]. Also, in some developing countries where early surgical reconstruction is not routinely performed, as in our patients, the incidence of surgery failure is high for children with bladder exstrophy. Different urinary diversion techniques are required after unsuccessful or repeated surgeries. Surgical background, healthcare delivery, and financial and socio-cultural norms in the countries where the patients come from generally limit management techniques. The requirement for self-cleaning intermittent catheterization, which comes with a permanent abdominal stoma, is considered unacceptable in this patient group [11]. Considering that all children had a normally functioning anal sphincter, the technique suitable for these patients was decided together with the patient's parents, and the modified Heitz-Boyer-Hovelacque rectal bladder technique was deemed appropriate [12]. In this technique, we believe that the risk of neoplastic changes, which are thought to be caused by a fecal-urine mixture, is minimized since urine and feces are combined in the rectum in small amounts for a short period. Ureterosigmoidostomy is not preferred due to the risk of rectal adenocarcinoma, which has been reported in 6-29% of cases in long-term follow-up studies in the literature [13,14].

According to the literature, the current experience with the modified Heitz-Boyer-Hovelacque rectal bladder technique suggests that it is a simple surgical procedure that can be performed without injury or weakening of the anal sphincter, with a low complication rate, as observed in our study [15]. Messina et al. applied the rectal bladder technique to 14 patients

with unsuccessful bladder exstrophy surgery in most Middle Eastern countries and performed a long-term follow-up [16].

In our study, all children became dry and odorless within 4-6 weeks; however, nocturnal urinary incontinence continued in the male patient. Patients who did not experience urinary incontinence for 3 hours or more during the day were considered continent, as per the literature [17]. The fact that all three patients did not need to use diapers allowed them to adapt to social life faster. During our follow-up period (1-2 years), no electrolyte malabsorption, acidosis, urinary tract infection, or renal parenchymal damage was observed in any of our patients. Ureteral reflux was not observed due to the sufficient capacity of the rectal reservoir and its low pressure. After a one-year follow-up, a proctoscopy was performed to examine the rectal bladder, obtain random biopsies, and evaluate the ureteral orifices and sigmoid-rectum anastomosis. No metaplastic or neoplastic changes were observed in the biopsy results. Our follow-up period may not be sufficient to predict histopathological changes; therefore, proctoscopy should be performed duly and without delay during the follow-up period.

The limitations of our study are the small number of patients and the short follow-up period. Long-term follow-up is needed to determine whether the rectal reservoir has sufficient capacity in the long term. The modified Heitz-Boyer-Hovelacque rectal bladder technique can be considered a rescue option in patients who previously underwent unsuccessful surgeries. Consistent with our study, Angotti and colleagues applied the Heitz-Boyer-Hovelacque technique and followed the patients for more than 10 years, finding no metaplasia or neoplasia in rectal biopsy samples [18].

Conclusion

Our three patients' common feature was that they had previously undergone unsuccessful bladder exstrophy surgeries and were referred to our clinic from developing countries. The modified Heitz-Boyer-Hovelacque rectal bladder technique was chosen by the families' request, following one-on-one discussions with the parents and the patient, and after providing information about all methods, including continent reservoirs. The fact that patients could quickly eliminate the need for diapers, did not require clean intermittent catheterization, and had relatively fewer metabolic risks was a key factor in choosing this technique. While daytime urinary incontinence improved rapidly, nocturnal incontinence persisted in the male patient. The technique queries three basic points. First, care should be taken regarding the development of adenocarcinoma in the rectal bladder, followed by the proctoscopy biopsy protocol. Later, it should be kept in mind that nocturnal incontinence may persist in some patients, as observed in our male patients. Thirdly, a longer follow-up period of several years is required in order to determine the capacity of the rectal bladder reservoir.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

This study was approved by the Erciyes University Faculty of Medicine Clinical Research Ethics Committee on 05/02/2025 (Decision No: 2025/56).

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