Pediatrics

Detailed presurgical evaluation of a case of congenital bladder diverticulum

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Laparoscopic diverticulectomy
Histology
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Introduction

Congenital bladder diverticulum is rare and is usually observed in male children. An 8-year-old Japanese boy was referred to a hospital with fever and gross hematuria and was treated with a course of antibiotics. Because the dilatation of the ureter was suspected by abdominal ultrasonographic examination, he was referred to our hospital. We diagnosed congenital bladder diverticulum by computed tomographic scan and carried out laparoscopic bladder diverticulectomy and extravesical ureteral reimplantation. Four years later, there was no recurrence of gross hematuria or urinary tract infection.

Case presentation

An 8-year-old Japanese boy was referred to a hospital with fever and gross hematuria and was treated with a course of antibiotics. As he had urinary tract infection, he underwent abdominal ultrasonographic examination, which revealed a possible dilatation of his right ureter. He was referred to our hospital for careful examination of the suspected dilatation of the ureter.

The patient was afebrile, with normal vital signs. His urine specimen was normal. Abdominal ultrasonography revealed a low echoic area behind the bladder but no hydronephrosis. As we could not determine what was behind the bladder, we used computed tomography (CT), which revealed a diverticulum that opened just beside the orifice of the right ureter (Fig. 1a-c). Uroflowmetry revealed double voiding (maximum flow rate, 16.4 mL/s; voided volume, 154.8 mL). Voiding cystourethrogram (VCUG) revealed a right posterior diverticulum (Fig. 1d-g). During the examination, the contrast medium that was injected into the bladder flowed to the diverticulum (Fig. 1d), which increased in size during voiding (Fig. 1e and f), and then flowed back to the bladder after voiding (Fig. 1g). There was no evidence of vesical ureteral reflex or urethral obstruction.

We carried out laparoscopic bladder diverticulectomy and extravesical ureteral reimplantation. The camera port (5 mm) was placed in a midline supraumbilical position. The 3-mm working port was placed pararectally on the right side, and the 5-mm working port was placed pararectally on the left side, about one fingerbreadth caudal to the camera port. Before laparoscopy, cystoscopy was carried out to position the open-ended ureteral catheters to facilitate dissection (Fig. 2a and b), and we injected indigo carmine solution into the wall of the diverticulum (Fig. 2c) to confirm its location when we observed from the pararectal position. The serosa of the diverticulum and ureter were discrete, except for a common septum where the diverticulum and ureteral walls joined (Fig. 2d). A detrusor trough was created by incising the muscularis of the bladder with cautery scissors. After exposing the bladder mucosa, ureteral hiatus, and diverticulum, we completely dissected the diverticulum and closed the defect with 5–0 absorbable sutures. The muscularis of the bladder was then closed over the ureter with 4–0 absorbable sutures in an interrupted pattern.
No drain was placed. Hematoxylin–eosin stain and Masson trichrome stain demonstrated near-total attenuation of the muscularis propria at the distal end of the diverticulum (Fig. 3). Because attenuation of the muscularis propria is one of the causes of congenital bladder diverticulum, we confirmed that we could completely resect the congenital bladder diverticulum based on the pathological findings. Four years later, there was no recurrence of gross hematuria or urinary tract infection.

Discussion

Complete excision of the congenital bladder diverticulum has been suggested as the treatment of choice in all symptomatic cases, but watchful waiting has been suggested for asymptomatic cases due to the possibility of recurrence.1

In the present case, we were able to confirm the urinary dynamics during voiding with the VCUG findings. Because the residual urine was thought to be the cause of the urinary tract infection despite the absence of vesicoureteral reflux, we performed bladder diverticulectomy. Several reports have described the successful extravesical and intravesical management of bladder diverticula.2 If associated with the ureter, reimplantation is often required. If the ureteral orifice is separate from the diverticulum (C and D1 positions3), laparoscopic bladder diverticulectomy is possible. However, if the ureteral orifice is located in D2 and D3 positions, laparoscopic bladder diverticulectomy might be impossible.4 Recently, robot-assisted bladder diverticulectomy has been described in children.5 However, robot-assisted bladder diverticulectomy of children and adults is not covered by the Japanese National Health Insurance system, which is run by the Health, Labor and Welfare Ministry of Japan; thus, operative treatment for congenital bladder diverticulum is generally performed by open surgery in Japan.

During the operation, we devised to identify the wall of the diverticulum when we observed from the abdominal cavity by laparoscopy by injecting indigo carmine solution into the wall of the diverticulum. Because the right ureteral orifice opens at the neck of the diverticulum (D1 position) and we were concerned that vesicoureteral reflux would occur after surgery, we performed ureteral reimplantation.

Conclusion

We confirmed the urinary dynamics during voiding based on the VCUG findings before operation. We safely carried out laparoscopic bladder diverticulectomy using indigo carmine solution to identify the wall of the diverticulum.

Declaration of interest

None.

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References

1. Bhat A, Bothra R, Bhat MP, Chaudhary GR, Saran RK, Saxena G. Congenital bladder diverticulum presenting as bladder outlet obstruction in infants and children. J Pediatr Urol. 2012;8:348–353.

2. Pieretti RV, Pieretti-Vanmarrcke RV. Congenital bladder diverticula in children. J Pediatr Surg. 1999;34:468–473.

3. Wickramasinghe SF, Stephens FD. Paraureteral diverticula. Associated renal morphology and embryogenesis. Investig Urol. 1977;14:381–385.

4. Aydogdu O, Burgu B, Soygar T. Predictors of surgical outcome in children with vesicoureteral reflux associated with paraureteral diverticula. Urology. 2010;76:209–214.

5. Christman MS, Casale P. Robot-assisted bladder diverticulectomy in the pediatric population. J Endoure. 2012;26:1296–1300.