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Case Report

Intraperitoneal Rupture of Urinary Bladder during Micturating Cystourethrography in a Child

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Abstract

Micturating cystourethrography (MCUG) is a very commonly performed diagnostic procedure in pediatric urology. Although considered to be simple, safe, and cost-effective, it can incur some complications. Bladder rupture during MCUG is a very rare complication and only a handful of cases have been reported in world literature. We report the case of a 2.5-month-old boy who had intraperitoneal bladder rupture during an MCUG needing surgical repair. At operation, the child had a bladder tear at the dome of the bladder which was repaired successfully. The postoperative recovery was uneventful and the child is doing well in follow-up. Although individual management of bladder rupture may differ, a majority of infants need surgery for the same. Thorough vigil and attention to the technique are a must to prevent such incidents in children.

Keywords: *Intraperitoneal bladder rupture, micturating cystourethrography, child*

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Introduction

Micturating cystourethrography (MCUG) is a relatively simple and very commonly performed diagnostic procedure in pediatric urology for the evaluation of congenital renal problems in children. Although safe, rare complications are known to occur which may lead to morbid clinical situations.[1]

Case Report

A 2.5-month-old boy was referred to us with a history of febrile urinary tract infection (UTI). Ultrasound scan done as a part of the workup showed fullness in both the renal pelvicalyceal systems. An MCUG was suggested for the child after control of UTI. The MCUG was performed by an experienced radiologist under fluoroscopy at a radiology center. A 6 F Foley catheter was placed urethrally and the bulb was inflated with 1.5 ml saline. 40 ml mixture of normal saline and contrast was instilled in the bladder using a 50 ml syringe. The image after 30 ml of contrast showed a well-distended bladder of a normal contour [Figure 1]. However, on instilling the next 10 ml of the contrast, intraperitoneal spillage was observed [Figure 2]. The procedure was abandoned and the child was brought back to our center.

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On examination, the child had tachycardia (Pulse Rate (PR) – 190/min) and tachypnea (Respiratory Rate (RR) – 40/min) with mild abdominal distention which was nontender. The urethral catheter was *in situ*. The child was stabilized with intravenous (IV) fluids, analgesics, and IV antibiotics were commenced. We observed that the urethral catheter was draining urine normally following which a nonoperative management approach was planned. Over the course of the next 24 h, the child developed abdominal distention. Ultrasound scan showed 250 ml of free fluid in the peritoneal cavity. The urethral catheter had also drained 110 ml of urine for 24 h. In view of good urinary drainage from the urethral catheter, a 20 G cannula was placed in the right iliac fossa and 230 ml of urine was drained from the peritoneal cavity. In the following 24 h, the urethral catheter drained 150 ml of urine. Follow-up ultrasound showed recollection of peritoneal fluid and another of 240 ml of urine was drained from the peritoneum.

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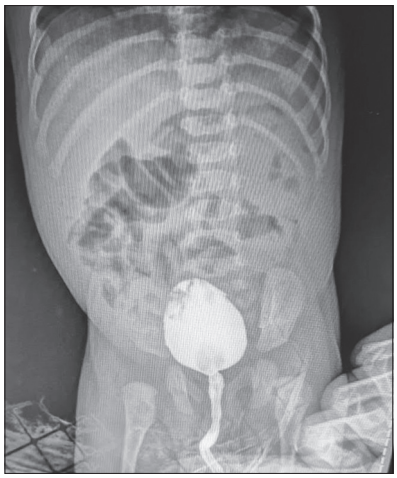

Figure 1: Photograph showing the bladder at instillation of 30 ml of contrast during MCUG. MCUG: Micturating cystourethrography

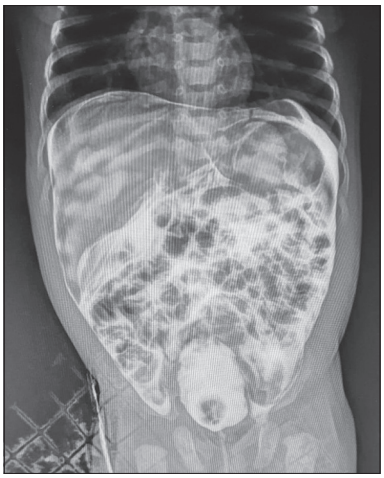

Figure 2: Image showing peritoneal spillage of the contrast during MCUG. MCUG: Micturating cystourethrography

Following 48 h of expectant treatment and two trials of peritoneal aspirations urine reaccumulated in the peritoneal cavity. Further to this, an open exploration was planned. A vertical midline infra umbilical incision was placed. The bladder exposed and the peritoneum opened. There was a 3 cm long full-thickness tear at the dome of the bladder with urinary ascites. The bladder was repaired in two layers with 5–0 polyglactin sutures leaving the Foley's catheter in the bladder. An intraperitoneal Penrose drain was placed. The child had an uneventful postoperative recovery. The Penrose drain was removed on the 5th postoperative day and the urethral catheter was removed on the 10th postoperative day. The child is voiding spontaneously. Follow-up ultrasound scans were done 2 and 6 weeks following discharge. They showed no intraperitoneal collection and no signs of renal or ureteric dilatation.

Discussion

MCUG is a commonly performed procedure for the evaluation of children with antenatally diagnosed hydroureteronephrosis, UTIs, suspected bladder outlet obstruction, etc. Commonly reported complications of MCUG include UTI, allergic reactions to the contrast, dysuria, hematuria, knotting of urethral catheter, etc.[2-8] Bladder rupture during MCUG is a rare complication and commonly seen in children with chronically unused bladders, previous surgeries, or underlying disease.[9] This may sometimes lead to life-threatening complications. Severe neurological toxicity following reflux of contrast material through ventriculoperitoneal shunt after intraperitoneal bladder rupture during MCUG has been reported.[10]

Careful attention should be given to multiple factors before performing a safe MCUG. Disease condition of the patient, estimation of bladder volume, size of urethral catheter, and speed and pressure of contrast instillation should all be taken into account. An experienced radiologist performing the procedure under fluoroscopic guidance is mandatory.

Two formulas have been proposed for the estimation of bladder volume in children according to their age. For children <1 year, bladder volume (ml) =38 + (2.5 × age in months). For children more than 1 year, bladder volume (ml) = (age in year + 1) × 30.[11,12] However, as suggested by Martinez-Garcia *et al*., the bladder is not like a rigid vase with a specific and constant capacity.[13] The presence of a catheter in the bladder or any stressful stimuli may lead to decreased capacity as compared to a relaxed bladder.[14]

The size and type of the urethral catheter are also important. The use of infant feeding tubes is recommended for MCUG in neonates and infants. The use of a Foley catheter is risky because the balloon may prevent urinary leakage through the urethra in the event of disproportionate volume or pressure during contrast instillation causing bladder rupture.[15]

Manual injection of contrast should be avoided to prevent a rapid increase in the pressure. Instead, the gravity method by placing the contrast container no higher than 60 cm from the patient is preferable. The bladder dome is the weakest part of the bladder and can easily rupture when the excess volume is injected rapidly or forcefully.[8]

The management of bladder rupture following MCUG is individualized. Keihani and Kajbafzadeh reviewed the reported cases of bladder rupture following MCUG in children without chronic underlying diseases.[16] All the eight cases of intraperitoneal bladder rupture required

surgical intervention. Two cases with extraperitoneal tear and perivesical extravasation were managed with nonoperative treatment. In our case, the main causes of the bladder rupture could be attributed to the use of a Foley catheter and manual injection of the contrast media with a high pressure. In our case, the urethral catheter drained a good amount of urine and hence despite the intraperitoneal collection, we opted for expectant treatment with peritoneal aspiration. Parental anxiety and hesitancy for the child to undergo an operative procedure were also another reason for expectant treatment over 48 h. However, when the urine was recollected after two trials of peritoneal aspiration, the decision for an open exploration and bladder repair was taken.

Conclusion

Although MCUG is generally safe, serious and rare complications may occur during or after the procedure. The clinician should always be thorough and vigilant about the technique and should have a keen eye for potential complications.

Consent for publication

The authors have obtained the necessary approval for the publication of the data from the hospital. The parents of the child have given written consent to operate on the child and to share the photograph for academic purposes in the journal.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the legal guardian has given his consent for the patient's images and other clinical information to be reported in the journal. The guardian understands that the patient's name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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