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Case Report

Appendicular Perforation with Incidental Meckel's Diverticulum Coexisting with Urological Anomalies. Highlighting the Importance of Staged Approach when Multiple Anomalies Co-Exist

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Abstract

Meckel's diverticulum (MD) is most commonly encountered as an incidental finding during exploration for acute abdomen due to appendicitis. Incidental Meckel's diverticulectomy in such a condition is controversial and there are specific criteria to do diverticulectomy in the same sitting and should be avoided if there is significant peritonitis. MD is also known to be increasing seen in association other gastro-intestinal conditions and rarely with other system anomalies. A 4-year-old child underwent laparoscopy for acute appendicitis had incidentally detected Meckel's diverticulum. There was a mesodiverticular band (from MD), which was attached to adjacent ileum, with a potential risk for internal herniation. The band was divided using hook diathermy and since there was significant peritonitis, the MD was not resected. This child also was noted to have a large bladder diverticulum filling the pelvis (which was not known preoperatively). On further evaluation with ultrasound and micturiting cystourethrogram, posterior urethral valves with a large bladder diverticulum arising form posterior bladder wall was confirmed. The child was electively planned for a MD scan during follow up to look for ectopic gastric mucosa and was also planned for cystoscopy with division of PUV. The child was lost to follow up and represented acutely with lower GI bleed. As the child was previously known to have a MD, the potential source of bleed was presumed to be MD and the need for Meckel's scan was not required. During this index admission, the child underwent cystoscopy with PUV fulguration and laparoscopic Meckel's diverticulectomy under same anaesthesia. The child was placed on anticholinergic medication and the bladder diverticulum persisted during subsequent ultrasound scans. As the bladder diverticulum would be potentially acting as a pressure pop off, an urodynamic study done after child had attained toilet training confirmed a quiescent bladder. Considering that the diverticulum was no longer acting as a pressure pop off, but was a source of urinary infection, an elective cysto-laparoscopic excision was performed. The child has been doing well, is toilet trained with no urinary infections.

When encountered with multiple co-incident anomalies, prioritizing the surgical approach and staging management is highlighted in this report.

Keywords: *Appendicular Perforation; Meckel's Diverticulum; Urological Anomalies; Multiple Anomalies*

Introduction

Peritonitis secondary to perforated appendix is a common surgical emergency and is dealt with laparoscopic or open procedure. Incidentally detected Meckel's diverticulum (MD) is known and there are few criteria to surgically intervene on Meckel's diverticulum in the same sitting. A child who underwent laparoscopy for appendicular perforation was also incidentally found to have a Meckel's diverticulum and bladder diverticulum, which were not resected, following appendicectomy. This child underwent multiple procedures later and the concept of staging surgical procedures in children with multiple anomalies is discussed in this report.

Case Report

A 4-year-old child presented acutely with peritonitis secondary to perforated appendix and underwent emergency laparoscopy following resuscitation. Laparoscopic appendicectomy and peritoneal lavage was successfully performed. Incidentally there was a long wide based MD with a mesodiverticular band attached to the adjacent ileum and the base of MD looked normal. Since the band posed a potential for obstruction/ internal herniation, the band was divided and the diverticulum was left behind. In addition, there was a large cystic structure on posterior bladder wall, likely a bladder diverticulum. No further exploration was done and child was catheterized before shifting to ward. Postoperative recovery was uneventful and child was discharged after 5 days on oral antibiotics. The follow up plan included Micturiting Cystourethrogram (MCU) after 2 weeks and a Meckel's scan after 6 weeks. MCU showed features of PUV with a large diverticulum from post bladder wall and no Vesicoureteral reflux (VUR) (Figure 1 and 2). The parents were counseled regarding their child's need for cystoscopy, but they were lost to follow up. Eight months later, child presented to emergency department with features of lower gastrointestinal bleed. The child had 2 episodes of melena and was hemodynamically stable. The child was electively taken up for cystoscopy and posterior urethral valves were fulgurated (Figure 3) and bladder was catheterized. A laparoscopy assisted Meckel's diverticulectomy (Figure 4) also was performed under the same anaesthesia. The child recovered well and was discharged on oral antibiotics and anticholinergics. He was clinically followed up, along with ultrasound examination and urine analysis. The child was continent, voiding well and had no UTIs. The diverticulum persisted on subsequent scans. Nine months after PUV fulguration considering the diverticulum was no longer acting as pressure pop off (Child was continent and toilet trained), a decision was made to resect the diverticulum. An elective Cystoscopy showed no residual valves, the bladder was smooth and a cystoscopic assisted laparoscopic bladder diverticulectomy was performed. The diverticulum had a narrow mouth opening on the posterior bladder wall (likely to be a true diverticulum). With cystoscope in the diverticulum, 2 loops of vicryl were placed over the neck of diverticulum and was resected (Figure 5). The child recovered well and the catheter was removed on day 7; he was voiding comfortably. Ultrasound done 1 month later showed normal bladder with no diverticulum and no upper tract dilatation; He was continued on regular anticholinergics and antibiotic uroprophylaxis was stopped. An urodynamic study (UDS) (Figure 6) performed after 1 year showed good capacity, stable bladder, with no detrusor overactivity; Anticholinergics were discontinued. All the laparoscopic procedures were performed through the same port sites (Figure 7) and child is well with no further urological or gastrointestinal illness and is on yearly clinical follow up.

Discussion

A 4 year old child with peritonitis due to perforated appendix on laparoscopy was incidentally found to have a Meckel's diverticulum with a mesodiverticular band. After appendectomy and lavage, the attachment of band to mesentry was released as it could potentially lead to future internal hernia. The surprising finding of associated bladder diverticulum prompted us to review his urinary symptoms retrospectively. The child was apparently well, with normal antenatal scans and did not have any urinary symptoms. A micturiting cystourethrogram showed presence of a large bladder diverticulum and suspicious PUV, which required urgent treatment. The child was advised cystoscopy and a Meckel's scan; but was unfortunately lost to follow up. He presented again after 1 year with features suggestive of lower GI Bleed. Since the presence of MD was already known, he was electively posted for cystoscopy and also laparoscopic Meckel's diverticulectomy (Without the need for a Meckel's scan).

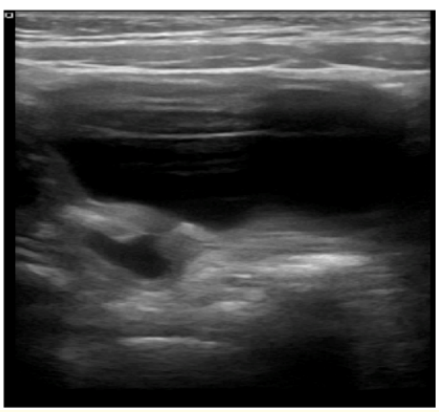

Figure 1: *USG showing thickened bladder with thick walled diverticulum.*

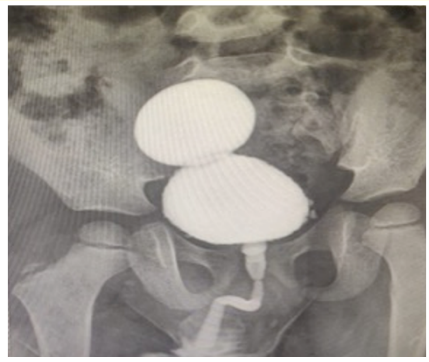

Figure 2: *MCU-PUV with a large diverticulum from post bladder wall and no vesicoureteral reflux.*

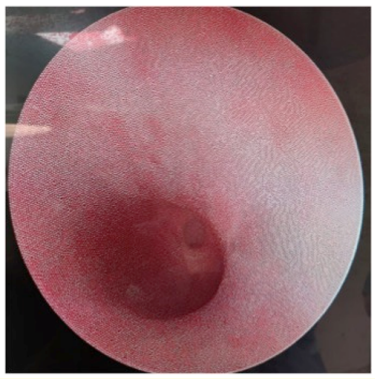

Figure 3: *Cystoscopy showing-Posterior urethral valves.*

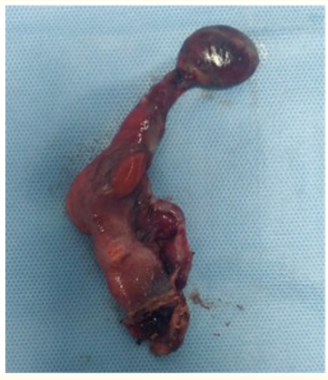

Figure 4: *Resected Meckel's diverticulum.*

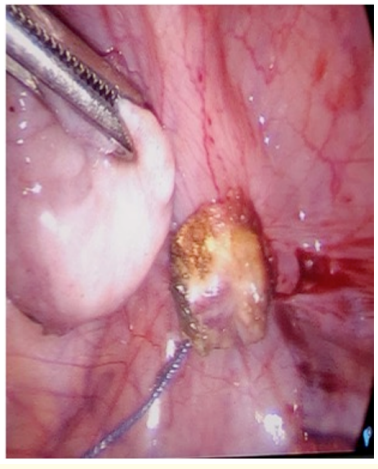

Figure 5: *Laparoscopic bladder diverticulectomy.*

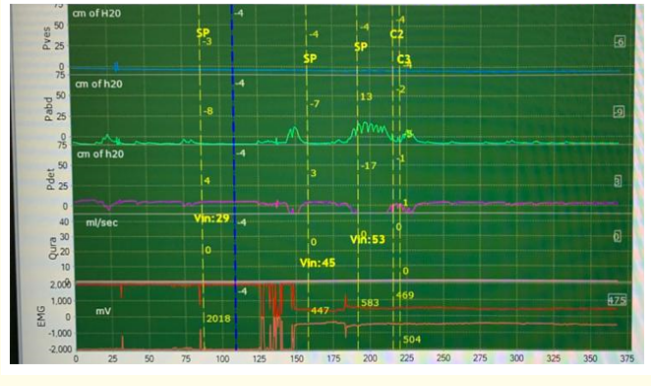

Figure 6: *Urodynamic study showed stable filling, good capacity bladder with no significant detrusor overactivity.*

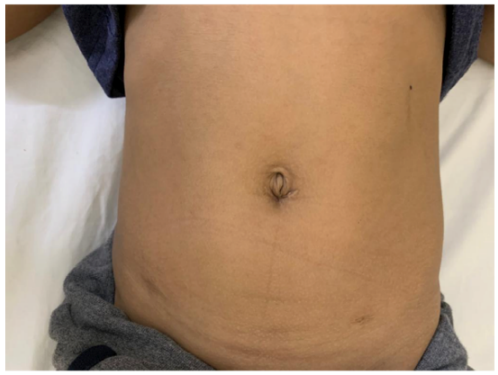

Figure 7: *Appearance of scars after completing all the 3 laparoscopic procedures.*

Meckel's diverticulum affects 2% of general population (1 - 4%) and symptomatic ones usually manifest by 4 years of age. Complications due to symptomatic Meckel's are more common in children less than 2 years of age, presenting with bleeding (8 - 63%, mechanical obstruction (14 - 40%), diverticulitis (30 - 50%), perforation etc. and the occurrence of tumors within MD are extremely rare. MD is an abnormality occurring due to incomplete obliteration of Vitello-Intestinal duct. MD is not a heritable defect, but is known to be increasingly associated with several GIT anomalies (intestinal obstruction, omphalocele, gastroschisis, malrotation etc.) [1]. The most common surgical condition, which draws attention towards Meckel's diverticulum, is surgery for suspected appendicitis. The lifetime risk for symptomatic Meckel's is around 4.2% to 9.0% and the role of prophylactic diverticulectomy in incidental MD is controversial. It is better avoided in an established case of complicated appendicitis/peritonitis [2] as was done in our case (The band was released as it had potential to incite obstruction). There are some characteristics, (arguable) for prophylactic Meckel's diverticulectomy - male sex, younger than 50 years, greater diverticular length than 2 cm, and the presence of ectopic tissue [1].

There are very few reports of concurrent occurrence of MD with other system anomalies. Urinary tract anomalies with MD are known to co-exist [2]; An isolated case report of bladder exstrophy with MD has been reported [3]. A co-existing congenital bladder diverticulum or PUV has not been reported in literature so far and their co-occurrence cannot be explained embryologically.

Bladder diverticulum in PUV is usually peri or paraureteric in location (Which account for over 90% of bladder diverticulae) and occurs at weak spots where the detrusor is penetrated by ureter and larger ones act as potential pressure pop-off outlets. In our patient, the diverticulum was arising from midline posterior bladder wall well away from ureteric orifices and hence it is a true/congenital bladder diverticulum (accounts for less than 10% of bladder diverticulae) [4]. The bladder diverticulum was supposedly acting as a pop off mechanism for PUV and was removed during follow-up after confirming stable bladder dynamics on UDS. It needed removal to prevent urinary tract infection and to improve voiding [4].

This case is unique in many ways. The child with complicated appendicitis had an incidental Meckel's diverticulum with a band needing division during initial exploration. A bladder diverticulum was also found and when evaluated with MCU was found to have a PUV. The child was lost to follow up and re-presented with Meckel's diverticular bleed, which necessitated excision (concurrently with PUV fulguration). Once the child was toilet trained and the bladder was quiescent (confirmed on UDS), the diverticulum was removed by combined cysto-laparoscopic technique. All the 3 laparoscopic procedures were performed through the same 3 ports and the end result was cosmetically pleasing (Figure 7) and the functional gastrointestinal and urological outcome was excellent.

Conclusion

An interesting case of two other unrelated, but significant concomitant pathology found during initial exploration for peritonitis is presented. It is often prudent not to go ahead with additional surgical intervention, if the additional (incidental) pathology doesn't interfere with recovery from the primary (presenting) problem. Potential of infection, consenting issues and consequent medico legal implications are to be kept in mind. Division of diverticular band was essential initially as it had the potential to cause intestinal obstruction. Bladder diverticulum may have been acting as a pressure pop off mechanism in cases of PUV and was resected later (to prevent long term complications) once the bladder dynamics were near normal.

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