CASE REPORT

Meckel's diverticular perforation presenting as acute abdomen in the second trimester of pregnancy

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SUMMARY

Meckel's diverticular perforation is a rare cause of acute abdomen during pregnancy. We report the case of a 24-year-old woman at 24 weeks of gestation who presented with abdominal pain for 4 days accompanied with abdominal distension, tenderness and guarding in right lower quadrant. Ultrasonography was inconclusive. The patient underwent exploratory laparotomy with the clinical suspicion of appendicular perforation peritonitis. Intraoperatively, a perforated Meckel's diverticulum was detected. Owing to gross contamination of the peritoneal cavity, a diverticulectomy with ileostomy was performed. She had a normal full-term vaginal delivery, and ileostomy was reversed 1 month after delivery. The physiological and anatomical changes in pregnancy can make a straightforward clinical diagnosis difficult. A high index of suspicion is required to prevent delay in diagnosis and surgical intervention, which could prove detrimental to the mother and fetus.

BACKGROUND

The incidence of acute abdomen in pregnancy is rare, 1 in 500–635 patients.¹ Out of all non-obstetric causes of acute abdomen during pregnancy which concern a general surgeon, appendicitis is the most common (0.05–0.13%), followed by bowel obstruction, volvulus, intussusception (1:1500–1:3000) and biliary disease and pancreatitis (1:5000).² A high index of suspicion is required to avoid delay in diagnosis and definitive surgical treatment, which could prove detrimental to the mother and fetus. We report an extremely rare case of Meckel's diverticular perforation presenting as acute abdomen during pregnancy. Only seven cases have been described in the English medical literature so far.

CASE PRESENTATION

A 24-year-old, primigravid, nulliparous woman presented at 24 weeks of gestation with chief symptom of abdominal pain for the past 4 days. Pain was insidious in onset, sharp in character, initially localised to the right lower quadrant but progressively increased to involve whole abdomen. It was associated with nausea and vomiting. Patient had not passed flatus and motion for past 2 days. Medical, social and family history was not significant.

On physical examination, the patient was febrile (99.6 F) with a pulse rate of 104/min, a blood pressure of 110/76 mm Hg and a respiratory rate of 24/min. On palpation, abdomen was tender and distended. There was voluntary guarding in right lower quadrant. Bowel sounds were absent. Gravid

uterus was palpable consistent with 24 weeks of gestation. Rectal examination was unremarkable.

INVESTIGATIONS

Routine haematological investigations and biochemical investigations were consistent with values for the second trimester of pregnancy, except for a total leucocyte count of $3.9 \times 10^3/\text{mm}^3$ (reference value $5.6\text{--}14.8 \times 10^3/\text{mm}^3$) with neutrophilia (75%).

Ultrasonography revealed free fluid in abdomen with multiple septa. There was single live and healthy intrauterine pregnancy with BPD (Bi parietal diameter) and FL (femur length) consistent with 24 weeks of pregnancy.

X-ray and CT scan was not performed out of concern for radiation exposure.

DIFFERENTIAL DIAGNOSIS

The patient's presentation was consistent with presentation of non-obstetric acute abdomen. The first clinical suspicion was appendicular perforation peritonitis as it is the most common cause of acute abdomen in pregnancy. The second differential based on clinical history and examination was a small bowel perforation.

TREATMENT

The patient underwent exploratory laparotomy with ~1.5 L of seropurulent fluid evacuated. On examination of the bowel, a Meckel's diverticulum 2–3 cm in length was present 70 cm from the ileocaecal junction on the antimesenteric border with a perforation at the tip (figure 1). The appendix was healthy. Owing to gross contamination of the peritoneal cavity, a Meckel's diverticulectomy with ileostomy was performed. Thorough abdominal lavage with normal saline was performed, and an intraabdominal drain was placed in the pouch of Douglas. The ileostomy was positioned in the right upper quadrant to allow space for the pregnancy to continue.

OUTCOME AND FOLLOW-UP

The ileostomy became functional on postoperative day 3. The patient was allowed clear liquids on the same day and a soft diet the next day. Postoperative ultrasonography established the good health of the fetus. The abdominal drain was removed on postoperative day 6, and the patient was discharged the next day. Subsequently, she had an uneventful normal vaginal full-term delivery. The ileostomy was reversed 1 month after the delivery. The histopathological examination of the biopsy specimen

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Figure 1 Intraoperative photograph showing a Meckel's diverticulum at the antimesenteric border of the ileum with a perforation at the tip (white arrow). Note the gravid uterus (U).

revealed a Meckel's diverticulum with inflammatory changes and no ectopic mucosa.

DISCUSSION

The normal physiological and anatomical changes during pregnancy complicate the evaluation of acute abdomen during pregnancy. Normal symptoms of pregnancy like nausea, vomiting, abdominal and pelvic discomfort overlap with symptomatology of non-obstetric causes of acute abdomen. Examination findings are altered as the gravid uterus displaces the other intra-abdominal organs, and signs of peritonitis may be absent due to lifting and stretching of the anterior abdominal wall. Leucocytosis, anaemia due to haemodilution and tachycardia are normal findings during pregnancy.³

Ultrasonography is the first-line imaging investigation for acute abdomen in pregnancy, though it is operator dependent and has limited field of view in pregnancy due to gravid uterus.⁴ In cases where ultrasonography is inconclusive, MRI without gadolinium contrast is preferred over CT because of lack of radiation exposure.^{5 6 3} Any delay in operating a pregnant patient with acute abdomen jeopardises the maternal and fetal outcomes.⁴

Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract affecting ~2% (range 0.14–4.5%) of the population.⁷ It is a true diverticulum on the antimesenteric side caused due to persistence of the proximal part of the congenital vitellointestinal duct which usually obliterates during 5–7th weeks of pregnancy. It has been classically described in textbooks by the 'Rule of 2s': it is present in 2% of the population, 2 cm wide, 2 inches long, with 2 feet of the ileocaecal junction and twice as common in men than women.⁸

It presents in the paediatric age group and usually asymptomatic in adults.⁸ The incidence is equal in men and women, though the complications are more frequent in men. The lifetime complication rate is ~4%.⁹ The most common complications are obstruction, 36.5%; intussusception, which usually presents as obstruction, 13.7%; inflammation or diverticulitis, 12.7%; haemorrhage, 11.8%; neoplasm, 3.2%; and fistula, 1.7%. The most common complication in adults is obstruction,

whereas haemorrhage is the most common complication in children.⁹ Bleeding in Meckel's diverticulum is most commonly due to heterotopic mucosa which is usually gastric mucosa in 60% of the cases and less commonly duodenal, colonic, pancreatic, Brunner's glands, hepatobiliary tissue or endometrial mucosa which is usually found near the tip.^{8 10}

They are either diagnosed incidentally during small bowel contrast study, laparoscopy or laparotomy for unrelated conditions or when complications arise in Meckel's diverticulum.¹⁰ Bleeding Meckel's diverticulum can be detected by Technetium-99m pertechnetate scan, which detects ectopic gastric mucosa.⁹

Meckel's diverticulum perforations are an extremely rare cause of acute abdomen in pregnancy with only seven cases reported so far.^{2 11–16} A perforated Meckel's diverticulum may mimic acute appendicitis and present as an acute abdomen as both can cause right iliac fossa pain, but these clinical findings are confounded by the physiological and anatomical effects of pregnancy.¹⁷

Definitive treatment of symptomatic Meckel's diverticulum is surgical resection. It can be either diverticulectomy or segmental bowel resection and anastomosis in case of palpable ectopic tissue at the diverticular base, intestinal ischaemia or perforation at the diverticular base.⁸ In case of excessive contamination of the peritoneal cavity, diverticulectomy or segmental resection with ileostomy may be a better option.^{10 17} In a retrospective analysis of 1476 patients with Meckel's diverticulum treated at the Mayo clinic from 1950 to 2002, it was determined that male sex, patients younger than 50 years of age, diverticulum length >2 cm and ectopic or abnormal features within a diverticulum were significantly more likely to be symptomatic. Therefore, it was recommended that patients with any of these features should undergo diverticulectomy in case of incidentally found asymptomatic Meckel's diverticulum.¹⁷

Laparoscopy has been shown to have a diagnostic as well as a therapeutic role in symptomatic Meckel's diverticulum. Laparoscopic tangential resection using an endostapling device or intracorporeal suturing and intracorporeal/extracorporeal segmental resection have been described in the literature.^{18 19} Laparoscopic Meckel's diverticulectomy has been tried in

Learning points

- ▶ Meckel's diverticular perforation is an extremely rare cause of acute abdomen during pregnancy. It has a variable clinical presentation, and preoperative diagnosis is very difficult. The normal anatomical and physiological changes during pregnancy can alter the classical clinical presentation of acute abdomen.
- ▶ A high index of suspicion and a low threshold for surgical intervention are required to prevent inordinate delay, which could harm the mother and fetus.
- ▶ Management of Meckel's diverticulum during pregnancy is same as non-pregnant patients. Surgical procedures are diverticulectomy or segmental resection and anastomosis depending on the condition of the base and presence of palpable ectopic tissue. In case of a septic abdomen, ileostomy is a good alternative.
- ▶ Though laparoscopic surgery has been tried as a diagnostic and therapeutic modality in non-pregnant patients, it has been shown to have higher miscarriage rate.

pregnancy with good results in a single case.² Though laparoscopy has been shown to be safe in pregnancy, two recent meta-analyses have shown higher miscarriage rate and comparable preterm birth rate.²⁰ Therefore, prospective patients undergoing the procedure during pregnancy should be adequately counselled about the risks.

In conclusion, Meckel's diverticulum is a rare cause of acute abdomen during surgery. A high index of suspicion and a low threshold for surgical intervention are required to prevent harm to the mother and fetus due to inordinate delay in diagnostic workup.

Contributors ZA participated in acquisition of data, analysis and interpretation of data, drafting the article, critical revision of the article and final approval of the version to be published. SC was responsible for critical revision of the article, analysis and interpretation of data, conception and design and final approval of the version to be published. JK was involved in acquisition of data, analysis and interpretation of data, critical revision of the article and final approval of the version to be published. RKJ participated in critical revision of the article, analysis and interpretation of data and final approval of the version to be published. All of the authors agree to be accountable for the article and to ensure that all questions regarding the accuracy or integrity of the article are investigated and resolved.

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