Gastrointestinal Tract

CASE REPORT

Perforation of Meckel's diverticulum complicated with suspected acute appendicitis successfully treated by laparoscopic surgery

Nguyen Cao Viet*, Tran Duc Trong, Bui Danh Anh, Nguyen Thanh Hung, Le Anh Minh, Bui Dinh Binh

Department of General Surgery, Vinh City General Hospital, Vinh City 460000, Viet Nam

ABSTRACT

Some diseases have clinical symptoms similar to acute appendicitis, making preoperative diagnosis difficult, including Meckel's diverticulum. We report a case with a preoperative diagnosis of suspected acute appendicitis, but a perforated Meckel diverticulum caused by a bamboo toothpick was discovered intraoperatively. A male patient, 32 years old, was admitted to the hospital for right iliac fossa pain 1 day before admission. Preoperative diagnosis of suspected acute appendicitis, emergency surgery indicated. During surgery, the appendix has no inflammation. Examining the entire abdomen, the ileum was found 50 cm from the ileocecal valve with a Meckel's diverticulum perforated by a bamboo toothpick. The patient was successfully treated with laparoscopic surgery. Perforation of Meckel's diverticulum is a rare complication. Preoperative diagnosing complications of Meckel's diverticulum is challenging, especially in children. Most imaging investigations are unrecognizable, requiring laparoscopic exploration. Laparoscopic surgery is the preferred method of treatment. Taking a history of ingesting foreign bodies or having a habit of using toothpicks helps identify risk factors. During surgery, it is necessary to carefully examine the abdominal organs, especially when damage to the appendix is disproportionate to clinical symptoms.

Key words: Meckel's diverticulum, acute appendicitis, perforation, bamboo toothpick

INTRODUCTION

Some diseases have similar clinical symptoms to acute appendicitis, making preoperative diagnosis challenging, including complicated Meckel's diverticulum.[1] Meckel's diverticulum is the most common congenital abnormality of the gastrointestinal tract, first described by German anatomist Johann Friedrich Meckel in 1809.[2] Meckel's diverticulum is formed when the omphalomesenteric duct does not regress, which connects the midgut to the yolk sac during the first 9 weeks of the embryonic period.[3] This is a true diverticulum, containing all three intestinal layers, has its own blood vessels and is located at the antimesenteric border of the intestine.[4] Meckel's diverticulum is mainly asymptomatic, but can also be complicated by intestinal obstruction, gastrointestinal bleeding, inflammation or perforation of the diverticulum, causing symptoms to be confused with other diseases. We report a case with a preoperative diagnosis of suspected acute appendicitis but intraoperative, a perforated Meckel's diverticulum caused by a bamboo toothpick was discovered, which was then successfully treated by laparoscopic surgery.

CASE PRESENTATION

A male patient, 32 years old, was admitted to the hospital for right iliac fossa pain 1 day before admission. History revealed no abnormalities. On physical examination, the vital signs are HR: 85 beats/min, BP:

***Corresponding Author:**
Nguyen Cao Viet, Department of General Surgery, Vinh City General Hospital, Tran Phu Street, Vinh City 460000, Viet Nam. E-mail: caoviet3100@gmail.com
Received: 9 September 2024; Revised: 18 September 2024; Accepted: 5 November 2024
https://doi.org/10.54844/git.2024.757

130/70 mmHg, temperature: 37.5°C and RR: 18 breaths/min. Abdominal examination showed right iliac fossa guarding, Mac Burney's point tenderness and Rosving's signs were positive. Examination of other organs was within normal limits. White blood cell counts 12×10^9/L with 82% neutrophil. Abdominal ultrasound showed the appendix size to be 6.5 mm, fat infiltration was not clear. The patient was indicated for laparoscopic exploration. During surgery, the appendix was not inflamed. Examining the entire abdomen showed a Meckel's diverticulum perforated by a bamboo toothpick which is located 50 cm from the ileocecal valve (Figure 1). The toothpick was extracted and Meckel's diverticulum was wedge resected with Endo GIA 60 mm staple (Figure 2). The laparoscopic surgery process was successful, with no intraoperative complications. The patient was stable after surgery and was discharged after 3 days.

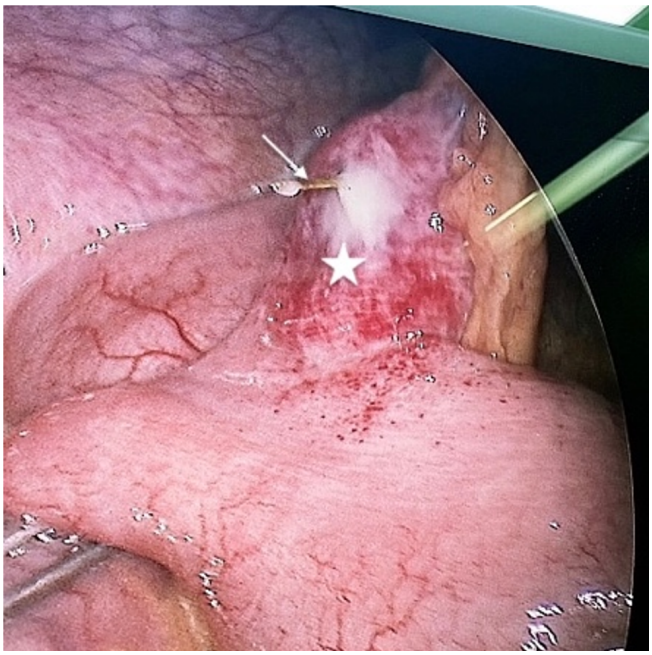

Figure 1. A perforated Meckel diverticulum by a bamboo toothpick (star: Meckel diverticulum, arrow: a bamboo toothpick).

DISCUSSION

Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract, accounting for about 2% of the population. Macroscopically Meckel's diverticulum is about 1–3 cm long, usually located 45–60 cm from the ileocecal valve, on the free edge of the ileum.[5] Microscopically is similar to the small intestine with a three-layer structure, which may contain the heterotrophic mucosa of the stomach, pancreas or colon. Only about 4%–6% of cases of Meckel's diverticulum show symptoms.[5] In a large retrospective study, the complications rate of Meckel's diverticulum is

Figure 2. Meckel diverticulum after laparoscopic resection by GIA 60 mm staple.

intestinal obstruction at 46.7%, bleeding gastrointestinal at 25.3% and diverticulitis 19.5%, respectively in children and 35.6%, 27.3% and 29.3%, respectively in adults.[6] Rare complications include diverticular perforation, enterolithiasis, volvulus, Littre's hernia, ulcers also reported.[7]

Perforation of Meckel's diverticulum is a rare complication. The cause of perforation of Meckel's diverticulum is mainly due to ingestion of foreign bodies. Patients at risk of ingestion of foreign bodies are those wearing denture poses due to reduced sensation in the palate, people with mental retardation or alcoholics.[8] In Viet Nam, many people have the habit of using bamboo toothpicks to clean their teeth, and using bamboo toothpicks while doing other things leads to unconsciously ingesting bamboo toothpicks. Most ingested foreign bodies can pass through the gastrointestinal tract without causing serious complications, with only about 1% requiring surgical treatment.[9] However, foreign bodies such as bamboo toothpicks, due to their sharp nature, easily stick into the intestinal mucosa, causing local necrosis and inflammation, and facilitating penetration of intestinal tissue. Some commonly reported sites of gastrointestinal perforation due to toothpicks include the duodenum, cecum, and sigmoid colon.[10]

Depending on the location of the injury, complicated Meckel's diverticulums have different clinical manifestations, which can be confused with renal colic, cecal diverticulitis, acute appendicitis, and colitis. In a

retrospective cohort study, author Ling Yan reports 20 cases of inflammation or perforation of Meckel's diverticulum but the preoperative diagnosis of appendicitis.[11] This proves that the preoperative diagnosis of complicated Meckel's diverticulums is challenging, especially in children. Lack of awareness of foreign body ingestion or lack of understanding of the relationship between foreign bodies and clinical manifestations can lead to missed diagnosis.[12] Our patient was admitted to the hospital with right iliac fossa pain, abdominal examination shows guarding, Mcburney point tenderness, and positive Rosving's signs, with clinical signs completely similar to acute appendicitis. In particular, this patient had no recollection of swallowing any foreign bodies. However, the surgery revealed a non-inflamed appendix. We examined carefully and found that 50 cm from the ileocecal valve had a perforated Meckel's diverticulum caused by a bamboo toothpick.

Most diagnostic imaging cannot detect foreign bodies in the gastrointestinal tract. We can see images suggesting complications of gastrointestinal perforation due to bamboo toothpicks such as localized intestinal wall thickening, surrounding fat infiltration, free abdominal fluid and air, and abdominal abscesses. In such cases, laparoscopic exploration is necessary to confirm the diagnosis of perforated Meckel's diverticulum.[13] In our case, preoperative imaging can not detect pathological causes so the patients need a laparoscopic exploration.

Meckel diverticulum complications are treated by surgery. In cases of large perforation, a segmental bowel resection with primary anastomosis is considered. In cases of small perforation, the diverticulum can be simply removed. In our case, Meckel's diverticulum was successfully removed laparoscopically using Endo GIA 60mm staples. The patient did not need a segmental bowel resection, there were no complications during surgery, and the patient was discharged after 3 days. Nowadays, laparoscopic surgery is the preferred choice due to its many benefits compared to traditional open surgery.[14]

CONCLUSION

Preoperative diagnosing perforated Meckel's diverticulum is challenging because the clinical symptoms can be confused with other diseases, including acute appendicitis. Taking a history of ingesting foreign bodies or having a habit of using bamboo toothpicks helps determine risk factors. During surgery, it is necessary to carefully examine the abdominal organs, especially when damage to the appendix is found to be disproportionate to clinical symptoms.

DECLARATIONS

Author contributions

Viet NC did the conceptualization, study design, project supervision, drafting and editing the manuscript. Trong TD made the project supervision. Anh BD reviewed the literature. Hung NT and Minh LA collected the data. Binh BD collected the data and prepared the figure.

Informed Consent

Patient informed consent was obtained.

Ethical Approval

Not applicable.

Conflicts of interest

The authors report no conflicts of interest

Data sharing statement

No additional data is available.

REFERENCES

1. Yu J, Fulcher AS, Turner MA, Halvorsen RA. Helical CT evaluation of acute right lower quadrant pain: part I, common mimics of appendicitis. AJR Am J Roentgenol 2005;184:1136-1142
2. Ruscher KA, Fisher JN, Hughes CD, Neff S, Lerer TJ, Hight DW, et al. National trends in the surgical management of Meckel's diverticulum. J Pediatr Surg 2011;46:893-896
3. De la Cruz Garcia I, Tan K, Riddell A. Perforated Meckel's diverticulitis secondary to a corn kernel obstruction of lumen in an elderly patient. J Surg Case Rep 2021;2021:rjab244
4. Dimitriou I, Evaggelou N, Tavaki E, Chatzitheoklytos E. Perforation of Meckel's diverticulum by a fish bone presenting as acute appendicitis: a case report. J Med Case Rep 2013;7:231
5. Sagar J, Kumar V, Shah DK. Meckel's diverticulum: a systematic review. J R Soc Med 2006;99:501-505
6. Hansen CC, Søreide K. Systematic review of epidemiology, presentation, and management of Meckel's diverticulum in the 21st century. Medicine (Baltimore) 2018;97:e12154
7. Choi SY, Hong SS, Park HJ, Lee HK, Shin HC, Choi GC. The many faces of Meckel's diverticulum and its complications. J Med Imaging Radiat Oncol 2017;61:225-231
8. Kolleri JJ, Abdirahman AM, Khaliq A, Abu-Dayeh A, Sajid S, Mirza S, et al. A Case Report on Fish Bone Perforating Meckel's Diverticulum Mimicking Appendicitis. Cureus 2022;14:e22693
9. Eisen GM, Baron TH, Dominitz JA, Faigel DO, Goldstein JL, Johanson JF, et al. Guideline for the management of ingested foreign bodies. Gastrointest Endosc 2002;55:802-806
10. Mark D, Ferris K, Martel G, Mulholland K. Radiological diagnosis of a small bowel perforation secondary to toothpick ingestion. BMJ Case Rep 2013;2013
11. Yan L, Zhou B, Wu P, Tian Y, Lou Y. Meckel's diverticulum mimicking acute appendicitis in children: a retrospective cohort study. BMC Surg 2024;24:40
12. Paixão TS, Leão RV, de Souza Maciel Rocha Horvat N, Viana PC, Da Costa Leite C, de Azambuja RL, et al. Abdominal manifestations of fishbone perforation: a pictorial essay. Abdom Radiol (NY) 2017;42:1087-1095
13. Jan Z, Ahmed N, Aziz N, Tariq M, Khattak D, Asghar MS. Meckel's

diverticulum containing enterolith mimicking acute appendicitis. Int J Surg Case Rep 2022;98:107497

14. Palanivelu C, Rangarajan M, Parthasarathi R, Madankumar MV, Senthilkumar K. Laparoscopic repair of suprapubic incisional hernias: suturing and intraperitoneal composite mesh onlay. A retrospective study. Hernia 2008;12:251-256