

## Perforation of Meckel's diverticulum caused by a fish bone: A case report

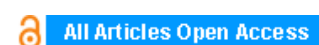
**Hideki Shibata, Koichi Sato, Takashi Tada, Hiroshi Maekawa, Mutsumi Sakurada, Hajime Orita, Tomoaki Ito**

### ABSTRACT

**Introduction:** Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract. Perforation of Meckel's diverticulum caused by a fish bone is a very rare complication.

**Case Report:** We report a 41-year-old male who was admitted to our hospital with deteriorating lower abdominal pain that started two days earlier. An abdominal computed tomography scan showed inflammatory changes thickening the intestinal wall and involving ileocecal fat. Based on a clinical diagnosis of acute appendicitis, we performed an emergency operation. At laparotomy, Meckel's diverticulum was perforated by a fish bone.

**Conclusion:** In the differential diagnosis as a probable cause of acute abdomen, it is important that computed tomography scan of the abdomen should be checked carefully while considering Meckel's diverticulum.



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CASE REPORT

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# Perforation of Meckel's diverticulum caused by a fish bone: A case report

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**Keywords:** Meckel's diverticulum, Perforation, Fish bone

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## INTRODUCTION

Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract [1]. Meckel's diverticulum represents a true diverticulum of the ileum, containing all three layers of the bowel wall, and is invariably found on the anti-mesenteric border of the ileum, with 90% located within 90 cm of the ileocecal valve [2]. In general, Meckel's diverticulum causes no symptoms. However, it can sometimes result in abdominal pain that requires treatment. Patients with perforation of Meckel's diverticulum may present with right iliac fossa pain, which mimics acute appendicitis. Here, we present an interesting and unusual case of perforation of Meckel's diverticulum; a very rare complication caused by a fish bone.

## CASE SERIES

A 41-year-old male was admitted to our hospital from an outside facility for deteriorating lower abdominal pain that started two days earlier. On admission he showed tenderness in the right lower abdomen without rebound tenderness or defense. His vital signs showed blood pressure 108/62 mmHg, a regular pulse rate 84/min and temperature 36.9°C. His blood test revealed a raised white cell count of  $19.1 \times 10^3/\mu\text{L}$ , a high C-reactive protein level 6.2 mg/dL, and high total bilirubin 2.2 mg/dL.

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An abdominal computed tomography (CT) scan showed inflammatory changes thickening the intestinal wall and involving ileocecal fat. There was also a 6 mm high density spot in the intestinal wall at the same area (Figure 1). Based on a clinical diagnosis of acute appendicitis, we performed an emergency operation.

At laparotomy, there were a few ascites and an inflamed appendix. Meckel's diverticulum was perforated by a fish bone about 50 cm from the Bauhini valve and its tip had impaled the cecum (Figure 2). The patient was treated with resection of the perforated ileum, including Meckel's diverticulum, simple closure of the cecum and appendectomy.

A surgical specimen revealed a 2×3 cm Meckel's diverticula perforated by a 2.5 cm fish bone. A pathologic examination of the specimen confirmed the presence of inflamed full-thickness mucosa with ectopic gastric mucosa in the diverticulum (Figure 3). The patient made an uneventful recovery postoperatively and was discharged from the hospital on postoperative day-11.

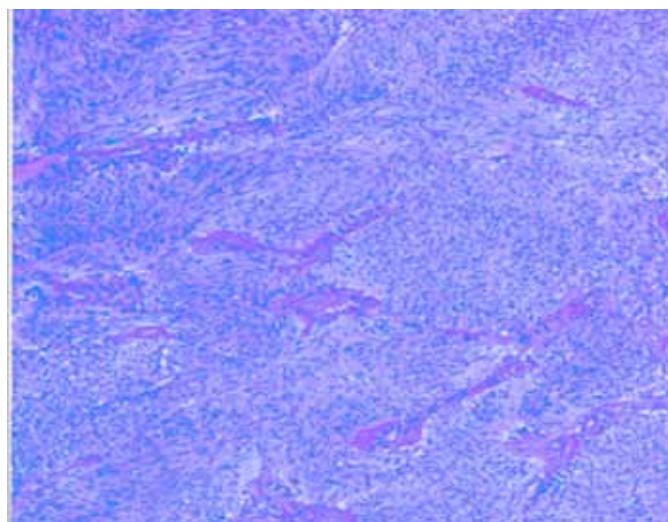


Figure 3: The pathologic examination of the specimen confirms the presence of an inflamed full-thickness mucosa with ectopic gastric mucosa in the diverticulum (H&E stain, ×400).

## DISCUSSION

Meckel's diverticulum was first described by Fabricus Hildanus in 1598, and was later named by the German anatomist, Johann Friedrich Meckel, who described its embryological origin in 1809 [3]. Meckel's diverticulum is a remnant of the omphalomesenteric duct, which is normally obliterated by the fifth week of gestation [4]. It is the most common congenital abnormality of the gastrointestinal tract, classically thought to occur in about 2% of the population. Despite the fact that this condition is relatively common, only about 4–16% of cases lead to complications [5]. Bleeding from Meckel's diverticulum due to ectopic gastric mucosa is the most common clinical presentation, especially in younger patients, but it is rare in the adult population. The complications in adults include obstruction, intussusception, ulceration, hemorrhage, and rarely vesico-diverticular fistula and tumors.

A very small percentage of ingested foreign bodies can cause perforation of the bowel, leading to acute abdomen requiring surgical intervention. Foreign bodies such as dentures, fish bones, chicken bones and cocktail sticks have been known to cause bowel perforation. There are more than 300 cases in literature of bowel perforation caused by foreign bodies [6]. The majority of patients do not recall ingesting the foreign body, it being discovered either on investigation or during an operation. Perforation of Meckel's diverticulum caused by a fish bone is very rare; only 28 cases have been reported in Japan, including the current patient. Analyses of these 28 cases are given in Table 1.

Perforation of Meckel's diverticulum remains a differential diagnosis of right iliac fossa pain. Meckel's diverticulum is notoriously difficult to diagnose, both clinically and radiologically, as the symptoms and imaging features are non-specific. In our patient, appendicitis was



Figure 1: Abdominal computed tomography scan showing inflammatory changes thickening the intestinal wall and involving the ileocecal fat. The arrow shows a 6 mm high density spot in the intestinal wall at the same area.

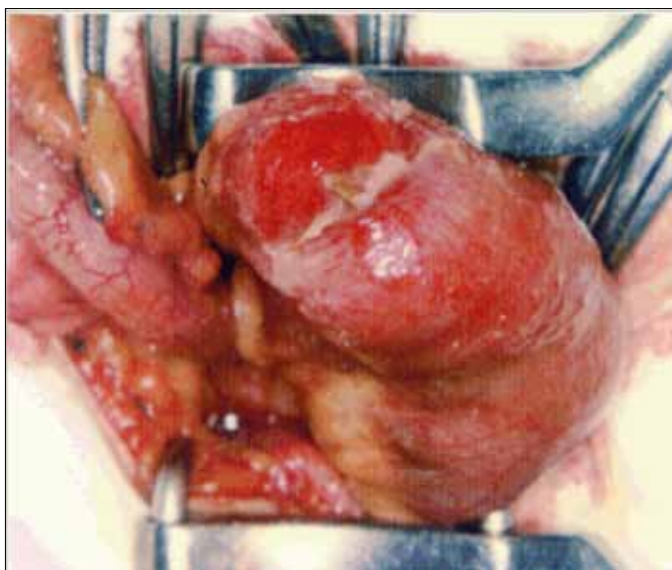


Figure 2: Meckel's diverticulum perforated by a fish bone.

Table 1: Reported cases of perforated Meckel's diverticulum caused by a fish bone in Japan.

Reported cases of perforated Meckel's diverticulum by fish bone in Japan								
Case	Author	Age	Sex	Chief Complaint	Period of illness	Preoperative diagnosis	Operation	Size of fish bone (cm)
1	Masuda(1964)	11	Male	Abdominal pain, vomiting	Unknown	Perforated peritonitis	Diverticulectomy	1-5
2	Ohta(1982)	27	Male	Rt. lower abdominal pain, vomiting	2 days	Perforated appendicitis	Partial resection of ileum	1.8
3	Sugi(1985)	51	Male	Rt. lower abdominal pain	3 days	Perforated appendicitis	Diverticulectomy	2.9
4	Ito(1985)	4	Male	Lower abdominal pain	Unknown	Acute appendicitis	Unknown	Unknown
5	Tanaka(1990)	79	Male	Rt. lower abdominal pain	Unknown	Perforated appendicitis	Partial resection of ileum	Unknown
6	Tanaka(1992)	4	Male	Lower abdominal pain	2 days	Perforated appendicitis	Diverticulectomy	1.8
7	Sasaki(1993)	55	Female	Rt. lower abdominal pain	5 days	Perforated appendicitis	Partial resection of ileum	1.8
8	Takatsuka(1994)	30	Male	Lower abdominal pain	2 days	Acute appendicitis	Diverticulectomy	2.5
9	Saito(1994)	69	Male	Epigastralgia	12 hours	Perforated appendicitis	Diverticulectomy	1.7
10	Nakata(1995)	54	Male	Lower abdominal pain	4 hours	Perforated peritonitis	Diverticulectomy	2.5
11	Ikeda(1995)	10	Male	Rt. lower abdominal pain	3 days	Perforated appendicitis	Diverticulectomy	2.4
12	Murata(1996)	58	Male	Rt. lower abdominal pain	1 day	Acute appendicitis	Diverticulectomy	1.7
13	kaneko(1997)	13	Male	Lower abdominal pain	1 day	Perforated appendicitis	Partial resection of ileum	2
14	Otsuji(1998)	80	Male	Abdominal pain	1 day	Perforated appendicitis	Diverticulectomy	4
15	Nagai(1998)	51	Male	Rt. lower abdominal pain	7 hours	Perforated peritonitis	Diverticulectomy	1.4
16	Taniai(1998)	60	Male	Rt. lower abdominal pain	4 days	Perforated appendicitis	Diverticulectomy	3-5
17	Hoshima(2000)	69	Female	Abdominal pain	3 days	Acute abdomen	Partial resection of ileum	2
18	Ohnishi(2000)	54	Male	Rt. lower abdominal pain	4 days	Acute appendicitis	Diverticulectomy	1.5
19	Kuminaka(2001)	20	Male	Rt. lower abdominal pain	1 day	Acute appendicitis	Diverticulectomy	Unknown
20	Soga(2003)	48	Male	Rt. lower abdominal pain	1 day	Acute appendicitis	Diverticulectomy	Unknown
21	Imashimizu(2004)	41	Male	Rt. lower abdominal pain	3 days	Acute appendicitis	Partial resection of ileum	Unknown
22	Shinohara(2004)	68	Male	Rt. lower abdominal pain	12 hours	Perforated peritonitis	Diverticulectomy	2.5
24	Hirabuki(2005)	42	Male	Rt. lower abdominal pain	1 day	Torsion of an ovarian tumor	Diverticulectomy	3
23	Yamashita(2006)	59	Male	Rt. lower abdominal pain	1 day	Perforated peritonitis	Diverticulectomy	2.1
25	Oikawa(2007)	31	Male	Lower abdominal pain	4 days	Perforated peritonitis	Partial resection of ileum	2.5
26	Moriuchi(2007)	71	Male	Lower abdominal pain	2 days	Strangulated ileus	Diverticulectomy	2.2
27	Murohashi(2009)	67	Male	Lower abdominal pain	1 day	Perforated peritonitis	Diverticulectomy	4-3
28	Our case	41	Male	Lower abdominal pain	2 days	Acute appendicitis	Simple closure of the cecum and appendectomy	2.5

Abbreviation: Rt - Right

suspected on CT scan and laboratory findings because of the inflammatory changes. However, at laparotomy, a high density spot at the preoperative CT scan was found to be a fish bone and we ultimately diagnosed Meckel's diverticulum and a perforated cecum because of this.

The management of symptomatic Meckel's diverticulum is surgical resection. A wedge resection of Meckel's diverticulum is generally carried out, and occasionally some ileum is resected by end-to-end anastomosis [7]. Recently, the prevalence of laparoscopic surgery has been increasing. However, a preoperative diagnosis of a complicated Meckel's diverticulum may be challenging because of the overlapping clinical and imaging features of abdomen. An adequate knowledge of embryological, clinical, pathologic and radiologic characteristics of Meckel's diverticulum will aid the early and accurate diagnosis of complicated cases [5].

## CONCLUSION

Perforation of Meckel's diverticulum caused by a fish bone is a very rare complication and may lead to a fatal outcome if not recognized early. In the differential diagnosis as a probable cause of acute abdomen, it is important that computed tomography scan of the abdomen should be checked carefully while considering Meckel's diverticulum.

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## Author Contributions

Hideki Shibata – Substantial contributions to conception and design, acquisition of data, and analysis and interpretation of data, Drafting the article of revising it critically for important intellectual content, Final approval of the version to be published

Koichi Sato – Substantial contributions to conception and design, acquisition of data, and analysis and interpretation of data, Drafting the article of revising it critically for important intellectual content, Final approval of the version to be published

Takashi Tada – Substantial contributions to conception and design, acquisition of data, Drafting the article, Final approval of the version to be published

Hiroshi Maekawa – Substantial contributions to conception and design, acquisition of data, Drafting the article, Final approval of the version to be published

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Hajime Orita – Substantial contributions to conception

and design, acquisition of data, and analysis and interpretation of data, Drafting the article of revising it critically for important intellectual content, Final approval of the version to be published

Tomoaki Ito – Substantial contributions to conception and design, acquisition of data, Drafting the article, Final approval of the version to be published

## Guarantor

The corresponding author is the guarantor of submission.

## Conflict of Interest

Authors declare no conflict of interest.

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