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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Keywords: Meckel’s diverticulum, Perforation, Fish bone

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 19.1x10^3/μL, a high C-reactive protein level 6.2 mg/dL, and high total bilirubin 2.2 mg/dL.
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 Bauchini 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.

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

<table>
<thead>
<tr>
<th>Case</th>
<th>Author</th>
<th>Age</th>
<th>Sex</th>
<th>Chief Complaint</th>
<th>Period of illness</th>
<th>Preoperative diagnosis</th>
<th>Operation</th>
<th>Size of fish bone (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Masuda(1964)</td>
<td>11</td>
<td>Male</td>
<td>Abdominal pain, vomiting</td>
<td>Unknown</td>
<td>Perforated peritonitis</td>
<td>Diverticulectomy</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>Ohta(1982)</td>
<td>27</td>
<td>Male</td>
<td>Rt. lower abdominal pain, vomiting</td>
<td>2 days</td>
<td>Perforated appendicitis</td>
<td>Partial resection of ileum</td>
<td>1.8</td>
</tr>
<tr>
<td>3</td>
<td>Sug(1985)</td>
<td>51</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>3 days</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>2.9</td>
</tr>
<tr>
<td>4</td>
<td>Ito(1985)</td>
<td>4</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>Unknown</td>
<td>Acute appendicitis</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>5</td>
<td>Tanaka(1990)</td>
<td>79</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>Unknown</td>
<td>Perforated appendicitis</td>
<td>Partial resection of ileum</td>
<td>Unknown</td>
</tr>
<tr>
<td>6</td>
<td>Tanaka(1992)</td>
<td>4</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>2 days</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>1.8</td>
</tr>
<tr>
<td>7</td>
<td>Sasaki(1993)</td>
<td>55</td>
<td>Female</td>
<td>Lower abdominal pain</td>
<td>5 days</td>
<td>Perforated appendicitis</td>
<td>Partial resection of ileum</td>
<td>1.8</td>
</tr>
<tr>
<td>8</td>
<td>Takatsuka(1994)</td>
<td>30</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>2 days</td>
<td>Acute appendicitis</td>
<td>Diverticulectomy</td>
<td>2.5</td>
</tr>
<tr>
<td>9</td>
<td>Saito(1994)</td>
<td>69</td>
<td>Male</td>
<td>Epigastralgia</td>
<td>12 hours</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>1.7</td>
</tr>
<tr>
<td>10</td>
<td>Nakata(1995)</td>
<td>54</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>4 hours</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>2.5</td>
</tr>
<tr>
<td>11</td>
<td>Ikeda(1995)</td>
<td>10</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>3 days</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>2.4</td>
</tr>
<tr>
<td>12</td>
<td>Murata(1996)</td>
<td>58</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>1 day</td>
<td>Acute appendicitis</td>
<td>Diverticulectomy</td>
<td>1.7</td>
</tr>
<tr>
<td>13</td>
<td>Kaneko(1997)</td>
<td>13</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>1 day</td>
<td>Perforated appendicitis</td>
<td>Partial resection of ileum</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>Otsuji(1998)</td>
<td>80</td>
<td>Male</td>
<td>Abdominal pain</td>
<td>1 day</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>Nagai(1998)</td>
<td>51</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>7 hours</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>1.4</td>
</tr>
<tr>
<td>16</td>
<td>Tanai(1998)</td>
<td>60</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>4 days</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>3.5</td>
</tr>
<tr>
<td>17</td>
<td>Hoshima(2000)</td>
<td>69</td>
<td>Female</td>
<td>Abdominal pain</td>
<td>3 days</td>
<td>Acute abdomen</td>
<td>Partial resection of ileum</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>Ohnishi(2000)</td>
<td>54</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>4 days</td>
<td>Acute appendicitis</td>
<td>Diverticulectomy</td>
<td>1.5</td>
</tr>
<tr>
<td>19</td>
<td>Kuninaka(2001)</td>
<td>20</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>1 day</td>
<td>Acute appendicitis</td>
<td>Diverticulectomy</td>
<td>Unknown</td>
</tr>
<tr>
<td>20</td>
<td>Suga(2003)</td>
<td>48</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>1 day</td>
<td>Acute appendicitis</td>
<td>Diverticulectomy</td>
<td>Unknown</td>
</tr>
<tr>
<td>21</td>
<td>Imashimizu(2004)</td>
<td>41</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>3 days</td>
<td>Acute appendicitis</td>
<td>Partial resection of ileum</td>
<td>Unknown</td>
</tr>
<tr>
<td>22</td>
<td>Shinohara(2004)</td>
<td>68</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>12 hours</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>2.5</td>
</tr>
<tr>
<td>23</td>
<td>Hirabuki(2005)</td>
<td>42</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>1 day</td>
<td>Torsion of an ovarian tumor</td>
<td>Diverticulectomy</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>Yamashita(2006)</td>
<td>59</td>
<td>Male</td>
<td>Rt. lower abdominal pain</td>
<td>1 day</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>2.1</td>
</tr>
<tr>
<td>25</td>
<td>Oikawa(2007)</td>
<td>31</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>4 days</td>
<td>Perforated appendicitis</td>
<td>Partial resection of ileum</td>
<td>2.5</td>
</tr>
<tr>
<td>26</td>
<td>Morishita(2007)</td>
<td>71</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>2 days</td>
<td>Strangulated ileus</td>
<td>Diverticulectomy</td>
<td>2.2</td>
</tr>
<tr>
<td>27</td>
<td>Murohashi(2009)</td>
<td>67</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>1 day</td>
<td>Perforated appendicitis</td>
<td>Diverticulectomy</td>
<td>4.3</td>
</tr>
<tr>
<td>28</td>
<td>Our case</td>
<td>41</td>
<td>Male</td>
<td>Lower abdominal pain</td>
<td>2 days</td>
<td>Acute appendicitis</td>
<td>Simple closure of the cecum and appendectomy</td>
<td>2.5</td>
</tr>
</tbody>
</table>
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

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

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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REFERENCES


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