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CASE REPORT

Laparoscopic treatment of a vesicointestinal fistula due to a Meckel's diverticulum: a case report and review of the literature

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Abstract

While there have been numerous reports about colovesical fistulas and ruptured intestinal diverticula, there have been far fewer reports about vesicointestinal fistulas caused by Meckel's diverticula. Most Meckel's diverticula are asymptomatic. Furthermore, they seldom cause vesicointestinal fistulas, and the associated complications are non-specific. Thus, their preoperative diagnosis is difficult. We experienced a case in which a vesicointestinal fistula was caused by a Meckel's diverticulum and was treated with laparoscopic surgery. A 46-year-old male was referred to our hospital after exhibiting hematuria. Cystoscopy revealed a fistula between the small intestine and bladder. Contrast-enhanced computed tomography and magnetic resonance imaging showed a diverticulum in the ileum and a fistula between the ileum and bladder, which passed through the diverticulum. A Meckel's diverticulum was suspected. We conducted a laparoscopic operation. We dissected the Meckel's diverticulum with an automatic suturing device and removed it together with part of the ileum. The patient's postoperative course was good. We experienced a case in which a vesicointestinal fistula was caused by a Meckel's diverticulum and was successfully treated with laparoscopic surgery. In selected cases of Meckel's diverticulum, the dissection of the diverticulum with an automatic suturing device is appropriate.

Keywords Meckel's diverticulum · Vesicointestinal fistula · Laparoscopy

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Introduction

While there have been numerous reports about colovesical fistulas and the rupturing of intestinal diverticula, there have been far fewer reports about vesicointestinal fistulas caused by Meckel's diverticula [1].

Approximately 2% of people have Meckel's diverticula, which are congenital distortions of the digestive tract [2]. However, only about 4% of them are symptomatic [2]. In addition, the complications associated with Meckel's diverticula include hemorrhaging, bowel obstruction, inflammation, and perforation. Furukori et al. [3] and Yang et al. [4] reported Meckel's diverticula seldom cause vesicointestinal fistulas. Therefore, it is difficult to preoperatively diagnose Meckel's diverticula unless they cause hemorrhaging, because the associated complications are non-specific [5]. We experienced a case in which a vesicointestinal fistula arose due to a Meckel's diverticulum and was treated laparoscopically. We report this case together with a review of the literature.

Case report

A 46-year-old male was referred to our hospital to undergo an examination after hematuria was detected. Cystoscopy revealed a fistula between the small intestine and bladder (Fig. 1). A contrast-enhanced computed tomography (CT) scan and magnetic resonance imaging (MRI) revealed a diverticulum in the ileum, and the ileum and bladder were connected through the diverticulum (Figs. 2, 3). A Meckel's diverticulum was strongly suspected. We decided to perform a laparoscopic operation. The small intestine had strongly adhered to the bladder due to inflammation. We peeled off the adhesion carefully and found a connection between the posterior wall of the bladder and ileum, which was suspected to be a Meckel's diverticulum. We dissected it with an automatic suturing device and aimed to leave as little remnant diverticulum tissue as possible. Then, we removed the diverticulum together with part of the ileum (Fig. 4).

A pathological examination of the diverticulum revealed an intestinal mucosa and a muscularis mucosa underneath the muscular layer. However, no ectopic pancreatic or gastric mucosal tissue was found. The

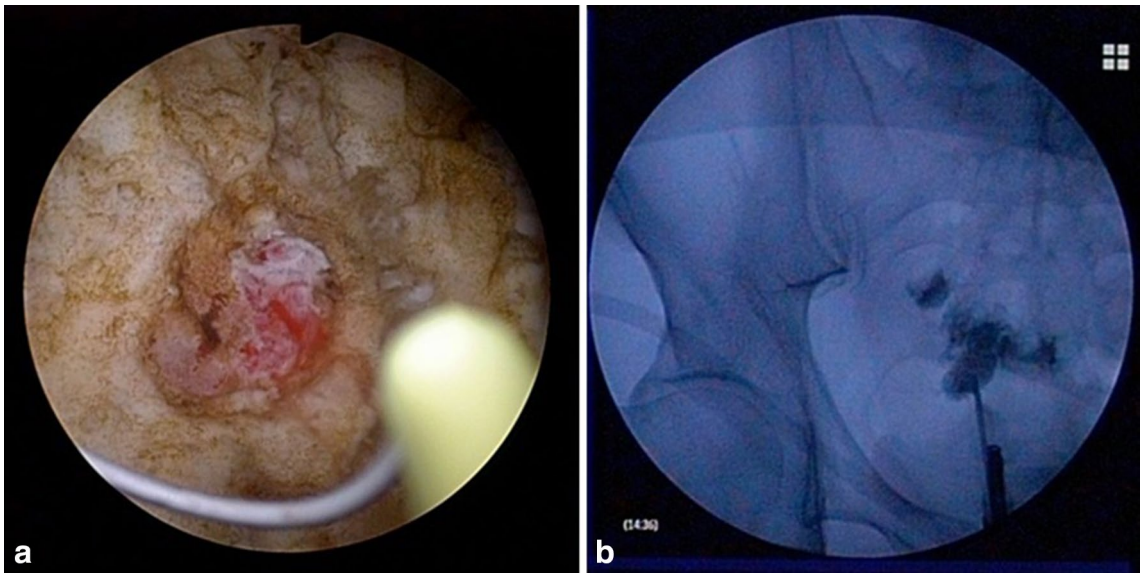

Fig. 1 **a** Small foramen was seen on the thickened posterior wall of the bladder. **b** Contrast medium was injected into the intestine through the foramen in the bladder

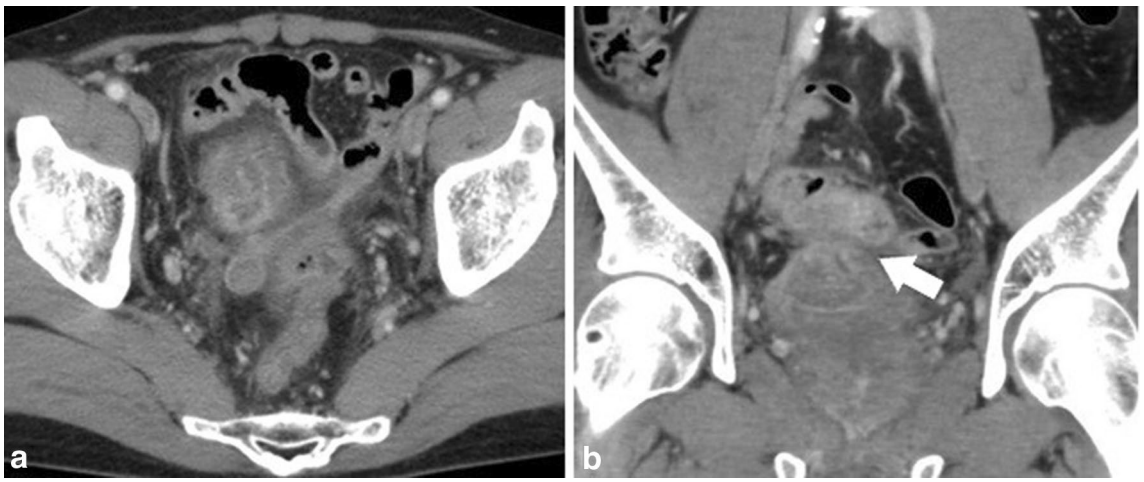

Fig. 2 **a** Axial section. The thickened posterior wall of the bladder is shown. **b** Coronal section. Adhesion was detected between the bladder and intestine (arrow)

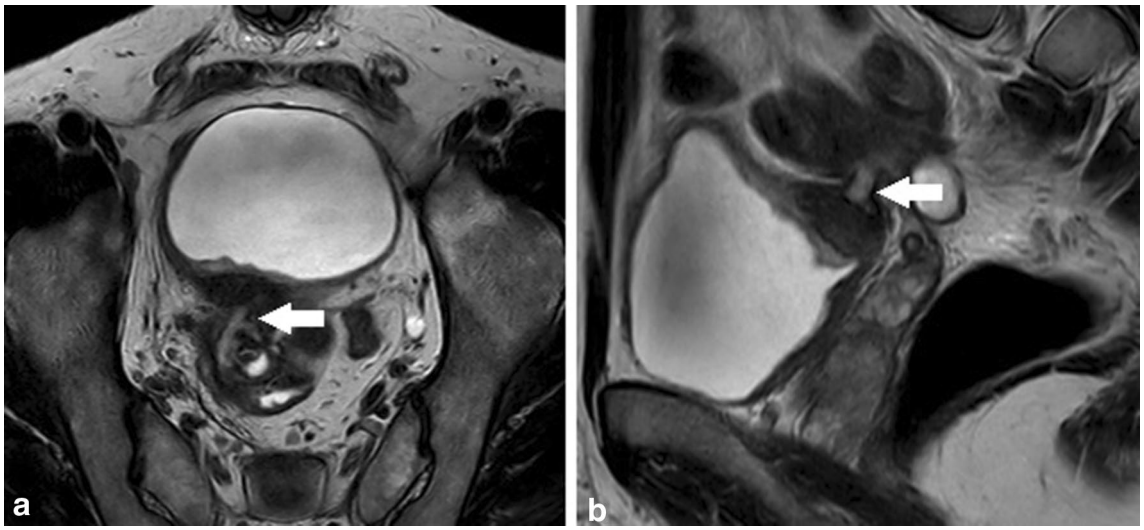

Fig. 3 **a** Axial section. **b** Sagittal section. The fistula between the bladder and intestine (arrow) is shown

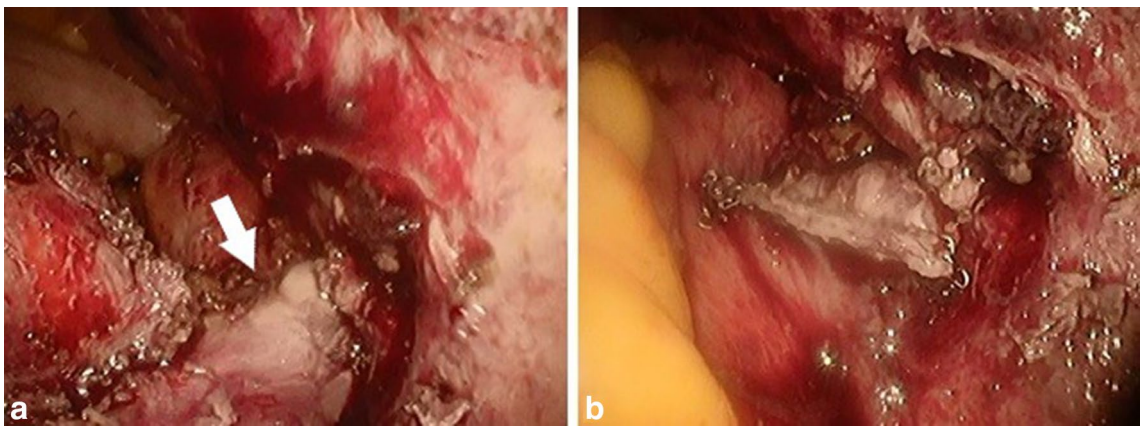

Fig. 4 **a** Fistula between the bladder and intestine caused by the Meckel's diverticulum (arrow) is shown. **b** We dissected the Meckel's diverticulum with an automated suturing device

diverticulum was an intrinsic diverticulum and was located about 40 cm from the ileocecal junction on the oral side. Therefore, we diagnosed it as a Meckel's diverticulum without any ectopic pancreatic or gastric mucosal tissue (Fig. 5).

The patient developed a fever after the operation. A CT scan demonstrated the accumulation of ascites around the stump. However, the stump had not ruptured. A culture of the ascitic fluid revealed a Corynebacterium infection, which was suggestive of a gastrointestinal tract infection. Cystography showed that there was no leakage from the stump of the diverticulum (Fig. 6). The intra-abdominal infection was treated conservatively with antibiotics. The patient was discharged on postoperative day 21.

Discussion

The complications of vesicointestinal fistulas include abdominal pain, fever, diarrhea, pneumaturia, fecaluria, and cystitis [6]. However, these complications contribute little to the diagnosis of vesicointestinal fistulas, since they are observed in many abdominal conditions. This makes it difficult to diagnose vesicointestinal fistulas. In the present case, the initial symptom was hematuria. Thus, we had to rule out urinary disorders.

Technetium-99m scintigraphy is used to diagnose Meckel's diverticula, because it is non-invasive. While it exhibits sensitivity, specificity, and accuracy values

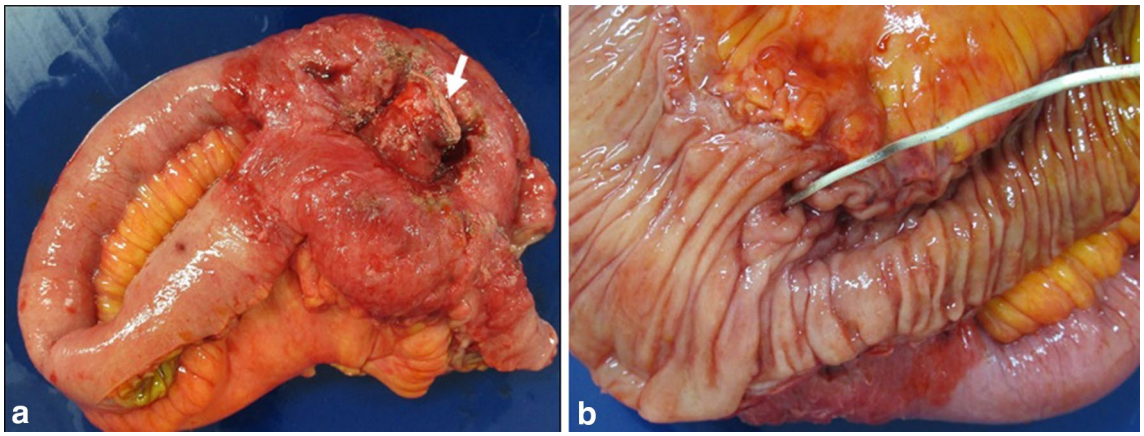

Fig. 5 **a** Small intestinal loop was wrapped around the Meckel's diverticulum (arrow). **b** Diverticulum was in communication with the small intestine on the contralateral side of the mesentery

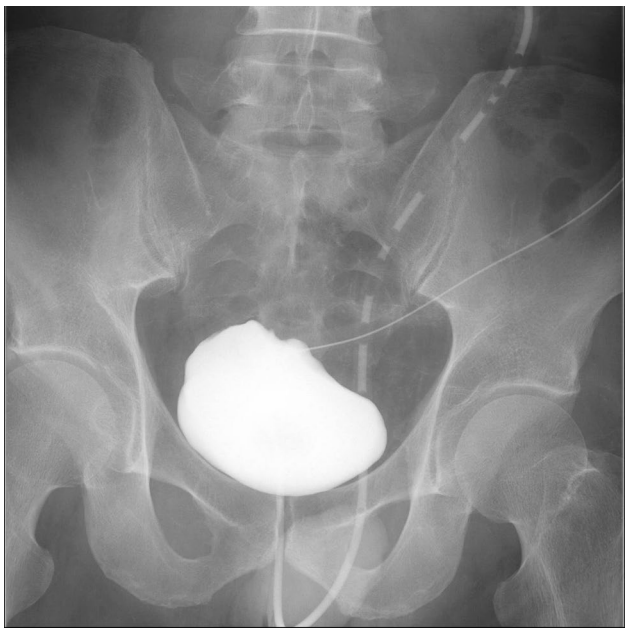

Fig. 6 No leakage of contrast medium from the stump of the diverticulum was detected

of 80–90, 95, and 90%, respectively, for diagnosing the condition in children, it is less reliable in adults; i.e., its sensitivity, specificity, and accuracy values are 62.5, 9, and 46%, respectively [7]. In the current case, the diverticulum was not detected by scintigraphy.

Although contrast-enhanced CT and enema examinations are also used to diagnose fistulas [8], they sometimes do not show fistulas clearly. Neither of these techniques was diagnostically useful in the present case. In fact, the fistula between the diverticulum and small intestine was more obvious on MRI than on CT. Thus, MRI seems to be useful for diagnosing such fistulas.

It is generally recommended that symptomatic Meckel's diverticula should be treated with surgery [7, 9]. Diagnostic laparoscopy is recommended if it is difficult to make a diagnosis based on imaging findings. This is a reasonable approach, because it only requires a small incision and is less invasive than open surgery. In the current case, we performed therapeutic laparoscopic surgery, because we were able to preoperatively diagnose the vesicointestinal fistula based on its imaging findings. A Meckel's diverticulum was strongly suspected, but this was difficult to confirm before the operation. Meckel's diverticula are generally treated by removing them completely. However, we considered that the complete removal of the diverticulum might make it difficult to close the resultant hole due to severe inflammation. Moreover, it has been reported that the complete removal of the diverticulum is not necessarily required to cure a vesicointestinal fistula caused by a Meckel's diverticulum [10]. In the present case, a preoperative examination did not detect any aberrant tissue, such as ectopic pancreatic or gastric mucosal tissue. Therefore, we used an automatic suturing device to remove as much of the diverticulum as possible. The current case suggests that if no ectopic mucosal tissue is detected and the patient is asymptomatic, vesicointestinal fistulas caused by Meckel's diverticula can be treated via the dissection of the diverticulum with an automatic suturing device. In this way, it is possible to treat such fistulas laparoscopically. However, patients who undergo such procedures require careful observation, as late perforation of the surgical site can occur if the remnant diverticulum becomes ischemic and necrotic. Thus, we must be careful about selecting appropriate cases.

We experienced a case in which a vesicointestinal fistula was caused by a Meckel's diverticulum and was successfully treated with laparoscopic surgery. In selected cases

of Meckel's diverticulum, the dissection of the diverticulum with an automatic suturing device is a useful treatment option.

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Author contributions HH and HM carried out the surgery and postoperative management. HH and HM prepared and drafted the manuscript. HM corrected and revised the manuscript. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest The authors declare they have no competing interests.

Human/animal rights All procedures followed have been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Informed consent Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the editor of this journal.

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