# Acute Appendicitis Due to a Ventriculoperitoneal Shunt —Report of a case—

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**ABSTRACT.** A 66-year-old woman presented to our clinic with a chief complaint of acute right lower abdominal pain in February 1992. She had undergone a ventriculoperitoneal shunt four months prior to this admission for communicating hydrocephalus, which was associated with subarachnoid hemorrhage due to a ruptured aneurysm of the right middle cerebral artery. The abdomen was tender over the right lower quadrant, with signs of peritonitis. On the day of admission, an abdominal exploration was done using a lower midline incision under general anesthesia. On entering the peritoneal cavity, a small amount of fluid was noticed. The shunt catheter was traced to the right paracolic space next to the appendix. Acute phlegmonous appendicitis was noted, and an appendectomy was performed. The peritoneal cavity was irrigated with saline, after which the shunt catheter was exteriorized. The patient's postoperative course was uneventful. Culture studies of the cerebrospinal fluid were negative, and culture studies of the ascites revealed *Esherichia coli*. Histological examination showed the serosa of the appendix to be inflamed with no obstruction of the lumen. These findings suggest that the shunt catheter may have caused the inflammation of the appendix.

**Key words: acute appendicitis —ventriculoperitoneal shunt—complication**

Ventriculoperitoneal shunts sometimes cause intraabdominal complications, such as infection or cyst. In this report, we describe a case of acute appendicitis which resulted from a ventriculoperitoneal shunt.

## CASE REPORT

A 66-year-old woman presented to our clinic with a chief complaint of acute right lower abdominal pain in February 1992. She had had abdominal pain, fever and appetite loss of 12 hours' duration. She had undergone a ventriculoperitoneal shunt four months prior to admission for communicating hydrocephalus associated with subarachnoid hemorrhage due to a ruptured aneurysm of the right middle cerebral artery.

On physical examination, she was alert. Her temperature was 38.8℃, her blood pressure was 150/88 mmHg, and her pulse rate was 122/min. There were no signs of inflammation along the subcutaneous tract of the catheter, and the pumping device was functioning well. The lungs, heart and breasts were

仁科雅良，荻野隆光，藤井千穂，中北和夫，小濱啓次

normal. The abdomen was tender over the right lower quadrant, especially over McBurney's point, with signs of peritonitis. Peristaltic sounds were hypoactive. A rectal examination revealed tenderness on the right side, but no mass was palpated. The results of a neurological examination were within normal limits.

Laboratory studies revealed a white blood cell count of 9,900/$\mu$l, without left shift, and normal hemoglobin, electolyte, and amylase values. Urinalysis and an electrocardiogram were normal. Plain x-ray examination of the

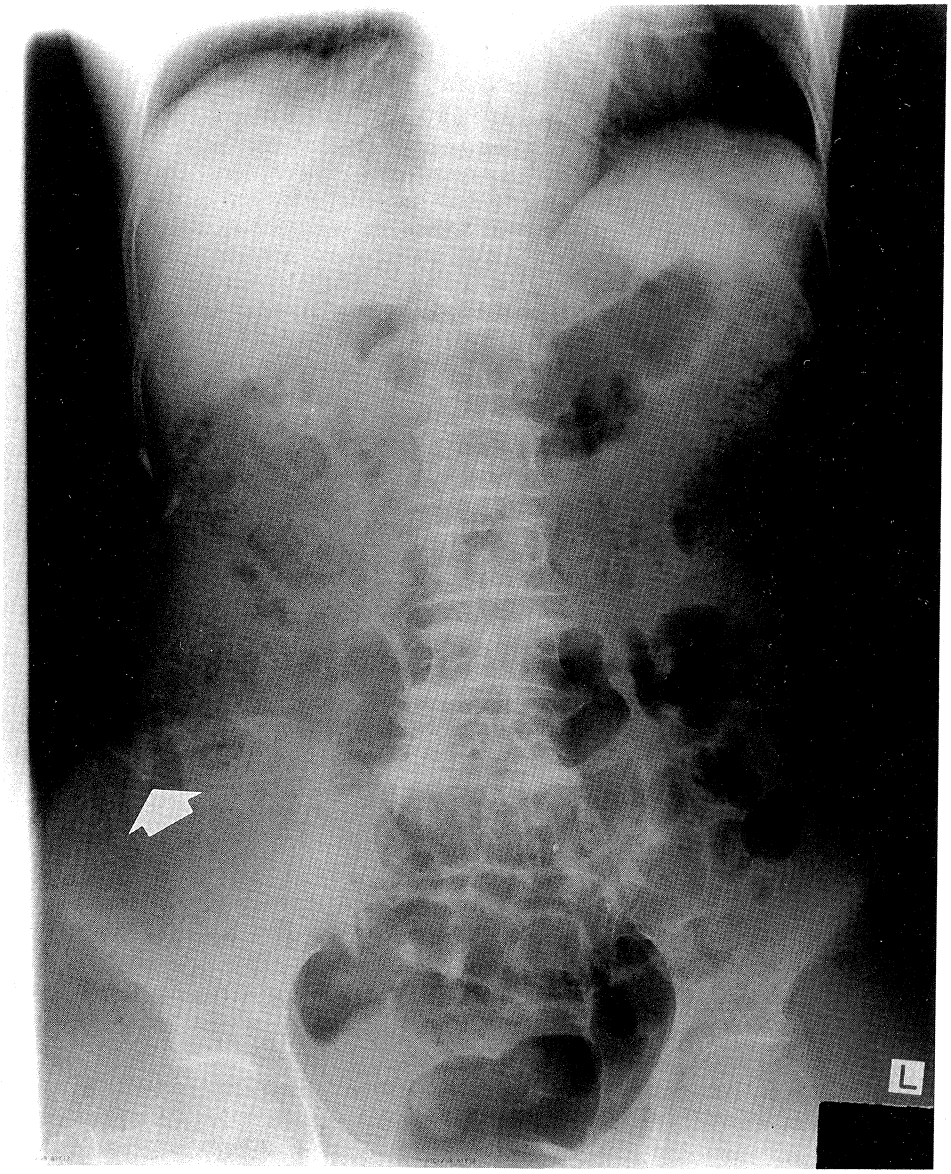


Fig 1. Plain x-ray examination of the abdomen did not suggest bowel obstruction or perforation. The distal end of the shunt tube was located in the right lower abdomen. (white arrow)

abdomen did not suggest a bowel obstruction or perforation. The distal end of the shunt catheter was located in the right lower abdomen (Fig 1). An ultrasound study of the abdomen revealed no abnormal findings in the liver or the common bile duct. The cerebrospinal fluid, which was obtained from a

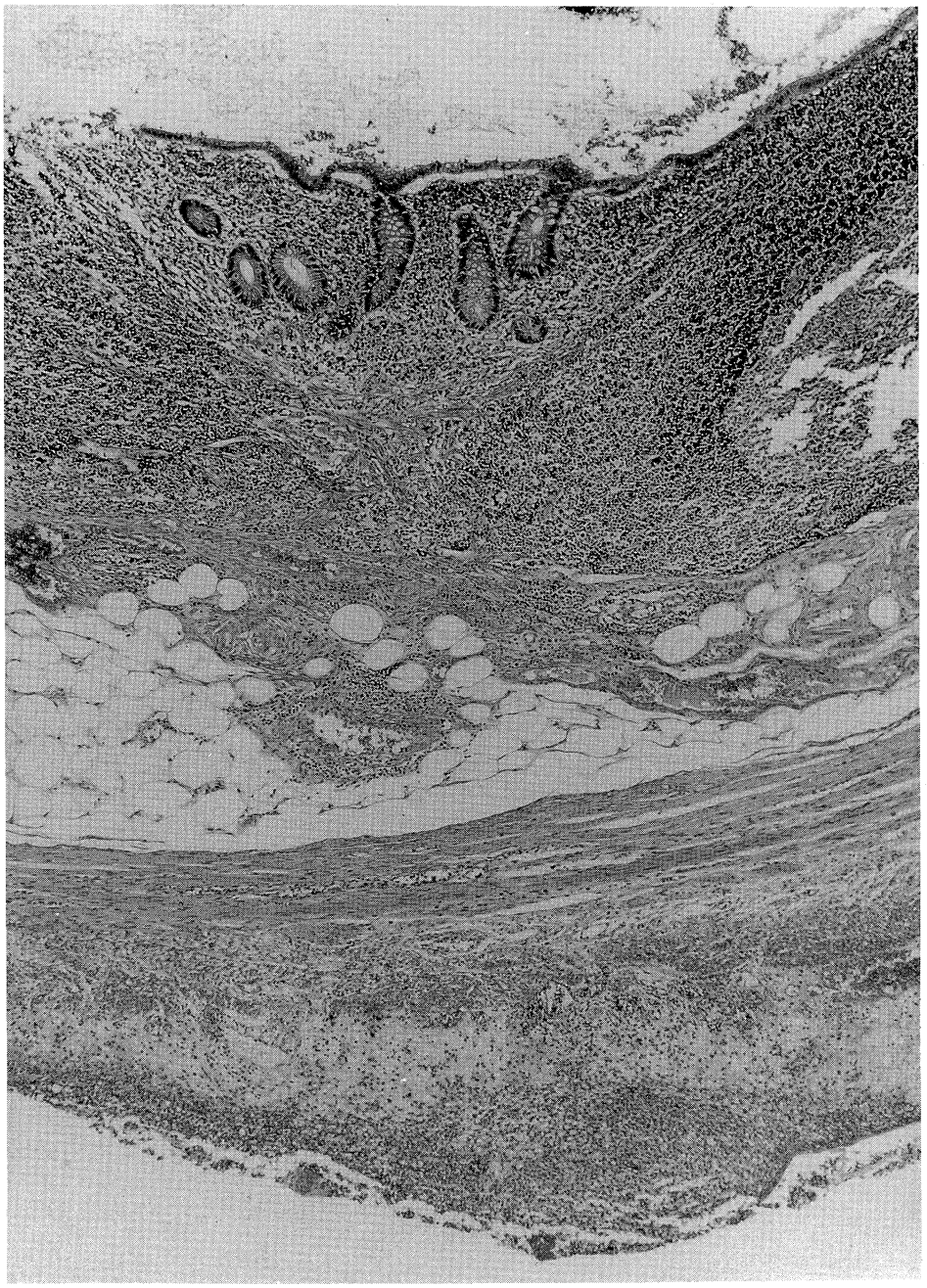

Fig 2. Histological examination showed the serosa of the appendix to be inflamed with no obstruction of the lumen. (H and E. X10)

proximal cephalad catheter, was clear, with a cell count 1/3 high power field, and glucose and protein contents were normal. Culture studies of the cerebrospinal fluid were negative.

On the day of admission, an abdominal exploration was done using a

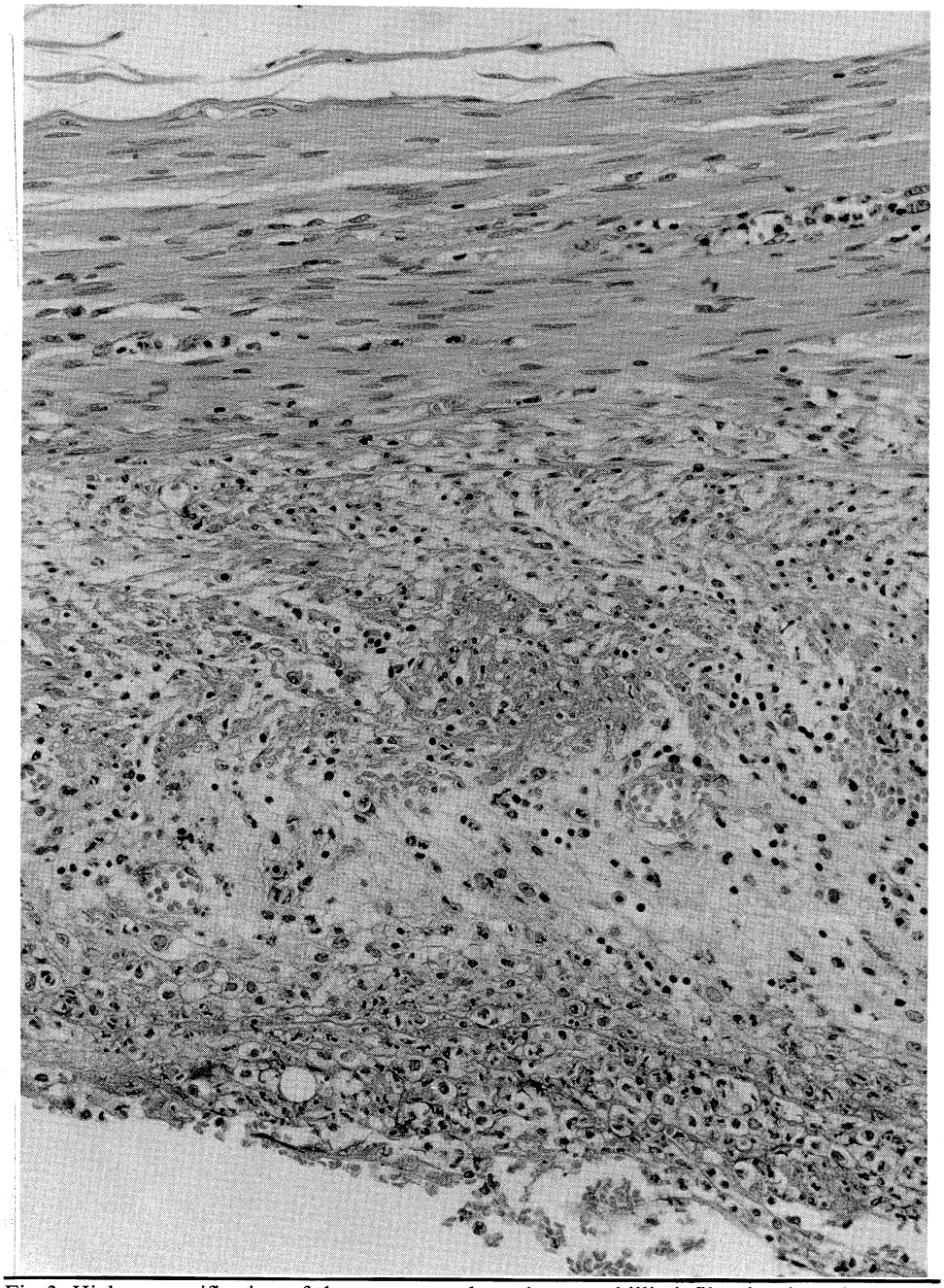

Fig 3. Higher magnification of the same area showed neutrophillic infiltration into the serosa of the appendix. (H and E. X50)

lower midline incision under general anesthesia. On entering the peritoneal cavity, a small amount of purulent fluid was immediately observed around the appendix, liver and spleen, but the fluid had no foul smell. The shunt catheter was identified in the peritoneal cavity, and it was traced down to its tip in the right paracolic space next to the appendix. Acute inflammatory change in the appendix was noted. Therefore, an appendectomy was performed in the usual manner. The peritoneal cavity was irrigated with 4,500 ml saline, after which the shunt catheter was exteriorized.

The patient's postoperative course was uneventful. Culture studies of the ascites revealed *Esherichia coli*. Histological examination of the appendix revealed inflamed serosa of the appendix with no obstruction of its lumen (Figs 2, 3).

One month later, the exteriorized shunt catheter was reinserted into the peritoneal cavity.

## DISCUSSION

Many abdominal complications secondary to ventriculoperitoneal shunts have been reported, such as perforation and obstruction of the bowel[1,2] or cerebrospinal fluid cysts.[3] Acute appendicitis has also been reported as complication of ventriculoperitoneal shunt.[4,5] The shunt catheter may result in nonspecific infection with high fever and peritoneal irritation.[6,7] Most of these conditions produce nonspecific abdominal signs, and the differential diagnosis is frequently difficult. As the initial treatment for such nonspecific infection of the shunt catheter, administration of antibiotics and removal of the intraperitoneal shunt catheter have been recommended.[6,7]

However, such treatment may result in severe morbidity in patients with a perforated appendix.[5] In our case, the symptoms and signs were localized in the right lower quadrant of the abdomen and suggested peritonitis. Therefore, acute appendicitis was highly suspected from the very beginning of the admission, and a laparotomy was performed immediately. Furthermore, the shunt catheter was removed from the peritoneal cavity during the initial operation. It was responsible for the patient's postoperative course being uneventful. It is not clear why culture studies of the ascites revealed *Esherichia coli*. However, bacteria may leak through the wall of the appendix.

In one case report, histological examination of the appendix revealed inflamed serosa,[4] similar to our case. In our case, culture studies of the cerebrospinal fluid proved negative, and histological examination of appendix revealed inflamed serosa. These findings suggest that the shunt catheter may have caused the inflammation of the appendix.

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