

**Title:** Current problems and clinical results of endoscopic necrosectomy for walled-off pancreatic necrosis.

**Short running title:** Clinical results of EN for WON

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Pancreatic necrosis affects approximately 20% of all patients with acute pancreatitis. Infected pancreatic necrosis is a major risk factor for sepsis-related multiple organ failure<sup>1</sup>. The development of walled-off necrosis (WON) is a late complication of acute severe necrotizing pancreatitis, and endoscopic necrosectomy (EN) has become an effective treatment for infected WON. A multicenter study<sup>2-4</sup> of EN in WON revealed clinical success rates from 75 to 91%. However, high mortality and morbidity rates of 6.7–11% and 14–33%, respectively, were found.

Figure 1 shows treatment results for WON cases at our institution between 2002 and 2017. Twenty-three patients with infected WON underwent endoscopic drainage as an initial treatment. Of these, 13 showed complete resolution without EN. Of the 10 patients who underwent EN, nine showed complete resolution following a median of four EN sessions; however, one patient with incomplete resolution died due to multiple organ dysfunction. The clinical success rate was 90%, and mortality and morbidity rates were 10% and 50%, respectively. The lost patient was 44 years man with alcoholic pancreatitis. He was not an alcohol abuser, and it was his first event of acute pancreatitis. The severity at 48 hours was a new Japanese severity score 4 with CT grade 3. EN was performed 8

times and the volume of necrotic cavity was reduced, however the patient died after 136 hospital days. Details of complications included bleeding in two cases (one each from a fistula and the cavity wall), perforation in two cases, and aspiration pneumonia in one case.

All patients were managed without having to undergo surgery (Figure 2).

More recently, several reports have described the use of a biflanged metal stent (BFMS) for WON with successful outcomes that reduced the need for EN<sup>5</sup>. However, long-term data on the use of BFMS for this disease is limited.

### **Conflict of interest**

Authors declare no conflict of interests for this article.

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## **Figure legends**

### **Figure 1**

Clinical results of patients with infected walled-off pancreatic necrosis (WON) with endoscopic drainage. EN: endoscopic necrosectomy; EUS: endoscopic ultrasound

### **Figure 2**

(a) A contrast enhanced computed tomography (CE-CT) image showing walled-off pancreatic necrosis (WON). (b) Endoscopic image during endoscopic necrosectomy (EN). (c) Pulsatile bleeding from the cavity wall occurred during EN. (d) A CE-CT image revealed a pseudoaneurysm at the cavity wall. (e) An interventional radiologic image showing an extravasation of contrast medium from the gastric duodenal artery (arrow). (f) We stopped the bleeding by coil embolization under interventional radiologic guidance (arrow).