Vacuum sponge therapy using the pull-through technique via a percutaneous endoscopic gastros- 
tomy to treat iatrogenic duodenal perforation

Fig. 1 a Duodenal perforation with free intra-abdominal fluid and air (arrow) in a patient undergoing 
argon plasma coagulation treatment for recurrent adenocarcinoma. b The inserted sponge (arrow) had 
dislocated to the stomach at 24 hours after endoscopic placement in the duodenum in order to treat 
the perforation shown in a.

Fig. 2 a Duodenal perforation. b Sufficiently granulated cavity at 20 days after sponge treatment.

In 2011, a 37-year old patient with a 
history of familial adenomatous polyposis 
underwent a subtotal colectomy and 
resection of the proximal jejunum and 
distal duodenum with side-to-side duode-
nojejunostomy. The procedure was 
performed for adenocarcinoma of the 
duodenum (pT3 pN0 L0 V0 R0 G2). In November of 2013, an endoscopically irresectable recurrent adenoma of the anastomosis was seen. Surgical resection was also impossible because of desmoids of the mesentery. Therefore, it was decided intraoperatively to resect the adenoma endoscopically in piecemeal fashion. Histology again showed adenocarcinoma (pT1 R2), and the residual carcinoma was treated at intervals of 6 months with argon plasma coagulation (APC). In June of 2015, the patient developed fever and 
abdominal pain 24 hours after the last 
APC therapy.

Computed tomography showed free fluid 
and air adjacent to the ablation site (Fig. 1 a). Endoscopy confirmed a duodenal perforation (Fig. 2 a). Because of a lack of surgical options, an Eso-Sponge (B. Braun Melsungen AG, Melsungen, 
Germany) was placed close to the perforation. 
However, post-interventional computed 
tomography showed that the Eso-Sponge 
had dislocated to the stomach (Fig. 1 b). The risk for persistent dislocation was minimized as follows: First, with a Pexact Device II (Fresenius Kabi AG, Bad Hom-
burg, Germany), the anterior gastric wall 
was sutured (four polydioxanone [PDS] sutures) before a conventional 20-Fr per-
cutaneous endoscopic gastrostomy (PEG) 
catheter (Fresenius Kabi AG) was inserted 
using the pull-through technique. This 
procedure minimizes the risk for peritoni-
tis during frequent manipulations. A 
thread was introduced through the PEG 
into the stomach and drawn out orally 
with a grasping forceps. The thread was 
connected to the end of the Eso-Sponge 
tube. Second, the Eso-Sponge device was 
introduced into the stomach using the 
pull-through technique, and the Eso-
Sponge tube was diverted through the 
PEG. Third, intraluminally the Eso-Sponge 
was positioned endoscopically close to 
the duodenal perforation (Fig. 3 a, b). A negative pressure was 
applied (30 mmHg). 
The Eso-Sponge was changed three times 
(at 4- to 6-day intervals) as follows: A gas-
tric tube was connected to the external 
end of the Eso-Sponge tube. The Eso-
Sponge was grasped in the duodenum, 
drawn out orally, and cut off. The end of a 
new Eso-Sponge tube was connected to 
the end of the transoral tube. Finally, the 
sponge was drawn into the stomach by 
the pull-through technique under endo-
scopic view, as described previously, and 
then repositioned in the duodenum. 
The patient received total parenteral nu-
trition and antibiotic treatment (cefurox-
ime/metronidazole) for 10 days. Because 
of various risk factors (obesity, sleep ap-
nea, lockjaw), all procedures were per-
formed with the patient under general 
anesthesia. No further sponge dislocation 
occurred. At 20 days after the initiation of 
treatment, the cavity appeared closed 
(Fig. 2 b), and the patient was started 
on solid food. The PEG was removed 7 
days later.

Endoscopic vacuum therapy has been 
established as an effective treatment for 
perforations [1,2]; however, it must be 
frequently modified in the upper gastro-
intestinal tract [3–5], and clinical experi-
ence is still limited. As shown in this case, 
intraluminal vacuum therapy is a feasible 
treatment option for a duodenal perfora-
tion. Because of the long distance and sev-
eral angles bridged by the sponge tube 
and adherence to the endoscope during 
retrieval of the device, there is a high risk 
for dislocation of the sponge when it is 
placed in the duodenum intraluminally 
and drawn out nasally. 
Use of the pull-through technique via PEG 
for sponge placement and necessary 
changes during treatment reduces the in-
traluminal distance of the Eso-Sponge
tube. Thus, the described method represents an easy way to prevent dislocation and so increase the chance of successful treatment.

Competing interests: None

References
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Fig. 3  a The Eso-sponge tube passes through the percutaneous endoscopic gastrostomy. b Endoscopic placement of the sponge in the duodenum with a forceps.