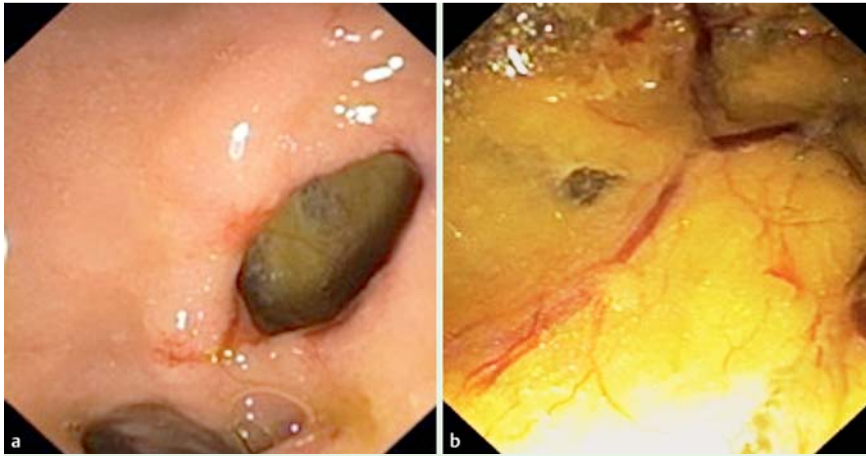


## Large type I post-ERCP perforation closed immediately through the duodenoscope with through-the-scope endoclips



**Fig. 1** a, b Duodenal perforation during endoscopic retrograde cholangiopancreatography (ERCP) in an 86-year-old patient with prostate cancer metastases to the liver hilum and lung.



**Fig. 2** The perforation was closed by means of four through-the-scope (TTS) endoclips, placed through the lateral-viewing duodenoscope.



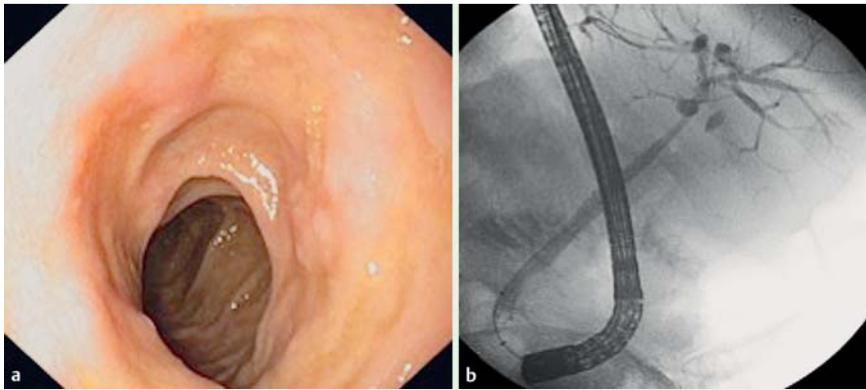
**Fig. 3** Enterography with Gastrografin contrast showed no leak.

Duodenal perforation as complication of endoscopic retrograde cholangiopancreatography (ERCP) is a rare but serious secondary event with an incidence of 0.6%–0.99% [1].

The most dangerous type of perforation is that categorized as type I in the classification by Stapfer et al. [2] and usually located in the lateral or medial duodenum wall. This is associated with high mortality rates (28%–47%) [3] and requires surgical

intervention in over 86% of cases [4]. Recently, the European Society of Gastrointestinal Endoscopy (ESGE) has recommended immediate closure during endoscopy, which is usually successful in 22% of attempts [5]. Case reports describe many different methods, but the most frequently used technique is application of endoclips with forward-viewing endoscopes [6]. Other techniques include the use of over-the-scope clips (OTSCs; Ovesco, Tübingen, Germany, and Aponos, Kingston, New Hampshire, USA) as well as glues, meshes, biologic or synthetic plugs, and endoloop plus clipping. However, with all these methods it is necessary to replace the lateral-viewing endoscope with a forward-viewing one.

The patient was an 86-year-old man with multiple co-morbidities including metastatic prostate cancer of the lung and the liver hilum, the latter having been treated with a plastic biliary stent 2 months previously. The patient was not a surgical candidate and presented for stent exchange, with a planned replacement of the plastic stent by a self-expandable metal stent (SEMS). Unfortunately, during the endoscopy a perforation of 13 mm diameter was clearly visible in the lateral wall of the duodenum (● Fig. 1 a, ● Fig. 1 b). Immediately after visual identification of the perforation, we thoroughly aspirated the duodenal contents. Without exchange-



**Fig. 4** Follow-up ERCP performed 5 weeks later showed complete healing of the duodenal wall and successful stent replacement: **a** endoscopic view; **b** radiological view.

ing the lateral-viewing duodenoscope, we proceeded to close the perforation using four through-the-scope (TTS) endoclips (Instinct; Cook Medical, Limerick, Ireland) (● Fig. 2).

The patient remained in hospital, with a nasogastric tube, intravenous antibiotics, proton pump inhibitor (PPI) medication, and parenteral feeding for 6 days. The patient denied any abdominal pain, fever, or sequelae of infection. Subsequent enterography with Gastrografin contrast demonstrated no leak and the patient was discharged home (● Fig. 3).

The follow-up ERCP 5 weeks later demonstrated the complete healing of the duodenal wall. During this second ERCP, the plastic prosthesis was successfully replaced with a covered metal stent (Hanarostent, 10Fr×100mm; M.I.Tech, France) without any adverse event (● Fig. 4a, ● Fig. 4b).

This report demonstrates that even large iatrogenic type I duodenal perforations can be safely, quickly and successfully closed with TTS endoclips through the duodenoscope. In this case carbon dioxide (CO<sub>2</sub>) gas was not used for insufflation but there is evidence that CO<sub>2</sub> insufflation can improve outcomes particularly in cases complicated by endoscopic perforation.

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