

## Duodenal perforation and bilateral tension pneumothorax following endoscopic sphincterotomy

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### Abstract

Endoscopic sphincterotomy is commonly used for retained bile stones. We report a 24-year-old woman who showed bilateral tension pneumothorax and duodenal perforation following endoscopic sphincterotomy performed under sedation. These complications are rare in the literature have significant mortality and morbidity.

**Key words** Duodenal perforation · Endoscopic sphincterotomy · Pneumothorax

Endoscopic retrograde cholangiopancreatography (ERCP) is an important method for the diagnosis and treatment of biliary and pancreatic diseases [1]. Various interventions such as stone extraction, sphincterectomy for papillary stenosis, lithotripsy for large intraductal stones, balloon dilatation for strictures, stent replacement, and local pseudocyst treatment can be performed by ERCP [1,2]. Major complications of these procedures are duodenal perforation, hemorrhage, tension pneumothorax, and pancreatitis [2–6].

Here we report a patient who developed bilateral pneumothorax and duodenal perforation after ERCP performed under sedation.

A 24-year-old woman was admitted with abdominal pain, nausea, vomiting, and jaundice following cesarean section performed 25 days earlier. On admission she had elevation of liver function tests: alanine aminotransferase (ALT), 502 U·l<sup>-1</sup> (normal range [NR], 0–34 U·l<sup>-1</sup>); lactate dehydrogenase (LDH), 372 U·l<sup>-1</sup> (NR, 0–220 U·l<sup>-1</sup>); gamma glutamyl transferase (GGT), 515 U·l<sup>-1</sup> (NR, 7–49 U·l<sup>-1</sup>); alkaline phosphatase (ALP), 1267 U·l<sup>-1</sup> (NR, 64–3000 U·l<sup>-1</sup>); and elevated bilirubin levels, with direct bilirubin, 3.37 mg·dl<sup>-1</sup> (NR, 0–

0.2 mg·dl<sup>-1</sup>) and total bilirubin, 5.44 mg·dl<sup>-1</sup> (NR, 0.2–1.0 mg·dl<sup>-1</sup>). Upper abdominal computed tomography (CT) showed intrahepatic ductal and choleductal dilations. Magnetic resonance cholangiopancreatography (MRCP) showed a filling defect suggesting a stone (12 mm) in the mid-choleductal region.

An ERCP was planned at the gastroenterology clinic and the patient was evaluated by an anesthetist for sedation during the procedure. After routine monitoring for sedation (electrocardiography [ECG], noninvasive blood pressure measurement [NIBP], and pulse oximetry [peripheral oxygen saturation [Sp<sub>O</sub><sub>2</sub>]; M1094B; Hewlett Packard, Saronno, Italy), nasal oxygen, at 3 l·min<sup>-1</sup>, and an intravenous infusion of 0.9% NaCl was started. Sedation was maintained with propofol infusion at 2–3 mg·kg<sup>-1</sup>·h<sup>-1</sup> and bolus alfentanil and midazolam. ERCP was performed after sedation. The common bile duct (CBD) was selectively cannulated. A cholangiogram via the catheter showed a dilated proximal CBD and a 1.5-cm stone in the middle part of the CBD. The distal CBD measured about 6–7 mm in diameter. Large endoscopic sphincterotomy was performed. The gallstone was fragmented with a basket catheter, but the large piece was not extracted from the papilla and the procedure was terminated. The procedure lasted approximately 1 h, with the patient in the prone position. At the end of the procedure she was transferred to the recovery room, where she was evaluated every 15 min by a nurse. When the patient was seen 60 min after the end of the procedure for discharge to the ward by an anesthetist, she complained of pain in the right chest region and her face was slightly swollen. Clinical examination revealed subcutaneous emphysema in the right cheek and neck and decreased air entry in the lower level of the right lung.

A chest X-ray showed total pneumothorax of the right lung, but her clinical signs did not get worse. A thoracic tube was placed immediately at the fourth intercostal space and she was transferred to the inten-

sive care unit (ICU) for further observation. A chest X-ray taken 1 h later showed a pneumothorax on the left side and at the same time she developed abdominal tenderness and the emphysema extended down to the abdomen. A left chest tube was inserted and she underwent emergent laparotomy due to suspicion of duodenal perforation. At laparotomy, a perforation of the retroperitoneal part of the duodenum was realized and cholecystectomy, choledochotomy, and duodenostomy were performed. During this procedure general anesthesia was maintained with propofol, remifentanyl, and rocuronium. After 3 days in the ICU she was discharged to the ward, where she stayed for another 10 days before leaving the hospital.

Retroperitoneal duodenal perforation is a well-known complication of endoscopic sphincterotomy and develops in 1.1% of the cases [5]. Most perforations originate posteriorly from the head of the pancreas or the processus uncinatus [8]. There are several procedural causes of perforation; in our patient, the perforation was probably due to the large diameter of the stone, the narrow diameter of the distal choleduct, and the wide endoscopic sphincterotomy. Another serious but rare complication of ERCP is pneumothorax [3,4,6,7]. The case reported by Hui et al. [3] was due to extensive air insufflation to the afferent loop, and the case reported by Morley et al. [6] was because of intraperitoneal perforation. The patient reported by Gya et al. [4] developed pneumothorax because of retroperitoneal duodenal perforation, similar to the occurrence in our patient.

In our hospital ERCP is performed in the endoscopic unit of the gastroenterology department, and all ERCP patients are monitored and sedated by an anesthesia team consisting of two senior anesthetists and one assistant professor. Most of the patients are ambulatory, and after the procedure all patients are transferred to the recovery room for observation for 1 h. Before discharge from the recovery room they are evaluated by an anesthetist. The sedation during the ERCP in our patient was uneventful, but she developed symptoms during the recovery period. Emphysema developed slowly and was

shown after a 60-min stay in the recovery room, and chest X-ray showed bilateral pneumothorax. This emphasizes the importance of the recovery period after such procedures.

Patients are discharged when their cardio respiratory parameters are stable, when they have no pain, when their consciousness has reached the preoperative level, muscle strength is enough for airway potency, and there is no nausea or vomiting. Complication due to sedation in ambulatory patients is related to the experience of the anesthetist. The complication which developed in our patient was recognized early, and therefore mortality could be avoided.

In conclusion, although rare, pneumothorax and duodenal perforation should be considered in ERCP patients. Cooperative working of the gastroenterologist and anesthesiologist and well-evaluated recovery criteria are other important factors in avoiding fatal complications.

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