

Subcutaneous Emphysema, Pneumomediastinum and Pneumoperitoneum after ERCP: Management of an Unusual Case

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Abstract

Background: Endoscopic retrograde cholangiopancreatography (ERCP) is a commonly used procedure in the diagnosis and treatment of biliary tract and pancreatic diseases. This procedure is safe but may cause life-threatening complications such as pancreatitis, bleeding and perforation. Perforation is the most fearful one among these complications. In cases of perforation, rapid diagnosis and treatment is lifesaving.

Case presentation: We report the case a 61-year-old female patient who developed pneumoperitoneum, pneumomediastinum and subcutaneous emphysema after ERCP. She was admitted to the emergency department due to neck swelling one hour after ERCP procedure. The patient was further evaluated on suspicion of

perforation in emergency department. Computed tomography (CT) scans demonstrated free air in the peritoneal cavity, retroperitoneal region and mediastinum and neck region. We thought that there might be air leakage due to excessive insufflation and facilitation of air leakage via duodenal diverticulum in our case. Early surgery was not planned and the patient was followed up nonoperatively. On the fifth day of the follow-up period, the patient was discharged with stable vital signs.

Conclusion: It should be kept in mind that there may be microperforations and duodenal air leaks that do not require surgery after ERCP. The clinical or radiographic amount of air does not always correlates with the size of the perforation or severity of the complication, but rather pertains

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perforation.

Key words: Cholangiopancreatography,
endoscopic retrograde; subcutaneous
emphysema; pneumomediastinum,
pneumoperitoneum.

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is a widely used method in the diagnosis and treatment of biliary tract and pancreatic diseases (1). Complications related to ERCP include reasons such as pancreatitis, bleeding, cholangitis and perforation. Mortality rates due to this procedure are between 1% and 1.5% (2). Among these complications, the most fearful one is air leakage, it may be from the duodenum and small intestine, or from the extrahepatic bile duct

system. In addition, positive compressed air delivered during ERCP may spread to the abdomen, retroperitoneum, mediastinum and subcutaneous soft tissues (3).

In this case, we aimed to present the management of the patient in the emergency department who developed pneumoperitoneum, pneumoretroperitoneum, pneumomediastinum and subcutaneous emphysema due to duodenal air leakage after ERCP.

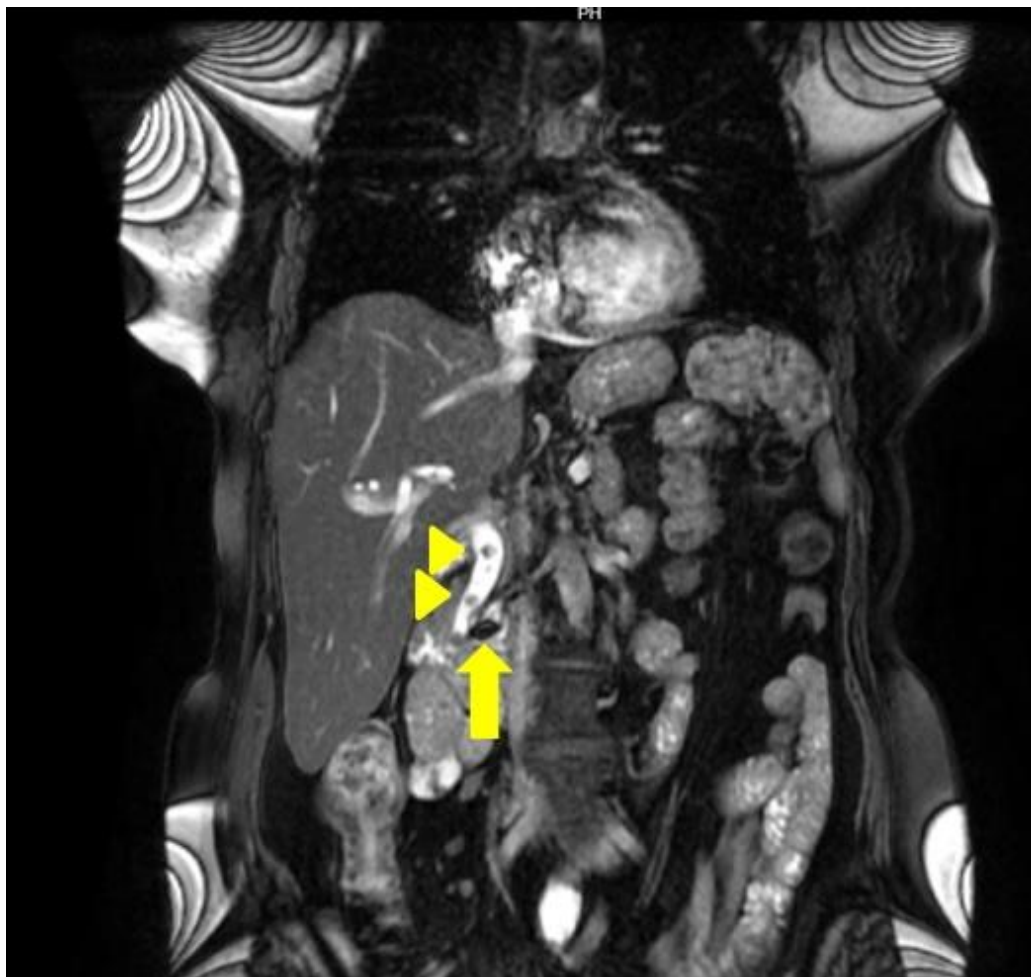


Figure 1. MRI scan showed duodenal diverticula (arrow) and multiple stones (arrowheads) in common bile duct before the ERCP procedure

CASE REPORT

61-year-old female patient who had right upper quadrant pain was referred to our hospital for further evaluation. USG (ultrasonography) revealed dilatation of common bile duct. She had undergone cholecystectomy seven years ago in her past medical history. Choledocholithiasis was detected by MRCP (magnetic resonance cholangiopancreatography) in further evaluation (Figure 1). Initially ERCP (endoscopic retrograde cholangiopancreatography) was performed to remove common bile duct stones. Juxtapapillary

duodenal diverticulum was detected during ERCP procedure and papilla of Vater could not be clearly visualized. Surgical extraction of the stones was suggested to the patient. She was admitted to the emergency department due to neck swelling one hour after ERCP procedure.

The patient was further evaluated on suspicion of perforation in emergency department. A posteroanterior chest radiograph revealed of subcutaneous emphysema, pneumomediastinum



Figure 2. A posteroanterior chest radiograph revealed of subcutaneous emphysema, pneumomediastinum and pneumoperitoneum



Figure 3. CT scan showed duodenal diverticula (yellow arrow), pneumoperitoneum (yellow arrowheads) and retroperitoneum (red arrowheads) after the ERCP procedure

and pneumoperitoneum (Figure 2). CT (computed tomography) scanning of chest and abdomen was performed. Although no free fluid was detected in the abdominal cavity, CT scans demonstrated free air in the peritoneal cavity, retroperitoneal region (Figure 3), mediastinum and neck region (Figure 4). Diverticula was also located medially in the second part of the duodenum (Figure 3). The patient was monitored in the emergency department with discontinuation of oral intake, hydration, and

antibiotherapy (ceftriaxone and metronidazole). She was consulted with Department of General Surgery and Thoracic Surgery. Urgent or emergency surgery was not considered other than drainage of subcutaneous emphysema due to the stable clinical findings of patient. The patient was hospitalized and followed up with daily chest radiography. On the fifth day of the follow-up period, free air was decreased on the radiography, and the vital signs of the patient were stable. The patient was discharged for elective surgery.

Surgical removal of common bile duct stones was planned on 30th day after ERCP procedure. Common bile duct stones were removed via choledochotomy and choledochoduodenostomy was performed. The patient was discharged on the 6th postoperative day. The patient has been followed up for 3 months without any surgery-related complications.

Type III perforations define perforation of the bile or pancreatic duct due to instrumentation, and Type IV perforations define retroperitoneal gas alone or diminutive retroperitoneal perforation due to excessive insufflation gas (4,5). Our patient had Type 4 perforation; it was thought that the patient had diffuse pneumomediastinum, pneumoperitoneum and

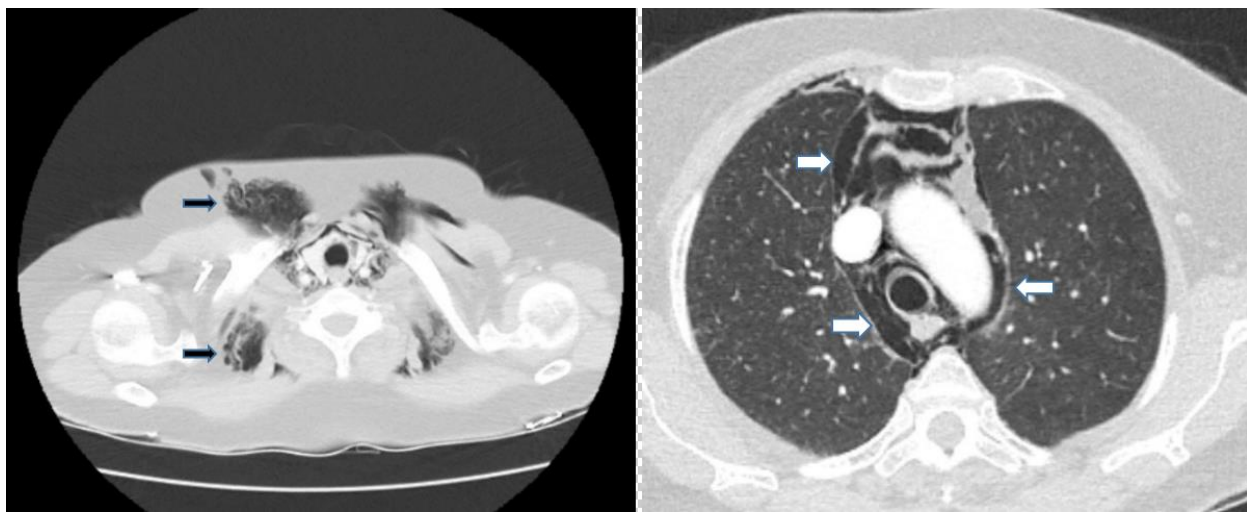


Figure 4. CT scans showed subcutaneous emphysema (black arrow), and pneumomediastinum (white arrow)

DISCUSSION

The incidence of duodenal perforation after endoscopic procedures is approximately 0.08-0.6% with an estimated mortality rate of 8-23% (4). ERCP-related duodenal perforations are classified into 4 types in descending order of severity (4, 5). Type of perforation and the size of the leakage may help management of the patients (4). Type 1 perforations often define perforation of lateral wall of duodenum caused by the endoscope, Type II perforations define periampullary perforation of the medial wall of the duodenum associated with biliary or pancreatic sphincterotomy or precut papillotomy,

subcutaneous emphysema due to air leakage during insufflation.

Serious and fatal complications requiring intervention such as pneumoperitoneum, pneumomediastinum and subcutaneous emphysema due to ERCP procedure are rare (2). There are many different causes of subcutaneous emphysema in the literature. These include spontaneous or traumatic pneumothorax, iatrogenic or traumatic tracheal injury, sinus injury associated with facial trauma, and dental procedures. In addition, it has been reported that invasive interventions to the gastrointestinal tract such as ERCP may cause subcutaneous

emphysema, albeit rarely (3). It has been known for a long time to develop subcutaneous emphysema due to air leakage from the gastrointestinal tract. Air may escape from the lumen of the gastrointestinal tract and lead to multiple mechanisms of subcutaneous emphysema. Retroperitoneal air may spread upward from the mediastinum and neck or downward from the subcutaneous plane to the abdominal wall, hips and scrotum. In addition, air in the peritoneal cavity may reach the subcutaneous tissues directly by dissection from a defect in the parietal peritoneum or through diaphragm separating the thoracic and abdominal cavities (6). Excessive insufflation during the procedure may cause to leak significant amount of air through a small opening, which may explain the clinical situation in our case. We did not find any obvious perforation or free fluid in abdominal cavity except the presence of free air. We thought that there might be air leakage due to excessive insufflation and facilitation of air leakage via duodenal diverticulum in our case.

Abdomen of the patients may be evaluated with fluoroscopy immediately after ERCP procedure. If there is a suspicion of perforation, small amount of contrast injection under fluoroscopy may diagnose or exclude extravasation and prevent delay in diagnosis of perforation (5). The perforation is also diagnosed by CT and the presence of intraabdominal fluid and the passage of contrast material into the abdominal cavity may be shown with CT scans (2,6,7). Severe abdominal pain, distinctive abdominal distention,

shortness of breath and presence of crepitation in the skin may suggest suspicion of ERCP-related perforation (8). Abdominal X-rays and chest X-rays are common initial imaging method to confirm the diagnosis. Free air under the diaphragm and air densities in the mediastinum and neck may be demonstrated on X-ray. CT scan is probably should be obtained even when there is no evidence of retroperitoneal air on plain films. This is because of its high sensitivity for detecting free air and for differentiation this diagnosis from others (e.g. pancreatitis) (8,9). Pneumomediastinum, pneumothorax, subcutaneous emphysema, free air in the retroperitoneal and intraperitoneal space may be shown on CT scans. CT scans with contrast may confirm the location of the perforation. However, this technique has low sensitivity to detect microperforations (10). In our case, subcutaneous emphysema and pneumomediastinum were detected on the chest X-ray. CT scans showed subcutaneous emphysema in the neck, pneumomediastinum and pneumoperitoneum, but no obvious sign of perforation was detected. The clinical or radiographic amount of air does not always correlates with the size of the perforation or severity of the complication, but rather pertains to the degree of manipulation after the perforation.

In stable patients, the presence of contrast leakage due to perforation in CT helps the clinician for the need for surgical intervention (11). Most cases respond to conservative treatment but require immediate treatment because of the presence of

subcutaneous emphysema with pneumomediastinum, especially when the respiratory and cardiovascular system is suppressed (6). The treatment of subcutaneous emphysema is to repair the ruptured organs, to prevent air from entering the subcutaneous tissue, and to facilitate the release of air under the skin. Decompression therapy is recommended to facilitate the release of air under the skin. Several methods for decompression have been described such as infraclavicular incision, gill incisions, and trancutaneous drains (6, 12). When perforation is suspected, bowel rest and stomach decompression with a broad-spectrum antibiotic is mandatory (13). In our case, due to widespread free air in the peritoneum, mediastinum and neck, an incision was made in the jugular region in order to evacuate the air and it was observed that the air regressed after the incision. In addition, conservative management is acceptable in clinically stable patient with type 4 perforation with insignificant leakage on the contrast-enhanced CT. Early surgery was not planned and the patient was followed up nonoperatively. Surgical choledochotomy and extraction of stones were performed one month after ERCP. T-tube drainage was assumed unsuitable due to the duodenal diverticulum, choledochodoudenostomy was performed in the same session.

CONCLUSION

It should be kept in mind that there may be microperforations and duodenal air leaks that do

not require surgery after ERCP. The clinical or radiographic amount of air does not always correlates with the size of the perforation or severity of the complication, but rather pertains to the degree of manipulation after the perforation. Decompression of subcutaneous emphysema and antibiotic treatment will prevent unnecessary surgery. In these cases, rapid diagnosis and treatment are important for prognosis.

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Conflict of Interest Disclosure: The authors declare that they have no conflict of interest.

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