



MANAGEMENT OF SUBCUTANEOUS EMPHYSEMA: AN UNUSUAL COMPLICATION DURING ERCP – A CASE REPORT

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ABSTRACT

Endoscopic retrograde cholangiopancreatography (ERCP) is a diagnostic and therapeutic procedure widely employed for biliary and pancreatic diseases. Although generally safe, ERCP can result in complications such as pneumothorax, pneumomediastinum, pneumoperitoneum, and subcutaneous emphysema due to duodenal perforation[1]. These conditions necessitate prompt recognition and appropriate intervention to prevent morbidity and mortality. We report a case of a 74-year-old female with obstructive jaundice who developed extensive subcutaneous emphysema and associated complications during ERCP. Management included surgical intervention, supportive care, and close monitoring. This case highlights the importance of vigilance and a multidisciplinary approach in managing rare complications of ERCP.

KEYWORDS :

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is a well-established diagnostic and therapeutic procedure for pancreaticobiliary disorders. Despite its widespread utility, ERCP is associated with a significant complication rate of 4%-10%[6][8]. While common complications include post-ERCP pancreatitis (3.5-5%), haemorrhage (1-2%), and cholangitis (1%), duodenal perforation occurs in less than 1% of cases but can lead to serious sequelae[2].

Duodenal perforation during ERCP can result in air dissection through anatomical planes, potentially causing pneumoretroperitoneum, pneumomediastinum, pneumothorax, and subcutaneous emphysema[5]. The retroperitoneal location of the duodenum creates a unique pathway for air dissection along fascial planes, leading to these complications. Subcutaneous emphysema, while rare, presents as tissue swelling and crepitus, often serving as an important clinical indicator of underlying perforation[4].

The management of ERCP-related subcutaneous emphysema requires careful consideration of multiple factors, including the extent of emphysema, associated complications, and the patient's clinical status. Treatment approaches range from conservative management with close monitoring to surgical intervention. Despite existing literature on ERCP complications, detailed reports of subcutaneous emphysema management in this context remain limited.

This case report presents our experience in managing subcutaneous emphysema as a complication of ERCP, focusing on the diagnostic approach, treatment decisions, and clinical outcomes. Our aim is to contribute practical insights to the existing literature and assist clinicians in managing similar cases effectively. Understanding the potential for such complications and being prepared with appropriate management strategies is crucial for all practitioners performing ERCP procedures.

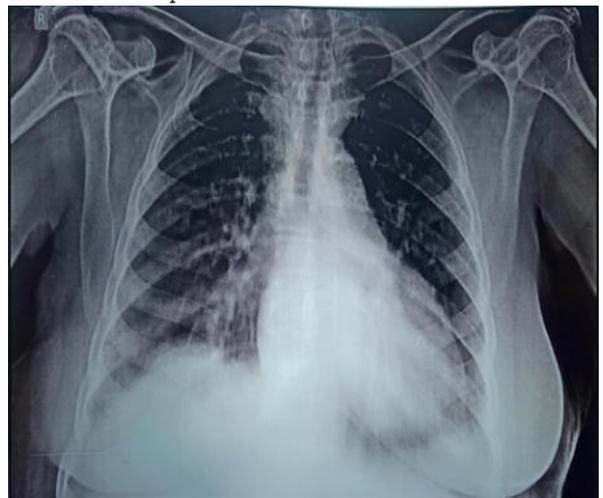
Case Presentation

A 74-year-old female with obstructive jaundice was referred for ERCP. Preoperative evaluation included a 2D echocardiogram showing an ejection fraction of 61%, with no significant abnormalities. Systemic examination and baseline chest X-ray were normal. The patient had a history of well-controlled hypertension and diabetes mellitus.

ERCP was performed under general anesthesia (GA) without intubation. Premedication included glycopyrrolate (0.2 mg), midazolam (1 mg), and fentanyl (40 µg). Induction was achieved with propofol (50 mg) and ketamine (40 mg). The procedure was uneventful until the later stages, when a sudden drop in oxygen saturation from 100% to 80% was noted. Immediate management included oxygen supplementation, repositioning, and bag-mask ventilation, maintaining SpO₂ at 90%.

Post-procedure, the patient presented with unilateral facial, neck, and chest swelling with palpable crepitus. Computed tomography (CT) revealed bilateral pneumothorax, pneumoperitoneum, and subcutaneous emphysema, suggestive of duodenal perforation[3].

Emergency diagnostic laparoscopy confirmed a duodenal perforation, which was repaired surgically after converting to an open laparotomy. A feeding jejunostomy was placed, and a left intercostal drain was inserted for pneumothorax management. Postoperatively, the patient required ICU care with ventilatory support. Extubation was achieved on postoperative day one. The patient showed a favorable recovery and was discharged in stable condition after resolution of complications.



Pre OP Chest X Ray



Post ERCP Chest X Ray



Post ERCP Emphysema

DISCUSSION

Pathophysiology And Etiology

Some of the major complications of ERCP are haemorrhage, pancreatitis, cholangitis and duodenal perforation. Subcutaneous emphysema following ERCP is an uncommon but serious complication that usually results from duodenal perforation. This occurs when insufflated air escapes from the gastrointestinal tract into the retroperitoneal space due to a breach in the duodenal wall[2][9]. From the retroperitoneum, the air can spread along fascial planes to the peritoneal cavity, mediastinum, and subcutaneous tissues[7]. While minor air leaks may remain asymptomatic or cause mild discomfort, significant leakage can lead to severe complications such as respiratory distress, tachycardia, and hemodynamic instability. In the present case, the duodenal perforation resulted in widespread air dissemination, manifesting as subcutaneous emphysema, pneumothorax, and pneumoperitoneum, necessitating urgent surgical intervention.

Risk Factors

The main risk factor for complications of ERCP are difficult bile duct cannulation, sphincter of odi dysfunction and continuous

air insufflations and repeated attempts to cannulate the papilla. Several factors contribute to the risk of duodenal perforation during ERCP. Advanced age, as in this case, is a well-recognized risk factor due to reduced tissue elasticity and resilience. Comorbid conditions such as hypertension and diabetes mellitus may further compromise tissue integrity and healing. Additionally, therapeutic interventions like sphincterotomy and biliary stenting increase the risk of perforation[6][10]. Operator experience and the presence of altered anatomy or strictures are also crucial determinants of procedural safety. In this case, the patient's advanced age and comorbidities likely heightened her vulnerability to this complication.

Management Strategies

The management of subcutaneous emphysema and its associated complications depends on the severity and underlying etiology. A prompt and structured approach is crucial for successful outcomes[5][9].

1. Conservative Treatment

Oxygen supplementation: High-flow oxygen enhances the reabsorption of nitrogen from trapped air, thereby accelerating the resolution of subcutaneous emphysema.

Broad-spectrum antibiotics: Administering antibiotics reduces the risk of secondary infections, particularly in cases of gastrointestinal perforation.

Intravenous hydration: Adequate fluid resuscitation improves tissue perfusion, promotes healing, and prevents shock in cases of hemodynamic instability.

2. Surgical Intervention

Repair of duodenal perforation: When perforation is confirmed, primary repair or surgical resection of the affected segment is often required[2]. In this case, the perforation was repaired during an emergency laparotomy.

Chest tube insertion: Pneumothorax associated with perforation necessitates chest tube placement to evacuate air from the pleural cavity and restore normal respiratory function.

Air decompression techniques: In cases of extensive subcutaneous emphysema causing severe discomfort or functional impairment, small surgical incisions or needle aspirations can be used to release trapped air.

In this case, the patient underwent successful laparotomy for duodenal perforation repair, placement of a feeding jejunostomy, and chest tube insertion for pneumothorax management. These interventions, combined with intensive care support, facilitated a favourable outcome.

Comparison With Literature

Findings from this case align with observations in the existing literature. Islim et al. (2021) and Stapfer et al. (2000) have emphasized the importance of early detection and surgical management in cases of ERCP-related perforations. The use of imaging, as highlighted by Matsubara et al. (2019), is critical for identifying retroperitoneal air and guiding therapeutic decisions. Our case supports these insights by demonstrating how prompt imaging, early surgical intervention, and comprehensive supportive care can mitigate the consequences of even severe complications.

Implications For Clinical Practice

This case underscores the importance of vigilance and preparedness during ERCP procedures, particularly in elderly patients with comorbidities. To enhance procedural safety and minimize risks, a multidisciplinary approach involving anaesthesiologists, endoscopists, and surgeons is essential.

Key strategies to reduce complications include:

Limiting insufflation pressures: Minimizing air insufflation during ERCP reduces the risk of air leakage and associated complications.

Advanced imaging techniques: Real-time imaging can aid in early detection of perforations or air escape, facilitating timely intervention.

Close perioperative monitoring: Continuous monitoring during and after the procedure ensures that complications are recognized and managed promptly.

This case reinforces the need for a systematic approach to managing ERCP-related complications and highlights the value of a collaborative, multidisciplinary effort in achieving optimal patient outcomes.

CONCLUSION

Subcutaneous emphysema and its associated complications, such as pneumothorax and pneumoperitoneum, are rare but serious events during ERCP, often resulting from duodenal perforation. Early recognition and prompt intervention, including surgical repair and supportive care, are essential to ensuring favorable outcomes.

This case underscores the importance of vigilance, multidisciplinary collaboration, and preparedness during minimally invasive procedures. Proactive measures, such as controlled insufflation pressures, careful monitoring, and structured management of complications, are critical to minimizing risks. Effective teamwork and timely intervention were key to the successful resolution of complications in this patient, highlighting best practices in managing ERCP-related adverse events.

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