

# Sudden Respiratory Deterioration During ERCP under General Anesthesia

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## ARTICLE INFO

### Article history:

Received 28 February 2026

Revised 22 March 2026

Accepted 05 April 2026

### Keywords:

ERCP;

Pulmonary edema;

Prone position;

Hypercapnia;

General anesthesia

## ABSTRACT

Pulmonary complications during endoscopic retrograde cholangiopancreatography (ERCP) performed under general anesthesia are uncommon but may become life-threatening, particularly following prone positioning. We report a case of intraoperative pulmonary edema that presented as an abrupt rise in end-tidal carbon dioxide and reduced bilateral air entry shortly after proning for ERCP. Early recognition guided by capnography and clinical examination, followed by prompt ventilatory and pharmacological management, resulted in a favorable outcome. This case highlights the importance of vigilant respiratory monitoring and early intervention during prone endoscopic procedures, especially in patients with compromised cardiac function.

## Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) is widely used in the diagnosis and treatment of biliary and pancreatic disease. For the anaesthetist, however, the procedure can be challenging because it requires immobility, reliable airway protection, and positioning that is often non-supine. General anaesthesia with endotracheal intubation is therefore commonly chosen for patients in whom airway or procedural risk is considered high [1]. Prone positioning facilitates endoscopic access and fluoroscopic imaging, but it also changes both respiratory and cardiovascular mechanics. Chest wall compliance may fall, diaphragmatic movement can become restricted, and venous return may change. These effects are particularly relevant in patients with impaired cardiac function who may have little physiological reserve. Hypoxemia is a recognized problem during ERCP, whereas acute pulmonary edema is uncommon and may initially occur before a marked fall in oxygen saturation.

In such a setting, an abrupt increase in end-tidal carbon dioxide (EtCO<sub>2</sub>), together with a change in airway pressures or delivered tidal volume, may provide an early clue to developing respiratory pathology. We describe a case of acute pulmonary edema that developed shortly after prone positioning during ERCP under general anaesthesia.

## Case Report

A 61-year-old woman weighing 55 kg, with an ASA physical status of IV, was scheduled for ERCP for obstructive jaundice (total bilirubin, 12 mg/dL). Her medical history included ischemic heart disease with previous percutaneous transluminal coronary angioplasty and severe left ventricular dysfunction. Preoperative echocardiography showed an ejection fraction of 30–35%, regional wall motion abnormalities, moderate left ventricular dysfunction, mild tricuspid regurgitation, and mild pulmonary arterial hypertension. Her baseline haemodynamic parameters were stable.

The authors declare no conflicts of interest.

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DOI:

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Because the procedure was expected to be prolonged, general anaesthesia was planned. Standard ASA monitoring was applied. Anaesthesia was induced with etomidate and the trachea was intubated with a 7.0-mm cuffed endotracheal tube. Maintenance was with sevoflurane in an oxygen–air mixture. Volume-controlled ventilation was started with a tidal volume of 380 mL, a respiratory rate of 10/min, and PEEP of 3 cm H<sub>2</sub>O.

After the patient was turned prone, and shortly after carbon dioxide insufflation began, the EtCO<sub>2</sub> rose abruptly from 30 to 65 mmHg. At the same time, peak airway pressure increased and the delivered tidal volume fell. Oxygen saturation subsequently decreased to 75%. Bilateral basal crepitations were heard on auscultation. Bronchospasm, endotracheal tube obstruction, pneumothorax, aspiration, and acute pulmonary edema were considered in the differential diagnosis.

The procedure was stopped and 100% oxygen was administered. The endotracheal tube was suctioned, recruitment manoeuvres were performed, and the ventilator settings were adjusted. Intravenous diuretics were given, with haemodynamic support as required.

She was transferred to the intensive care unit for planned postoperative ventilation. Her respiratory status and overall clinical condition improved progressively, and she was extubated after 12 hours. The subsequent postoperative course was uneventful.

## Discussion

Acute pulmonary edema during ERCP is uncommon, but the consequences can be serious in patients with limited cardiac reserve. In this patient, several factors may have contributed, including prone positioning, general anaesthesia, positive-pressure ventilation, and the effects of the procedure itself.

Prone positioning can alter chest wall mechanics and increase airway pressures. In a patient with poor left ventricular function, these changes may increase pulmonary capillary hydrostatic pressure and favour movement of fluid into the alveolar space. General anaesthesia also reduces lung volumes and can promote atelectasis, while positive-pressure ventilation raises intrathoracic pressure and may influence pulmonary venous drainage [2–5].

During ERCP, carbon dioxide insufflation can raise intra-abdominal pressure and restrict diaphragmatic

movement, thereby worsening ventilation–perfusion mismatch. Absorption of CO<sub>2</sub> can itself increase EtCO<sub>2</sub>, but a marked rise that persists despite correction of the usual ventilatory causes should prompt consideration of another pulmonary process. In our patient, the capnographic abnormality appeared before the severe fall in oxygen saturation and therefore provided an early warning of the developing respiratory problem.

The case emphasizes the value of continuous capnography and attention to changes in airway pressure, tidal volume, and the overall ventilatory pattern during prone endoscopic procedures. When a high-risk patient develops an unexplained respiratory deterioration, early reassessment and a low threshold for postoperative ventilation and intensive care observation may be appropriate [6].

## Conclusion

Acute pulmonary edema during ERCP is rare but can be life-threatening, particularly in patients with significant cardiac dysfunction undergoing the procedure in the prone position. In this case, the sudden rise in EtCO<sub>2</sub> preceded severe hypoxemia and helped draw attention to the developing respiratory complication. Close respiratory monitoring and prompt investigation of unexpected changes in capnography and airway mechanics are important for early recognition and treatment.

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