

# Epigastric Pain Caused By Pneumothorax Following Extubation In A Case Of Transperitoneal Laparoscopic Nephrectomy

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## Abstract

Pneumothorax is a rare complication of laparoscopic surgeries.<sup>1</sup> We report our experience of a patient who developed a sudden fall in SpO<sub>2</sub> and a sharp rise in EtCO<sub>2</sub> during transperitoneal laparoscopic nephrectomy, requiring conversion of the surgery into an open procedure. Postoperatively, the patient developed severe epigastric pain. A chest X-ray was inconclusive but a CT angiogram revealed a pneumothorax with mediastinal shift, which required intercostal drainage. We believe that epigastric pain maybe an important symptom of pneumothorax following laparoscopic nephrectomy and recommend the use of a CT scan to make a definitive diagnosis should that not be obvious on a chest X-ray.

## INTRODUCTION

Laparoscopic techniques have expanded considerably to include many advanced procedures, transperitoneal laparoscopic nephrectomy being one of them.

We report our experience of a patient who developed severe epigastric pain due to pneumothorax following transperitoneal laparoscopic nephrectomy for renal cell carcinoma, which needed intercostal drainage.

## CASE REPORT

A 55-year-old man weighing 81 kg underwent transperitoneal laparoscopic right nephrectomy. He received one mg midazolam and thirty mg pentazocine as premedication. Anaesthesia was induced with 120 mg propofol and 100 mg succinylcholine and maintained with 60% N<sub>2</sub>O and 1% isoflurane in O<sub>2</sub>. The relaxant used was vecuronium.

Monitoring included the electrocardiogram (ECG), pulse oximetry, end-tidal CO<sub>2</sub> and non-invasive blood pressure monitor.

A CO<sub>2</sub> pneumoperitoneum was created with a pressure-controlled insufflator to an intra-abdominal pressure of 14 mm Hg. The haemodynamic and respiratory parameters were all within normal limits for the first two hours (SpO<sub>2</sub>-100%, EtCO<sub>2</sub>-35 to 40 mm Hg, heart rate-75 to 85 /min,

blood pressure-120-140 mm Hg systolic). After two hours, there was a sudden fall in SpO<sub>2</sub> from 100% to 75% in about 90 seconds. At the same time, there was a sharp increase in EtCO<sub>2</sub> from 38 to 55 mm Hg. The haemodynamic parameters and the ECG were normal. The surgery was stopped and the pneumoperitoneum deflated immediately, and 100% O<sub>2</sub> given. This resulted in an improvement in SpO<sub>2</sub> to 90%. On auscultation, air entry was equal over both the lung fields and there was no evidence of bronchospasm. After three minutes of 100% O<sub>2</sub>, the SpO<sub>2</sub> improved to 97-98%. The EtCO<sub>2</sub> returned to normal and the haemodynamic parameters remained normal. It was decided to convert the surgery into an open nephrectomy, and anaesthesia was resumed with 60% N<sub>2</sub>O and 1% isoflurane in O<sub>2</sub>. No obvious rent in the pleura was found. The surgery lasted another hour and was uneventful.

At the end of surgery, neuromuscular blockade was reversed and the patient extubated. However, he complained of severe epigastric pain and was unable to maintain SpO<sub>2</sub> above 93% even on 100% O<sub>2</sub>. He had a respiratory rate of around 30/min and air entry was bilaterally equal. An arterial blood gas (ABG) showed a PaO<sub>2</sub> of 72 mm Hg (on 100% O<sub>2</sub>), but the pH and pCO<sub>2</sub> were normal.

He was shifted to the ICU for observation on 100% O<sub>2</sub> by mask. A 12-lead ECG was normal and CPK-MB and Troponin-T studies were negative. A chest X-Ray was

uninformative. A CT pulmonary angiography and D-Dimer were done. It showed a right-sided pneumothorax with mediastinal shift. No evidence of embolism was noted on pulmonary angiography and the D-Dimer was also negative.

In view of these findings, an intercostal drain (ICD) was immediately inserted. The patient immediately felt more comfortable, his SpO<sub>2</sub> came up to 99% on 100% O<sub>2</sub> by mask. An ABG done after 30 minutes showed PaO<sub>2</sub> of 132 mm Hg. The ICD was kept in situ for 72 hours and removed when serial X-rays confirmed lung expansion. The patient made a full recovery and was discharged on the seventh day.

## DISCUSSION

Pneumothorax as a complication of surgical CO<sub>2</sub> pneumoperitoneum has been reported in gynaecologic laparoscopic procedures<sub>1</sub> and laparoscopic cholecystectomy<sub>2,3</sub>. Congenital diaphragmatic defects causing peritoneopleural communication is the most common explanation<sub>1</sub>.

The development of pneumothorax following laparoscopic vagotomy<sub>4</sub> and laparoscopic fundoplication<sub>5</sub> has also been described. The explanation was that an iatrogenic peritoneopleural communication occurred in these cases.

In the present case, the sudden onset of signs points to an acute event causing peritoneopleural communication. We believe that dissection of renal structures close to the pleura during laparoscopic nephrectomy opened up tissue planes through which CO<sub>2</sub> entered the pleura.

A case of tension pneumothorax masked by subcutaneous emphysema after laparoscopic nephrectomy<sub>6</sub> has been described. In that case, post-operative X-rays suggested subcutaneous emphysema but CT revealed a tension pneumothorax. The authors concluded that there was a difficulty in making the diagnosis on X-ray because of the subcutaneous air routinely seen after any laparoscopic procedure. A study of 308 laparoscopic nephrectomies at the Mayo Clinic<sub>7</sub> concluded that routine chest X-ray was unnecessary after laparoscopic nephrectomies, because all cases of post-operative pneumothorax (4 in 308 cases) were diagnosed on clinical suspicion and were not an incidental X-ray finding.

In the reported cases, the most common signs of intra-operative pneumothorax have been a decrease in SpO<sub>2</sub><sub>3</sub>, an increase in airway pressures<sub>3,8</sub>, an increase in EtCO<sub>2</sub><sub>8</sub> and a

fall in blood pressure<sub>8</sub>. With the exception of the fall in blood pressure, all the other signs were also seen in our case.

It has been recommended that CO<sub>2</sub> pneumothorax should be managed conservatively since the gas is highly soluble in blood and the pneumothorax resolves rapidly<sub>4,9</sub>. However, our patient had a pneumothorax significant enough to cause mediastinal shift on CT, which explains his severe epigastric pain. A pneumothorax of that magnitude required intercostal drainage.

There is an increasing use of laparoscopic techniques in urosurgery. Anaesthesiologists managing such cases need to be able to detect and manage such incidents at the earliest. We believe that post-operative epigastric pain maybe an important symptom of pneumothorax following laparoscopic nephrectomy, and recommend the use of a CT scan to make a definitive diagnosis should that not be obvious on a chest X-ray.

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