

**Case Report****Massive hydrothorax following percutaneous nephrolithotomy**

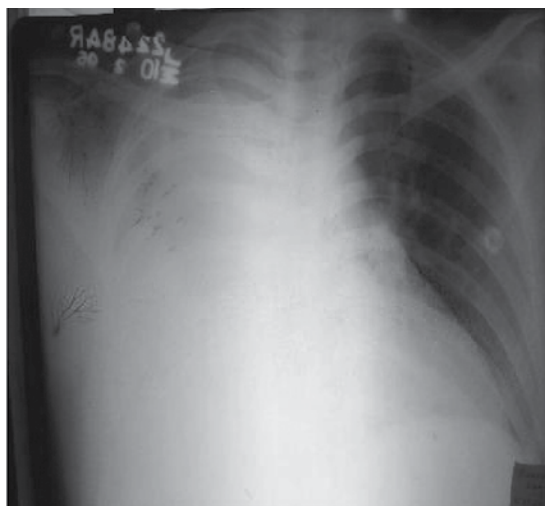
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**CASE REPORT**

A 31-year-old male patient weighing 80kg with calculus in the upper and middle calyces of his right kidney was scheduled for repeat right percutaneous nephrolithotomy (PCNL). He had undergone PCNL under general anaesthesia four days previously with no perioperative complications. There was no other significant surgical or medical history. Anaesthetic assessment was unremarkable as was a preoperative chest radiograph.

After preoxygenation anaesthesia was induced with propofol and fentanyl. The trachea was intubated after relaxation with vecuronium. Bilateral equal air entry was confirmed before and after the patient was positioned prone. Isoflurane, oxygen and nitrous oxide were used for maintenance of anaesthesia. Intraoperative vital signs were within normal limits. Peak airway pressure was 12cmH<sub>2</sub>O in the supine position and 15-20cmH<sub>2</sub>O when prone. PCNL was performed with a right supra-costal (between 11th and 12th rib) approach and lasted one hour. 1.5l Ringer's lactate was administered intravenously. 12 litres 1.5% glycine was used for irrigation and total blood loss was 50-60ml.



**Figure 1.** Postoperative chest radiograph showing opacity of the right hemithorax

Once surgery was completed, the patient was turned supine and neuromuscular blockade was reversed with neostigmine and glycopyrolate.

After extubation the patient was comfortable, undistressed, haemodynamically stable and oxygen saturation was 97% breathing 40% oxygen by mask and 94% on room air. On auscultation, air entry was slightly decreased with fine crepitations on the right side of chest, with dullness on percussion on this side. Chest radiograph revealed opacity of right hemithorax (Figure 1). A diagnosis of hydrothorax was made which was confirmed by needle aspiration through the right 5th intercostal space. An intercostal drain with underwater seal was inserted in the right 5th intercostal space in the midaxillary line. 1500ml fluid was drained in 6 hours and a further 200ml in the next 12 hours. Repeat chest radiograph 24 hours later showed full expansion of the lung and the drain was removed on the 3rd postoperative day. The patient was discharged on the 5th postoperative day.

**DISCUSSION**

PCNL was introduced in the 1970s to treat kidney stones in patients who were poor operative risks. In recent years, where available, PCNL has virtually replaced open stone removal in patients of all ages and for nearly all types of stone.<sup>1</sup> Advantages of the percutaneous method include lower mortality and morbidity, faster convalescence, greater ease of repeat procedures and greater cost effectiveness.<sup>1</sup>

Success of percutaneous nephrolithotomy depends directly on the approach to the collecting system, either subcostal or supracostal. The kidney lies tilted in the retroperitoneum with its upper pole posterior to the lower pole. When accessed from below (the subcostal route), it may be difficult to pass the rigid instrument to the upper pole because of the acute angle from the skin. An upper pole approach (supracostal route) results in a tract that is less parallel to the long axis of the kidney allowing easier access to the upper pole.

However the supracostal approach is associated with a small but significant increase in morbidity.<sup>2-4</sup> The increase in morbidity of this supracostal approach is primarily due to the potential for damage to the lung and pleura. A portion of the diaphragm is not covered by a pleural reflection and so injury to the pleura can be avoided by supracostal puncture over the most lateral portion of the 12th rib.<sup>3</sup> The lungs do not normally fill

**Summary**

Percutaneous nephrolithotomy (PCNL) is used extensively for removal of renal and upper ureteric calculi. The calyceal system of the kidney can be accessed via a subcostal or supracostal route. Supracostal puncture provides direct access to the upper, middle and lower calyx and the upper ureter, and so it is used extensively despite an increased incidence of intrathoracic complications. We encountered massive hydrothorax following PCNL which was managed by intercostal drain insertion. The literature on this subject is reviewed.

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the costophrenic recess during quiet respiration, lying approximately at the level of the 8th rib in midaxillary line and 10th rib posteriorly. This position is variable and the lungs may fill the whole costophrenic recess in patients with obstructive pulmonary disease and during deep inspiration in the prone position. All percutaneous tracts that pass between the 11th and 12th ribs posteriorly puncture the diaphragm. Puncture of the pleura is a relatively more serious problem and is a recognized risk of supracostal puncture.

Accumulation of fluid can occur due to two reasons;<sup>3</sup> first due to inadequate tamponade of the nephrostomy tract combined with inadequate drainage of the kidney after the puncture. Secondly, post-procedure hydropneumothorax may be due to failure to seal the tract with a working sheath during stone removal. For patients in the prone position, at full expiration during puncture, the quoted rates of damage to the left and right lungs are 14% and 29% respectively, when using 11th-12th intercostal space.<sup>5</sup>

Hydrothorax complicating PCNL is usually diagnosed clinically during the procedure by decreased oxygen saturation and significant increased airway pressure.<sup>6</sup> The diagnosis can be confirmed using a chest radiograph. With the patient in the prone position, fluid can be seen tracking along the lateral borders of the chest cavity and compressing the ipsilateral lung. In our patient, there was neither desaturation nor significant increase in airway pressure. Postoperatively, the patient was comfortable but a slight decrease in oxygen saturation was noted. There was reduced air entry with fine crepitations on the affected side. This clinical scenario led us to suspect an intrathoracic complication and manage it accordingly.

This case highlights the need to have a high index of suspicion for this complication even in the absence of the expected clinical signs.

In summary, hydrothorax is a known complication of PCNL by the supracostal route. We recommend strict intraoperative monitoring of airway pressure, with early intraoperative fluoroscopy where available. In symptomatic postoperative patients prompt chest X-ray should be undertaken.

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