



CASE REPORT

HEMOTHORAX AFTER PERCUTANEOUS NEPHROLITHOTOMY VIA A SUPRACOSTAL PUNCTURE

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Abstract:

Percutaneous Nephrolithotomy is the gold standard procedure for management of renal calculus disease as it is a less invasive procedure with less post-operative complications and a decreased hospital stay. Although complication as bleeding may occur, acute hemothorax following a supracostal puncture PCNL is rare but a severe complication. We report the case of 48 male who underwent PCNL for left renal calculus disease in our institution and developed acute hemothorax and collapse of the left lung. He was swiftly managed by intercostal drainage which was removed on the 10th post-operative day when x-ray chest revealed a well expanding lung.

Keywords: Percutaneous Nephrolithotomy, Supracostal approach, Hemothorax

INTRODUCTION:

The first percutaneous nephrostomy description of record was published in 1865 by Thomas Hillier, MD. Dr. Hillier, a young physician in London, repeatedly drained a 4-year-old boy's kidney, which he believed at that time to be congenitally obstructed. He performed multiple nephrostomies from 1863-1868 in an attempt to relieve the patient's abdominal distension, hoping to create a permanent fistula to the skin. This child ultimately died 5 years later. None of Hillier's contemporaries followed his example, and percutaneous renal procedures received no further attention until the mid 1950s.

The technology and techniques involved in percutaneous renal access and percutaneous surgery have evolved rapidly over the last 65 years, with Goodwin and associates providing the next description of percutaneous renal access in 1955[1], followed by Fernstrom and Johansson who described a procedure in which a renal pelvic calculus could be extracted through a percutaneous tract in 1976.[2]

Most of the following therapeutic interventions were once performed via an open approach. With percutaneous renal access, these interventions carry significantly decreased morbidity than they did with open surgery. Percutaneous renal access is a minimally invasive technique that allows the patient quicker recovery time, better cosmetic effect, and a shorter hospital stay, and now used as Nephrostomy catheter drainage, Antegrade ureteral stenting, Treatment of ureteral strictures, Percutaneous endopyelotomy, Percutaneous endopyeloplasty, Percutaneous



Nephrolithotomy, Miniature percutaneous nephrolithotomy (Mini-Perc), Tubeless percutaneous Nephrolithotomy, Perfusion chemolysis to dissolve and clear certain renal stones and Endoscopic resection & treatment of upper urinary tract urothelial tumors.

CASE REPORT:

A 48 year old male was admitted to MGMCH, Jaipur diagnosed with left renal calculus. All routine investigations revealed no marked abnormality and he was scheduled for a percutaneous Nephrolithotomy [PCNL]. His intravenous pyelogram revealed a calculus in the upper pole of the left kidney and hence a notion to proceed with the PCNL via a supracostal puncture was decided.

PROCEDURE:

Operative intervention included administration of an antibiotic pre-operatively and the patient sent to the operating room and placed in a supine position for inducing general anaesthesia and placement of U-Cath, the patient was then placed in prone position for commencement of s-PCNL.

After antiseptic cleansing, adhesive disposable drapes with collecting pockets were used to capture the irrigation fluid. PCNL was performed by biplanar fluoroscopy with a rotating C-Arm. Intrarenal anatomy, stone configuration was studied and the desired upper calyx was punctured by supracostal via the 11th intercostal space and guide wires were navigated through the collecting system and duly fixed and tract dilatation was pursued. After securing renal access, tract dilatation and placing the working sheath, a rigid nephroscope was inserted under direct vision and Nephroscopy performed under videoendoscopic monitoring. Irrigation fluid (0.9% normal saline, warmed to room temperature), was used. Stone fragmentation was performed by pneumatic lithotripter and fluoroscopy with contrast nephrogram was performed to obtain a stone free status. The puncture was examined for any overt/active bleeding after stone clearance, a double J stent was placed and guide wire was removed. Nephrostomy tube sized 22 Fr was then placed via the dilated puncture and clamped until the first postoperative day

The patient was shifted to the post-operative ward where he complained of chest pain, shortness of breath and vital monitoring revealed a pulse rate of 106bpm, blood pressure of 100/60 mm Hg and a respiratory rate of 22/min. On physical examination, auscultatory findings revealed decreased air entry in the left side of chest. The patient was managed in intensive care with oxygen support at 4L/hr, blood transfusion, antibiotic and analgesic management, an urgent chest x-ray was sought which revealed massive hemothorax in the left chest. Intercostal drain tube was placed through the 6th rib at the posterior axillary line and about 600ml of blood was drained. A patent air column movement was noted and the patient was managed in intensive care until the next post-operative day. Ultrasonography was also carried out to review any peritoneal collection and status of the left kidney which revealed no abnormality. Subsequently the patient's general condition was satisfactory to proceed with the scheduled protocol for post-operative PCNL management, the chest tube was removed on post-op day 10 when the air column seized to



function and the patient was satisfactorily discharged on the 14th post-operative day and had no complaints during follow-up two weeks later when he was also scheduled for removal of the Double J stent.

DISCUSSION:

Multiple renal punctures and renal pelvic perforation are associated with a twofold greater blood loss. Kukreja et al [6] found that diabetes mellitus, multiple tract procedures and a prolonged operative time were associated with significantly greater blood loss.

Large bulk stones, specifically staghorn stones, are more likely to be associated with bleeding and the need for transfusion. In a multivariate analysis, staghorn stones and multiple tracts were independent predictors of bleeding [3].

Supracostal access is normally achieved above the 12th or 11th rib and has a potential for injury to the pleura and/ or lung. The parietal pleura is reflected to the level of the 10th rib in the midaxillary line and variable along the 12th rib posteriorly. The visceral pleura never descend to the level of the midpoint of 12th rib except with forced ventilation. Therefore, all tracts that pass above the 12th rib pierce the diaphragm. [4] Entry through the pleural space may lead to an accumulation of fluid causing hydrothorax. Haemothorax secondary to laceration of the intercostal artery may also develop, which may be avoided by staying immediately above the upper border of the lower rib. According to available literature, pulmonary injury caused by transgressing the lungs via the posterior supra 12th rib intercostal approach is likely to occur in 14% of cases on the left side and 29% on the right side. [5] Supracostal approach above 11th rib is associated with 23.1% intrathoracic complications compared with 1.5 to 12% for above 12th rib approach and 0.5% for subcostal approach to access the collecting system⁶. Gupta et al. [7] reported 63 supracostal access procedures, with 14 (22%) sustaining overall complications. Chest complications developed in seven (11%) patients, three with minimal blunting of the costo-phrenic angle, managed conservatively, while significant hydrothorax and haemothorax occurred in three and one patient, respectively, who were treated with chest drains.

Hossian et al. [8] and colleagues have concluded in their study that Although the morbidity is slightly higher than with a subcostal approach, this may be avoided to some extent by adhering to the basic principles of always puncturing in full expiration, sufficiently laterally to the margin of erector spinae muscle closer to the midscapular line, and always using a working sheath during nephroscopy and a well-draining nephrostomy tube after the procedure. Proper attention to the technique and intraoperative and postoperative monitoring can detect chest complications, and these can easily be managed with intercostal drainage without serious morbidity or death.

CONCLUSION:

Supra costal access for management of renal calculus disease is a positive step towards the ongoing development and refinement of an already standardized procedure. It avoids solid organ injury at the risk of injury to the pleura and lungs, which are relatively low and can be managed if the procedure is performed under careful guidance with selection of an appropriate needle puncture point. If the patient's condition is clinically suggestive of haemothorax or hydrothorax



an x-ray chest must be sought for in the immediate postoperative period and must be actively managed.

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