

Anaesthesia for Percutaneous Nephrolithotomy in Bahrain

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ABSTRACT

A modified general anaesthetic technique for percutaneous nephrolithotomy (PCNL) is adapted by stabilizing the kidney during percutaneous entrance in apnoea and the use of small tidal volume during the procedure of tract dilatation and stone extraction. The success rate was 97 percent in establishing calyces puncture and removal of calculi.

In November 1986, Salmaniya Medical Centre started performing procedure for removing renal calculi by PCNL. The single-stage technique is usually used.

Various techniques of anaesthesia are employed for PCNL. These include general anaesthesia with intermittent positive pressure ventilation, local anaesthesia, spinal and general anaesthesia with the use of high frequency ventilation ^{1, 2, 3}.

The aim of this study was to establish a modified technique of general anaesthesia for patients undergoing percutaneous nephrolithotomy.

METHODS

One hundred patients with renal calculi were anaesthetised in nine months for percutaneous nephrolithotomy. The patients were assessed by the anaesthesiologist pre-operatively and premedicated with pethidine 1.0 mg/kg and atropine 0.5 mg.

The physical status of the patients ranged from ASA 1 to 3 (American Society of Anaesthesiologists classification of patients). Table 1 shows the pre-operative data.

TABLE 1

Pre-operative Findings

	Range	Mean
Sex		
Male	68 patients	
Female	32 patients	
Age	9-69 years	37 years
Haemoglobin	11.6-15.0 g. %	12.7 g. %
Blood Pressure	100/70-160/100	130/80
Pulse	64 - 96/minute	72/minute
Weight	24 - 99 kg	68 kg

All the patients received general anaesthesia, induction with thiopentone, alcuronium for muscle relaxation followed by intubation of the trachea by armoured tube. Anaesthesia was maintained with nitrous oxide (60%) and oxygen (40%) and intermittent administration of halothane 0.5%. The anaesthetic gases were delivered with positive pressure provided by a Manley Pulmovent ventilator. The fresh gas flow rate was 100 ml/kg per minute which was reduced to 40 - 50 ml/kg per minute during the procedure of tract dilatation and stone extraction. The frequency of respiration was 12 to 14 per minute. Apnoea was maintained during percutaneous cannula entrance with 100% oxygen flushing the endotracheal tube. Apnoea was required for 1.5 to 2.5 minutes.

Continuous electrocardiographic and pulse monitoring and intermittent blood pressure measurements were performed. Arterial blood was taken for gas analysis before the procedure, during the procedure and during the apnoeic period. Blood loss, IV fluids and fluids used for irrigation were estimated. At the end of the operation the neuromuscular blockade was reversed with neostigmine 2.5 mg and atropine 1.2 mg. The total duration of anaesthesia ranged from 45 minutes to 2 hours and 30 minutes. The patients were transferred to the recovery room and kept under close observation and sent to the

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ward when they were fully awake. Post-operative care was managed by the surgeons.

RESULTS

In 95 patients percutaneous puncture of the renal collecting tube system and stone extraction were successful. In two patients the procedure failed and was repeated one week later and the calculi were removed. In 3 patients open nephrolithotomy was performed.

There was no significant variation in the blood pressure and the pulse from the baseline. None of the patients showed signs of light anaesthesia. There was significant increase in arterial PO_2 with slight reduction in arterial PCO_2 . During the apnoeic period, there was slight non-significant increase in arterial PCO_2 .

Intra-operative intravenous fluids, dextrose 5%, saline 0.18% and Ringer lactate, ranged from 1 to 2 litres. 16 patients required blood transfusion during the procedure.

One patient showed respiratory distress and cyanosis after reversal of the neuromuscular blockade. X-ray on the table showed pleural effusion at the side of the surgical procedure. An intercostal tube had to be inserted. Two patients were found to have mild pneumothorax on routine post-operative check X-ray, which was managed conservatively. None of the patients experienced awareness during the procedure.

The surgical procedure, operative and post-operative complication have been previously described⁴.

DISCUSSION

Stability of the kidney during percutaneous entrance and minimal mobility of the kidney during tract dilatation and stone extraction are the aims for successful percutaneous nephrolithotomy⁵.

Regional techniques require the co-operation of the patient. Attempt was made to perform the

procedure on the first patient under local anaesthesia. Intolerance by the patient necessitated the administration of general anaesthesia. High frequency ventilation achieves the requirement, but it presents a number of drawbacks which include the use of high gas flows and difficulty in controlling the anaesthetic gas concentration⁶.

The result of this study suggests that the technique of anaesthesia used had high success rate (97%) in establishing calyces puncture and removal of calculi. Only one patient had inadvertent pleural puncture with the use of this technique. None had any anaesthetic or other respiratory complications intra-operatively or post-operatively.

CONCLUSION

Maintenance of apnoea during percutaneous entrance and ventilation with low tidal volume during the procedure of tract dilatation and stone extraction is an anaesthetic technique which can be safely used for percutaneous nephrolithotomy.

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