

Percutaneous Nephrolithotomy under Spinal Anaesthesia

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Submission: December 30, 2015; **Published:** February 26, 2016

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Abstract

Objective: To Evaluate efficacy and safety Profile of Intrathecal anaesthesia for adult patients undergoing percutaneous nephrolithotomy (PCNL).

Patients and Method: This study has been conducted at urology department Liaquat University Hospital Jamshoro. From 1st November 2013 to 31st October 2014. Thirty male patients aged between 25 to 75 years were included in this study. All patients were given spinal anaesthesia to perform PCNL. The height of block was assessed in all patients, any supplemental drug given was recorded in every case.

Results: There were thirty male patients in this study with mean age 43.33 years, range between 25 to 75 years. Mean weight was 67.53 Kg range between 45 to 98kg and mean height was 67 inches range between 52 to 72 inches. The mean duration of surgery was recorded as 85.33 minutes. Patients ASA I were 66.7 % ASA II were 23.3 % and ASA III were 10%. Patients with comorbidities like hypertension were 20.70 %, chronic renal failure was 9.7 % and Asthma were 3.30%. Rest of 73.3% patients was fit without any comorbidities. The height of block was recorded as; 15 patients with sensory block up to T6 level, 12 patients with sensory block up to T7 level and 3 patients with sensory block up to T8 level.

Conclusion: The spinal anaesthesia can be safely and effectively given to the adult patients undergoing PCNL.

Keywords: PCNL; Spinal anaesthesia; Adult patients

Introduction

Renal stones are one of the oldest entities known to mankind (eg. Egyptian mummies with renal stones) [1]. The reported incidence of stones in the urinary tract varies widely suggesting that there may be factors in the diet or water which favours stone formation in different areas the so called stone belts. Different modalities of treatment of renal calculi were being practiced. Pyelolithotomy, Nephrolithotomy were the important methods practiced for long times. Percutaneous Nephrolithotomy PCNL is now a popular method for removal of kidney and ureteral calculi and the treatment of choice for renal calculi greater than 2 cm to 3 cm in diameter, multiple kidney calculi, stag horn calculi and cases of failed shockwave lithotripsy (such as those with calcium oxalate monohydrate and cysteine calculi) [2,3]. PCNL is now established and popular method to treat renal calculi due to less trauma, early mobilization, less pain, less hospital stay and early returned to job makes it economical. Anaesthesia for PCNL can be general or regional [4].

The method of dilating the tract after percutaneous renal puncture to specifically remove urinary tract calculi was first established in 1976 by Fernstorm and Johansson [5]. Advances in surgical techniques and equipment have further contributed to PCNL becoming the recommended primary treatment option for most patients with large volume renal calculi and stag horn calculi [6]. In Korea the first PCNL was performed in July 1984 by Koh et al. [7]. The spinal anaesthesia is frequently used in obstetrics and many Gynecological surgeries as well as few cases of lumbar Laminectomies [8]. PCNL is mostly performed under general anaesthesia but it can be performed under regional (Spinal) anaesthesia. Spinal anaesthesia has the advantages of better postoperative pain relief, fewer episodes of nausea and vomiting, more benign postoperative recovery, avoidance of poly pharmacy as well as being cost effective [9].

Patients and Method

This case series study was conducted at urology department

Liaquat University Hospital Jamshoro during 1st Nov 2013 to 31st Oct 2014. Thirty male patients were selected for this study. Female patients were not included in this study due to social embracement, because patients remain awake in spinal anaesthesia during surgery. A formatted questionnaire was complete by one respondent. The questionnaire was designed to evaluate variables such as age, weight height of patient and status ASA I, II and III and duration of surgery were noted. (Table 1), Co-morbidities (Figure 1), and supplemental drugs given (Table 2, Figure 2). Before anaesthesia and operation every patient was assessed properly, informed and written consent was taken. Standard monitors were applied, 18G i/v canula was inserted and all patients were preloaded with 500 ml of colloid (Gelofusine). Intrathecal anaesthesia was administered in lateral position in L 3-4space with 0.75% hyperbaric Bupivacaine hydrochloride 2ml (15mg). All anesthetic were performed with a 27 gauge Quincke-type spinal needle with introducer. The needle bevel was aligned parallel to the dural fibers. Patients were immediately placed supine with 10 degree head down tilt. Height of sensory block was assessed after 10 minutes (Table 3). Every patient was administered Injection Nalbuphine 5mg i/v after placing them prone. Patients oxygen saturation, heart rate, systolic and diastolic blood pressures were noted every 10 minutes throughout the surgery (Figure 3). Sedation in form of Propofol infusion 25 mg /Kg/min and analgesia in the form of Ketamine 20 mg boluses were provided accordingly. Hypotension was treated with Ephedrine 5mg boluses.

Table 1: Demographic characteristics.

	Mean ± SD/ %	Range
Age (yrs)	43.33 ± 12.39	25-70
Wt (kg)	67.53 ± 10.24	45-98
Ht (inches)	67 ± 3.31	52-72
Gender male %	100	
ASA-I (%)	66.7	
ASA-II	23.3	
ASA-III	10	
SaO2 %	99	
Duration of surgery min	85.33±14.4	40-140

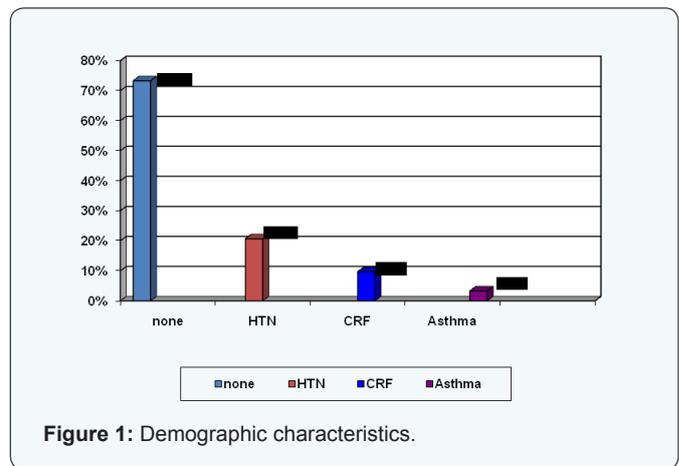


Figure 1: Demographic characteristics.

Table 2: Haemodynamics during surgery.

	B-line	5 min	10min	20min	30 min	40min	50min	60min
SBP	132.24 ±4.5	126.83±19.6	120.03±16.	116.57±11.1	118.53±9.7	115.93±10.4	118.8±9.89	121.4±10.46
DBP	79.65±6.67	78.2±11.2	72.67±6.68	72.67±6.68	72.23±7.26	71.47±6.23	75.03±7.2	74±8.08
HR	74.56 ±8.11	81.83±13.8	76.4±11.77	74.07±7.74	75.07±7.25	73.67±7.27	74.4±6.76	77±7.16

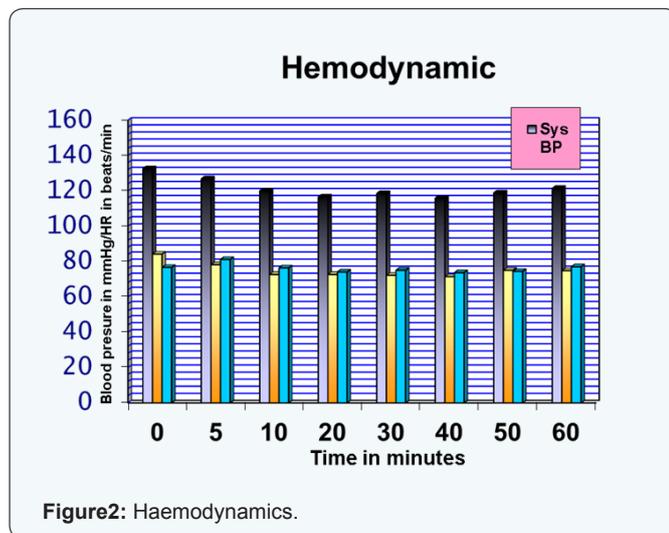


Figure2: Haemodynamics.

Results

This study conducted on 30 male patients with median age 43.33 range 25 to 75 years, median weight 67.53 Kg range 45 to 98 Kg, median height 67 inches range 52 to 72 inches. Anesthesia assessment was made as ASA I 20 patients i-e 66.7 % ASA II 7 patients i-e 23.3% and ASA III 3 patients i-e 10%. SO₂ saturation was maintained at 99%. Duration of surgery was recorded as 85.33 minutes range 40-140 minutes (Table 1). Out of these thirty patients 22 patients i-e 73.30% did not had any comorbidities, 7 patients i-e 20.70% patients were hypertensive and 3 patients 9.70% were suffering from chronic renal failure with renal stones and 1 patient i-e 3.30% was asthmatic (Figure 1).

The haemodynamics during surgery were maintained and noted. The mean baseline systolic Blood pressure was recorded

as 132.24±4.5 and mean diastolic baseline blood pressure was recorded as 79.65±6.67 and mean heart rate was 74.56±8.11. Blood pressure and heart rate were noted at 5 minutes, 10 minutes, 20 minutes, 30 minutes, 40 minutes, 50 minutes, 60 minutes duration in each patient and recorded, the mean value was calculated and given in Table 2, Figure 2. Propofol was given to 10 i-e 33.3 % patients and ketamine was needed in 5 i-e 16.7% patients while only 3 i-e 10% patients needed Ephedrine (vasopressor) to maintain their blood pressure (Table 3). 15 i-e 50 % patients received sensory block up to T6 level, 12 i-e 40% patients received block up to T7 level and remaining 3 i-e 10% patients received block up to teen age level (Figure 3).

Table 3: Supplemental Drugs.

	% Received	% Not Received
Sedation Propofol	33.3	66.7
Analgesia Ketamine	16.7	83.3
Vasopressor Ephedrine	10	90

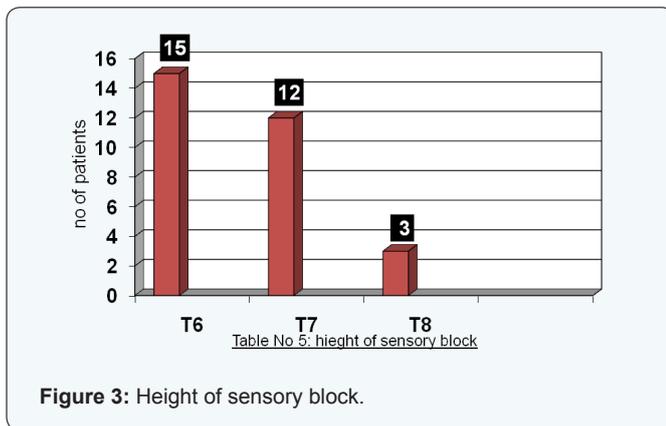


Figure 3: Height of sensory block.

Discussion

Percutaneous Nephrolithotomy (PCNL) is a minimally invasive effective and safe modality for removal of renal and upper ureteric calculi. Percutaneous Nephrolithotomy is used for the fragmentation and removal of large or multiple calculi from the renal pelvis and renal caliceal systems [10]. It has been shown that PCNL under assisted local anaesthesia is safe and effective in selected patients [11]. It has the advantage of shorter operative time, shorter hospital stay, and earlier return to work [12]. Anaesthesia for PCNL can be general or regional [4]. Spinal anaesthesia is not without complications but the complications are preventable [13]. Several studies have shown that spinal anaesthesia results in less intra-operative bleeding compared with general anaesthesia [14,15]. The spinal anaesthesia has the advantages of better postoperative pain relief, fewer episodes of nausea and vomiting, more benign postoperative recovery, avoidance of polypharmacy as well as being cost effective [9]. Spinal anaesthesia with bupivacaine is reportedly efficacious and safe [14].

In 321 cases of orthopedic and trauma surgery Ramaioli and Pagani [15] found that 10mg of 1% bupivacaine without adrenaline provided 135 minutes of spinal anaesthesia for hip and femur operations. In our study we had injected 0.75% hyperbaric bupivacaine 2ml (15 ml) in every patient. The duration of surgery was recorded as 85.33 minutes range 40 to 140 minutes (Table 1) and found to be adequate. The haemodynamics of these patients showed stable systolic and diastolic blood pressure and heart rate (Table 2, Figure 2). Only 10% patients needed Ephedrine (vasopressor) (Table 3). The height and quality of block was adequate for PCNL in all patients (Figure 3). It has been shown that PCNL under assisted local anaesthesia is safe and effective in selected patients [11]. General anaesthesia can be challenged in some situations such as PCNL for stag horn calculi because of possibility of fluid absorption and electrolyte imbalance. Therefore regional anaesthesia may be a good alternative [16]. Thus common complications of the general anaesthesia such as sore throat, presser response to laryngoscopy and intubation, bronchospasm, laryngospasm as well as postoperative nausea and vomiting are avoided which ultimately leads to shorter hospital stay.

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