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OUR EXPERIENCE OF REGIONAL ANESTHESIA FOR PERCUTAEOUS NEPHROLITHOTOMY SURGERIES IN 213 CASES

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ABSTRACT Percutaneous nephrolithotomy (PCNL) is mainly done for renal and upper ureteral stone removal1. Anesthesia techniques are general or regional anesthesia. Many studies have shown perioperative events related to anaesthesia 2. Regional anesthesia is preferred mainly to avoid general anesthesia related complications, and postoperative morbidity and to enhance practice of fasttracking. So we studied intraoperative instability, postoperative complications and patient and surgeon satisfaction in patients who received regional anaesthesia. **Method:** After ethical committee approval, regional anaesthesia were given for all 213 patients between 18-65 yrs who underwent PCNL surgeries. Perioperative hemodynamics like blood pressure, heart rate , postoperative complications in terms of shivering, vomiting, blood loss, pain and patients's and urosurgeon's satisfaction score was assessed. **Result:** Out of 213, 28 patients were received combined spinal epidural anaesthesia. Spinal anaesthesia was given to remaining 185 patients. In Intraoperative events, bradycardia (1), hypotension (31), bleeding at surgical site(2), and 1 case with hemothorax. Pain score was tolerable in 183 (85.9%) and intolerable in 30 (14%) patients. Hospital stay was total 3 days in 79% cases, more than 3 days in 21% cases. Surgeon's Satisfaction score was 2 in 23.9%, 3 in 75% for surgeons. Patient s satisfaction score was 2 in 24% and 3 in 75 %.**Conclusion:** In this minimally invasive urosurgeries, regional anaesthesia is an altenative anaesthesia choice for PCNL because of better hemodynamic stability, lesser complications and better satisfaction by surgeons and patients. Counselling, optimization of the patients by anaesthesiologists ,urosurgeons are needed for rapid recovery of such cases.

KEYWORDS : Percutaneous Nephrolithotomy (PCNL), regional anaesthesia, urolithiasis

Introduction:

Urinary tract stone disease is commonest pathology in urinary system[1]. Due to advances in endourology techniques, stone removal done with extracorporeal shock wave lithotripsy (ESWL), Transurethral lithotripsy (TUL). And Percutaneous nephrolithotomy (PCNL). PCNL is mainly done for renal, pelvis staghorn and upper ureteral stone removal[1]. It can be performed under general or regional anesthesia. Regional anesthesia is preferred mainly to avoid general anesthesia related complications, morbidity and enhance practice of fasttracking. In our institute, we are doing most of the cases of PCNL in spinal, epidural or combined spinal epidural anesthesia. So we have studied the efficacy, patients and surgeons, satisfaction ,as well as complications in 213 cases of PCNL in the tertiary care hospital over one year period.

Method: This prospective descriptive study was done in our institution for 1 year period after approval by institutional ethic committee. All 213 patients between age group of18-65 yrs who received regional anaesthesia for PCNL surgeries were enrolled in the study. Depending upon the duration of surgery, spinal or combined spinal epidural were decided. Epidural catheters were put in cases where surgical duration was more than 2 hours and cases with staghorn calculus.

Patients with horseshoe kidney, single kidney, and BMI more than 35 were excluded in our study. In preoperative visit, patient was explained about the prone positioning, regional anaesthesia technique and Visual analogue scale (VAS). Routine investigations, blood grouping, cross matching and renal function tests like Blood Urea Nitrogen, creatinine , serum electrolytes, Xray KUB , CT , IVP or USG .

Informed consent and starvation were confirmed for each patient undergoing PCNL. All patients were premedicated with inj. Pantoprazole 40mg 30min prior to surgery. Every patient was under appropriate antibiotic cover.

Standard intraoperative monitoring like pulse oximetry, electrocardiography, and noninvasive blood pressure were done. After wide bore intravenous cannulae placement, crystalloid Ringer lactate was started. Under aseptic precautions, spinal or spinal epidural anaesthesia was performed in sitting position in L3-4 interspace with appropriate needles as per institution protocol. Along with heavy bupivacaine, additive drugs like bupreonorphine, clonidine or fentanyl were added as per experienced anaesthesiologists of urology operation theatre. Target level of sensory blockade was T6 dermatome. Onsets of that level and drug dosage were recorded. After stabilization of anaesthesia, prone position was given carefully with help of trained operation theatre personnel. Since patient was conscious, 1 pillow was given under head as per demand and other pillow was between knee and ankle to encourage venous return. Both hands were placed 90 degree abduction at the level of the head. Patient was allowed to turn head on any side as per comfort. Patients with <95% spO2, received oxygen 2lpm with nasal prongs throughout the procedure.

Under fluoroscopic guidance, renal puncture was done. And then lithotripsy was carried out with continuous irrigation of fluid. Duration of the procedure and amount of irrigation fluid used were noted. As effluent fluid goes to bucket, it was difficult to measure the blood loss. Patient who bled excessively in intraoperative period, blood was transfused as per hemoglobin and clinical condition. Surgery was discontinued in prolonged procedure, excessive bleeding and hemodynamic instability. Intraoperative period, mean arterial pressure (MAP) was recorded and treated with vasopressors if MAP falls more than 20% of baseline.

After surgery, patients were shifted to recovery area till spinal effect had worn off. In recovery area, shivering, temperature, nausea, vomiting, VAS score for pain, treatment for pain and satisfaction score from surgeon and patients were noted. And also in postoperative period of 24 hrs, analgesia requirement were noted.

After shifting to ward, total duration of stay and any abnormal events were mentioned. Patients who shifted to ICU for critical condition were recorded to know morbidity. Patients' and urosurgeon's satisfaction score (0-not satisfied,1- mild satisfaction, 2- moderate satisfaction,3- fully satisfied) were noted with visual analog scale (VAS 1-10) was noted in postoperative period after 4hrs. Mortality and morbidity were also assesed.

Statistcal analysis – data was analysed with help of SPSS version and in percentage method.

Result: Out of 213, 131 (61%) were male and 83 (39%) were female.

Table 1. Male and Female distribution

	Frequency	Percent
Male	131	61

Female	83	39
	213	100

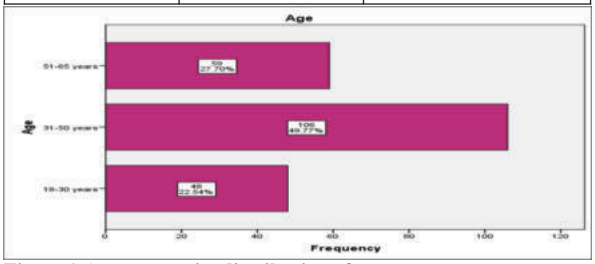

Figure 1.Age group wise distribution of cases

48 patients were of 18-30 yrs of age groups, 106 patients were of 31-50 yrs , and 59 patients from 51-65 yrs .(Fig. 1)

There were 116 patients with Right side calculi and 97 patients with left sided calculi. 95 patients were with pelvic calculi, 79 with lower calculi and 39 with upper calculi.

28 patients were received combined spinal epidural anaesthesia. And spinal anaesthesia was given to rest 185 patients. As per present anaesthesiologists choice, Clonidine (45mcg), Fentanyl (15-25mcg) and Bupreonorphine (60-90mcg) were added along with bupivacaine .But we didn't analysed comparative effects of this additive as it was not decided in proposed observational study.

Table 2. Significant Heart rate changes

Heart rate	Frequency	Percent
Stable	212	99.5
Unstable	1	0.5
Total	213	100

As per table 2, Heart rate was stable in all 212 patients except 1 who had bradycardia.

Table 3. MAP changes in all cases.

MAP range	Frequency	Percent
Stable	182	85.4
Unstable	31	14.6
Total	213	100

There were unstable BP mainly hypotension seen in 31 cases (14.6%) while rest all 182 patients were stable.

Table 4. Intraoperative events

Cases were postponed	Frequency	Percent
Stable	210	98.7
Unstable	3	1.3
Total	213	100

210 cases were done without any intraoperative complication. While out of 3, bleeding in 2cases while 1 case was prolonged hence stopped. (Table 4)

Postoperative shivering was seen in 35, nausea in 1 patient while vomiting in 3 cases.

Table 5. VAS score

VAS score (1-10)	Frequency	Percent
Tolerable pain (1-3)	183	85.9
Intolerable (4-10)	30	14.1
Total	213	100

Patient with VAS score more than 4, paracetamol was given 12hrly, 8hrly as per requirement but we had given analgesia on first day only.

Table 6. Hospital stay

Hospital stay	Frequency	Percent
Normal (1-3)	169	79.3
Prolonged (more than 4 days	44	20.7
Total	213	100

169 patients were discharged in 1-3 days which was normal. But there was prolonged stay in hospital in 44 cases with reason of bleeding, hypotension, and also for observation.

Hemodilution was seen in 20 cases but transfusion was given in 7 cases in view of low Hb in postoperative (8gm/dl). All patients were hemodynamically stable. In 29 patients, hypotension was due to post spinal anaesthesia and treated with fluid and 2 cases abandoned due to severe hypotension and treated with Noradrenaline infusion. These two patients were taken after 3 days under spinal anaesthesia. Only two patients (4.28%) had complications like hemothorax and bleeding at surgical site. One patient with hemothorax was in ICU for 5days and in the ward for 4days.

Table 7. Patients satisfaction score

Patient satisfaction score	Frequency	Percent
Mild satisfaction (0-1)	1	5
Moderate Satisfaction (2)	52	24.4
Fully Satisfied (3)	160	75.1
	213	100

Table 8. Urosurgeon satisfaction score

Surgeon satisfaction score	Frequency	Percent
Mild satisfaction (0-1)	0	0
Moderate Satisfaction (2)	51	23.9
Fully Satisfied (3)	162	76.1
	213	100

Surgeon were satisfied with anaesthesia field with regional anaesthesia. One mortality occurred due to sepsis on 7th postoperative day.

DISCUSSION-

Percutaneous nephrolithotomy procedure is minimally invasive procedure of stone removal especially larger stone >20mm, staghorn calculus. Endoscope is introduced upto pelvic calyceal junction under fluoroscopy guidance and radiooapque dye. With help of ultrasonic waves or laser probes, stone is fractured into multiple small pieces and then those were taken out with continuous irrigation through proper channel. Irrigation fluid is always saline .Stones are bigger in size can be easily broken with this techniques. Depending upon location of stones, incision level is decided by urosurgeons. Position is always prone position.

In Most of the institutes, general anaesthesia is most common anaesthesia technique with ease of control of hemodynamics , airway and positioning care. Many patients with elderly, diabetes mellitus, IHD, CKD, risk of general anaesthesia and prolonged recovery are always there. Optimization of preexisting diseases will ease to give regional anaesthesia, early ambulation and hence reduces chances of prolonged hospital stay Since one decade, many institutes prefer regional anaesthesia for PCNL cases. Our institute is a tertiary health care institute. There is always waiting list of cases of PCNL. Early ambulation helps early discharge and hence it helps to reduce waiting period.

Upper calyceal stones require subcostal incision, it can lead to pneumothorax. General anaesthesia provides control on ventilation during puncture. Regional anaesthesia helps to detect it early and also required interventions.

PCNL is minimal invasive surgery mainly indicated in large renal and upper ureteric calculi. Many new techniques of PCNL were detected such as mini-PCNL and Tubeless PCNL. These techniques helped to reduce morbidity, analgesic requirement and duration of hospitalization. In addition to surgical modification, anesthesia techniques were too modified. Till today most of institutes are administering general anesthesia for PCNL studies.

Singh V. Sinha RJ and Sankhwar SN et al showed list of complications associated with general anesthesia in their study. They have also proved that during suprasternal puncture, patients with PCNL under regional anesthesia can follow verbal commands and control of respiration for prevention of pulmonary events[2]. One more study had concluded regional epidural anesthesia is an alternative technique for PCNL which achieves more patients' satisfaction, less early postoperative pain and less adverse effects[3].

The organs most commonly injured during PCNL are lungs and pleura, so anesthesiologists must be aware of airway pressures, and intrathoracic complications[4]. Anemia in acute form can occur due to blood loss and dilution. Stoller et al showed incidence of blood

transfusion in uncomplicated single puncture PCNL reached 14% with an average decrease of 2.8g.dl in Hb concentration[5].

One more major concern is postoperative decrease in core temperature. This occurs due to large amount of fluid administered to the patient during PCNL. Regional anaesthesia also contributes it. It manifests as shivering, peripheral vasoconstriction and delayed drug clearance. Effective warming of irrigation fluid may prevent hypothermia, despite the large volumes used[6]. Finally, patients and surgeons satisfaction contributes for success of regional anesthesia.[7,8,9]

Study by Hazem EL Sayed Moawad , Ahmed S. El Hefnawy concluded that both GA and SA are effective and safe in PCNL. SA has fewer complications and lower consumption of analgesia postoperatively. However GA provides more satisfaction for patients and surgeons[7, 10, 11, 12]. Above all studies have showed various conclusions. So choice of anesthesia technique is very important for PCNL surgeries.

Supine PCNL via anterior caliceal approach is preferred and popular amongst urosurgeon. It has shorter tract length and minimal hypermobility because of good support of posterior abdominal wall muscles. Ultrasound guided tract assessment is also done. In this approach, position related changes are minimal and patient is also more comfortable in intraoperative period than in prone position PCNL.[10,13]

Periodic follow up in preanaesthesia clinic is helpful to optimize patients comorbid conditions and also counseling helps them to understand the perioperative course of this procedure. Adjuvants like opioids and nonopioids have shown their effectiveness in terms of hemodynamic stability, prolonged anaesthesia and analgesia as well as lesser complications .[14] Good communication between anaesthesiologists, urosurgeon and patients plays important role in achieving success in such surgeries.[15]

Conclusion:

From our experience of spinal anaesthesia is an altenative anaesthesia choice for PCNL because of better hemodynamic stability , lesser complications and better satisfaction by surgeons and patients. Awareness of devastating complications and preparedness by anaesthesiologists and expert skills of urosurgeon contributes best perioperative success. Periodic follow up with ananesthesiologists will ease the perioperative course in terms of optimization, anticipation and compliance.

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