

CASE REPORT

REGIONAL ANAESTHESIA - ANAESTHESIA OF CHOICE IN CHRONIC KIDNEY DISEASE

Chandrappa H.N¹, Hemanth Kumar J²

HOW TO CITE THIS ARTICLE:

Chandrappa H.N, Hemanth Kumar J. "Regional Anaesthesia - Anaesthesia of Choice in Chronic Kidney Disease". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 05, February 03; Page: 1085-1088, DOI: 10.14260/jemds/2014/1950

ABSTRACT: Laparoscopic surgery has obvious advantage over open surgery in being less painful, reduced hospital stay and earlier return to normal activities of daily living. Chronic kidney disease is one of the common complications of long standing uncontrolled hypertension and diabetes mellitus. General anesthesia is preferred in both these situations. We report an interesting case where we used epidural anesthesia for a patient with chronic kidney disease posted for laparoscopic cholecystectomy who had previously undergone laparoscopic appendicectomy under general anesthesia necessitating hemodialysis in the immediate post-operative period.

KEY WORDS: Analgesia, Epidural; Kidney Failure, Chronic; Laparoscopy.

INTRODUCTION: It is estimated that there are approximately 7.85 million chronic renal failure patients in India. ¹ Diabetes mellitus and hypertension reaching epidemic proportion in urban population and chronic kidney disease being inevitable in long standing untreated cases, providing anesthesia to patients with chronic kidney disease poses a challenge. Though general anesthesia is preferred choice of anesthetic in chronic renal disease and in chronic renal failure, regional anesthesia can be carefully considered in patients with chronic kidney disease, not in renal failure. ² We present a case where laparoscopic cholecystectomy was performed under thoracic epidural anesthesia in a patient with history of chronic kidney disease.

CASE REPORT: Female patient with history of type 2 diabetes mellitus since 15 years, on treatment with insulin and a known case of early stage kidney disease since 3 years on treatment presented with pain abdomen. She was diagnosed to have cholelithiasis and scheduled for laparoscopic cholecystectomy.

Pre-operative evaluation - 55 year old female patient weighing 65 kilograms (kg) with mild pedal edema, autonomic neuropathy was ruled out as there was no resting tachycardia, orthostatic hypotension, no variation of heart rate on deep breathing, no history suggestive of bladder atony or gastroparesis. She had metabolic equivalents of about 8. Her lab investigations were - serum creatinine 4.5 milligram per deciliter (mg/dl), blood urea 45 mg/dl, serum sodium 138 mili equivalents per liter (mEq/L), serum potassium 4.3mEq/L, glycosylated hemoglobin (HbA1c)-6. Rest of the investigations - complete blood count, coagulation profile, electro cardiogram (ECG) and echocardiography were unremarkable. She was on Tablet Furosemide 20 milligrams (mg) twice daily, her daily fluid intake was restricted to a total of 1.5 liters and her daily urine output was in between 1.5 to 1.7 liters. She gave a past history of undergoing laparoscopic appendicectomy one year ago under general anesthesia and had developed acute renal failure needing hemodialysis in the immediate post-operative period with three day stay in the intensive care unit.

CASE REPORT

Epidural anesthesia- An 18 Gauge intra venous cannula was inserted in the right dorsum of hand and 500 cubic centimeters (cc) of 0.9% normal saline was used for preloading. Right subclavian vein was catheterized by Seldinger's method under local anesthesia. Midline approach was adopted with patient in sitting position, T₇-T₈ inter space was entered and epidural space identified by loss of resistance to air. 2 mili liter (ml) glass syringe was connected and negative aspiration was confirmed for blood and cerebrospinal fluid. Epidural catheter inserted and fixed at 8centimeter (cm) to skin. Space was confirmed by a test dose containing lidocaine with adrenaline 2 %(1 in 2, 00, 000). A bolus injection of 10 cc bupivacaine 0.5% and 2 cc 100microgram (µg) of fentanyl-a total of 12 cc injected in supine position, a sensory level between T₂ and T₁₂ was achieved. As per our protocol we used 'no glucose no insulin' regime for control of sugars peri operatively.

Monitoring- ECG, heart rate (HR), non-invasive blood pressure (NIBP), pulse oximeter, central venous pressure (CVP), urine output, random blood sugar and arterial blood gas monitoring were done (Table-1).

CVP was maintained between 10 and 12mili meters (mm) of mercury (Hg). Midazolam 1.5 mg was used for sedation and oxygen administered via a facemask. Total duration of surgery was 1 hour with pneumoperitoneum for 45 minutes. Urine output intraop-500ml. Total fluids-normal saline 1300 ml. Blood sugar was 196 mg/dl intra operatively.

Post-operative period: - Patient was shifted to intensive care unit for observation. Coming morning patient was comfortable with stable hemodynamics and a 24 hour urine output of 2000ml and her blood investigations revealed serum creatinine of 4.6mg/dl, blood urea of 40 mg/dl and serum potassium was 4.5mEq/L. She was transferred to the ward and discharged from hospital on the third day.

DISCUSSION: Laparoscopic cholecystectomy has obvious advantage over open cholecystectomy in being less painful, reduced morbidity and hospital stay and earlier return to daily activities. ³ The procedure usually necessitates general anesthesia with endotracheal intubation to prevent aspiration and respiratory embarrassment secondary to induction of Pneumoperitoneum. Nevertheless, regional anesthesia can be considered as an option in patients who are poor candidates for general anesthesia due to cardiopulmonary problems, hepatic dysfunction and chronic kidney disease. ^{3,4} There are several case reports of laparoscopic cholecystectomy successfully performed under epidural anesthesia in patients with chronic obstructive pulmonary disease (COPD), cystic fibrosis, scleroderma and during third trimester of pregnancy. ⁵⁻⁸ The present patient was administered thoracic epidural anesthesia and surgery successfully performed without requirement of an additional analgesic / anesthetic technique.

Chronic kidney disease is defined as either a glomerular filtration rate (GFR) less than 60ml/min/1.73m² for 3 months or more irrespective of the cause, or a kidney damage leading to decrease in glomerular filtration rate present for 3 months or more. ² Chronic kidney disease is divided into 5 stages (Table-2). ⁹ Our patient had a GFR of approximately 13 ml/min/1.73m² (Cockcroft-Gault). The present patient was categorized as 5th stage chronic kidney disease not in renal failure. In a study which included pediatric age group, posted for renal transplantation the authors concluded that epidural anesthesia maintained good kidney function better than general anesthesia. ¹⁰ A study on patients with peri-operative kidney dysfunction posted for total hip replacement concluded that epidural anesthesia when carefully managed does not appear to

CASE REPORT

predispose chronic kidney disease to acute renal failure.¹¹ The present patient developed acute renal failure following laparoscopic appendicectomy under general anesthesia one year ago which necessitated hemodialysis and recovery over 10 days. Similar perioperative events have been reported in literature.¹²

This time, the patient received epidural anesthesia with careful monitoring of hemodynamic parameters, intravenous fluid infusion, respiratory parameters and urine output (Table – 1). The CVP was maintained at 10 – 12 mm of mercury and mean arterial pressure was maintained above 75 mm of Hg perioperatively. Arterial blood gas analysis done prior to insufflation, 15 minutes after insufflation and 15 minutes after exsufflation showed that respiratory rate and PaCO₂ were maintained within physiological limits. Intra-abdominal pressure was limited to 10 mm Hg, as studies have shown that pressures greater than 15 mm of Hg impair venous return and impede renal function due to direct renal compression.¹³ Postoperative epidural opioid analgesia obviated the need for oral / parenteral analgesics and their effects on the compromised renal organ system.

CONCLUSION: Proper understanding of organ system dysfunction, nature of surgical procedure, choice of anesthetic technique and maintenance of vital parameters in normal range perioperatively all contribute to successful management of patients with complex medical problems undergoing laparoscopic procedures. Although there are patients with chronic kidney disease for whom the benefits of general anesthesia outweigh the risks, regional anesthesia can be offered to select patients where general anesthesia carries more risks, but with a careful analysis of individual patients. Regional anesthesia avoids poly pharmacy and thus reduces the risk of patient needing hemodialysis in the immediate post-operative period and thus can be considered as anesthesia of choice for patients with chronic kidney disease.

REFERENCES:

1. Dash SC, Agarwal SK. Incidence of chronic kidney disease in India. *Nephrol Dial Transplant* 2006; 21(1):232-3
2. Craig RG, Hunter JM. Recent developments in the peri operative management of adult patients with chronic kidney disease. *Br J Anaesth* 2008; 101:296-310.
3. Yi JW, Choi SE, Chung JY. Laparoscopic cholecystectomy performed under regional anaesthesia in patient who had undergone pneumonectomy. *Korean J Anesthesiol* 2009; 56(3): 330-3.
4. Joris JL. Anaesthesia for laparoscopic surgery. In: Miller RD, editor. *Miller's Anaesthesia*. 6th ed. Philadelphia: Churchill Livingstone; 2005. p. 2285-306.
5. Pursnani KG, Bazza Y, Calleja M, Mughal MM. Laparoscopic cholecystectomy under epidural anaesthesia in patients with chronic respiratory disease. *Surg Endosc* 1998; 12: 1082-84.
6. Kang SB. Continuous thoracic epidural anaesthesia for biliary tract surgery and postoperative pain relief in a patient with cystic fibrosis. *Anesth Analg* 1982; 61: 793-95.
7. Sulemanji DS, Donmez A, Arslan G. Epidural anaesthesia for laparoscopic cholecystectomy in a patient with scleroderma. *Br J Anaesth* 2006; 97 (5): 749.
8. Costantino GN, Vincent GJ, Mukalian GM, Kleifoth Jr WL. Laparoscopic cholecystectomy in pregnancy. *J Laparo Endoscopic Surg* 1994; 4: 161-164.
9. Garwood S. Renal disease. In: Hines RL, Marschall KE, editors. *Anaesthesia and Co-Existing Disease*. 5th ed. Philadelphia: Churchill Livingstone; 2008. p. 323-47.

CASE REPORT

10. Murakami M, Nomiya S, Ozawa A, Matono H, Tanabe H, Watanabe S. Anesthetic management of pediatric renal transplantation for chronic renal renal failure. Masui 1993; 42(2):263-70.
11. Sharrock NE, Beksac B, Flynn E, Go G, Valle GD. Hypotensive epidural anaesthesia in patients with preoperative renal dysfunction undergoing total hip replacement. Br J Anaesth 2006; 96(2):207-12.
12. Ben-David B, Croitoru M, Gaitini L. Acute renal failure following laparoscopic cholecystectomy: a case report. J Clin Anaesthesia 1999; 11 (6): 486-89.
13. Harman PK, Kron IL, McLachlan HD, Freedlender AE, Nolan SP. Elevated intra-abdominal pressure and renal function. Ann Surg 1982; 196: 594-7.

	SBP/DBP (MAP)	HR (bpm)	CVP (mm Hg)	pH	PaCO ₂	PaO ₂	SaO ₂	Resp rate
Pre-op	126/85 (98.6)	89	10	7.414	36	88	94	18
5 min	119/84 (95.7)	82	10					
10 min	115/80 (91.6)	82	11					
15 min (insufflation)	114/78 (90)	79	10					
20 min	117/80 (92.3)	85	12					
30 min	120/84 (96)	79	11	7.321	44	96	98	17
40 min	124/84 (97.3)	80	10					
75 min (post-op)	132/78 (96)	88	09	7.365	42	96	97	16

Table 1: Perioperative Monitoring

Stage	Description	GFR(ml/min/1.73m ²)
1	Kidney damage with Normal or ↑GFR	≥90
2	Kidney damage with Mild ↓GFR	60-89
3	Kidney damage with Moderate ↓ GFR	30-59
4	Kidney damage with Severe ↓ GFR	15-29
5	Kidney failure/on dialysis	<15

Table 2: Stages of chronic kidney disease

AUTHORS:

1. Chandrappa H.N.
2. Hemanth Kumar J.

PARTICULARS OF CONTRIBUTORS:

1. Consulting Anaesthesiologist and Chief of Department of Anaesthesiology, Affiliated to Sagar Hospitals, Kumarswamy Layout, Bangalore.
2. Assistant Professor, Department of Anaesthesiology, Kempegowda Institute of Medical Sciences, Bangalore.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Hemanth Kumar J.
No. 56, 1st Main Gopalappa Layout,
16th Cross, Lakkasandra,
Bangalore - 560030.
Email - hemumg@gmail.com

Date of Submission: 05/01/2014.
Date of Peer Review: 06/01/2014.
Date of Acceptance: 18/01/2014.
Date of Publishing: 28/01/2014.