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Case Report

Anaesthesia Section

Anaesthetic Management of a 75-Year-Old Male with Multiple Comorbidities and Adrenal Adenoma Undergoing Robotic Nephrectomy: A Case Report

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ABSTRACT

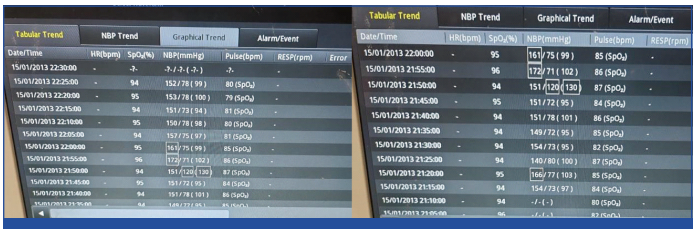
Elderly patients with multiple associated comorbidities undergoing urological surgery present significant pre-operative challenges in anaesthetic management. The case discussed in this report involves a 75-year-old male with hypertension, bronchial asthma, and a history of stroke, who was diagnosed with a left renal mass and a right adrenal adenoma. Pre-operative assessment revealed high blood pressure, left-sided weakness, and multiple respiratory and cardiovascular abnormalities. Combined general and epidural anaesthesia was administered to the patient. Intraoperatively, significant haemodynamic fluctuations were observed during the manipulation of the tumour, which were successfully managed with vasoactive medications and epidural analgesia. Postoperatively, the patient was transferred to the surgical intensive care unit for monitoring and had an uneventful recovery. This case report focusses on pre-operative evaluation, intraoperative monitoring, and the use of multimodal anaesthesia in high-risk elderly patients. The haemodynamic instability during tumour manipulation indicated the presence of a catecholamine-secreting tumour, making it crucial to monitor vital signs and intervene promptly. Successful anaesthetic management requires thorough preparation and individualised anaesthetic planning for elderly patients undergoing robotic nephrectomy. Combined general and epidural anaesthesia provides effective pain management and haemodynamic stability.

Keywords: Adrenal adenoma, Catecholamine, Recovery

CASE PRESENTATION

A 75-year-old male presented with complaints of abdominal pain for the past two months, which was not associated with nausea, fever, or vomiting. He was diagnosed with a left renal mass and a right adrenal adenoma and was planned for robot-assisted nephrectomy. The patient had a known case of bronchial asthma for 10 years and was using Foracort puff (BD) and Levolin (SOS). His last asthmatic attack occurred one week prior to surgery. The patient also had a history of hypertension for 10 years and was on Telmisartan 40 mg, Amlodipine 5 mg, and Metoprolol 12.5 mg. One month ago, he experienced a cerebrovascular accident (stroke) and was admitted to the Intensive Care Unit (ICU) for four days. Aspirin 150 mg was started, which was discontinued two days prior to surgery.

The patient had a 30-year history of smoking (4-5 cigarettes/day) and a history of alcohol intake for 30 years, consuming alcohol twice per week (4-5 pegs/day). Neurological examination revealed left-sided weakness. During examination, the patient's blood pressure fluctuated every three minutes, necessitating 30 minutes of continuous monitoring (see [Table/Fig-1]). On auscultation, there was reduced air entry in the lower lobe of the right side of the chest (see [Table/Fig-2] for preoperative laboratory investigations of the patient).

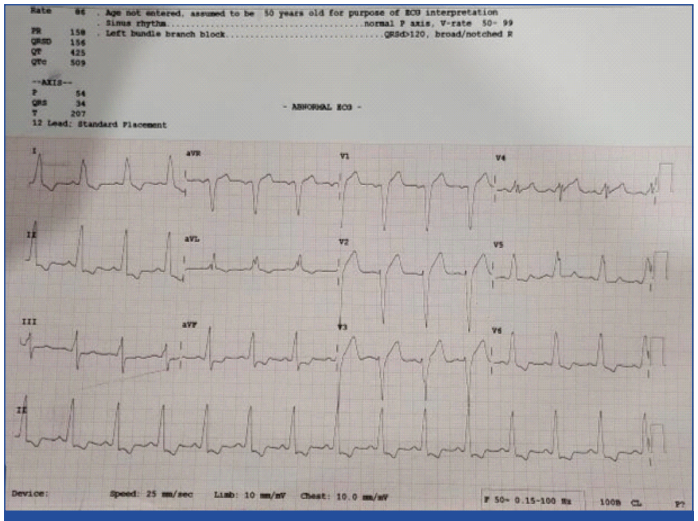


[Table/Fig-1]: Showing pre-operative variations in blood pressure during monitoring.

Electrocardiogram (ECG) (see [Table/Fig-3]) revealed Left Bundle Branch Block (LBBB), M-pattern in aVL, V4, and V5, tall T-waves

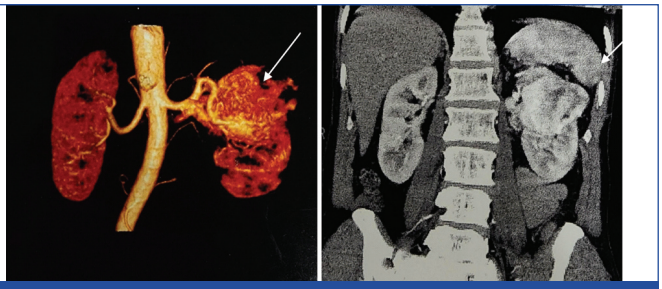
Parameters	Values
Complete blood count (Hb/WBC/Platelets)	11.1 g/dL / 4100 µL / 1.07 µL
Serum electrolytes (Na/K/Cl) (mmoL/L)	138 / 4.3 / 109
Prothrombin time/International Normalised Ratio	13.2 secs / 1.05
Renal function test (Urea/Creatinine) (mg/dL)	39 / 0.8
Liver function tests (Bilirubin) (mg/dL)	0.45 / 0.15 / 0.30
Serum Glutamic Oxaloacetic Transaminase/ Serum Glutamic Pyruvic Transaminase/ Alkaline phosphatase (U/L)	19 / 13 / 46
Protein/Albumin (g/dL)	6.1 / 3
Serology	Non-reactive

[Table/Fig-2]: Showing laboratory investigations.

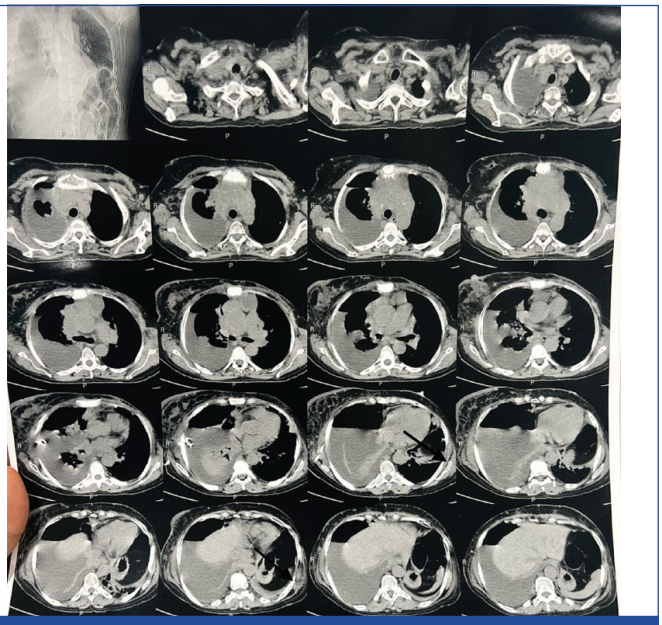


[Table/Fig-3]: Showing ECG.

in V2 and V3, and T-wave inversion in V6. A Two-Dimensional (2D) echocardiogram revealed Left Ventricular Ejection Fraction (LVEF) of 68%, grade 1 diastolic dysfunction, mild tricuspid regurgitation, mitral annular calcification, and asymmetric left ventricular hypertrophy. Contrast-enhanced Computed Tomography (CECT) of the abdomen revealed a lobulated infiltrating hypervascular partially exophytic mass lesion arising from the posterolateral aspect of the mid-part of the left kidney (5.8×5.6×5 cm), a small ovule nodule in the right adrenal gland (17×10 mm), likely adenoma, and prostatomegaly [Table/Fig-4]. CECT of the chest revealed right-sided pleural effusion with areas of subsegmental collapse and atelectasis in the right lower and middle lobes, along with a nodule in the lateral basal segment of the left lung (3×3 mm) (see [Table/Fig-5]).



[Table/Fig-4]: Showing CECT abdomen with arrow representing left Renal Cell Carcinoma (RCC).

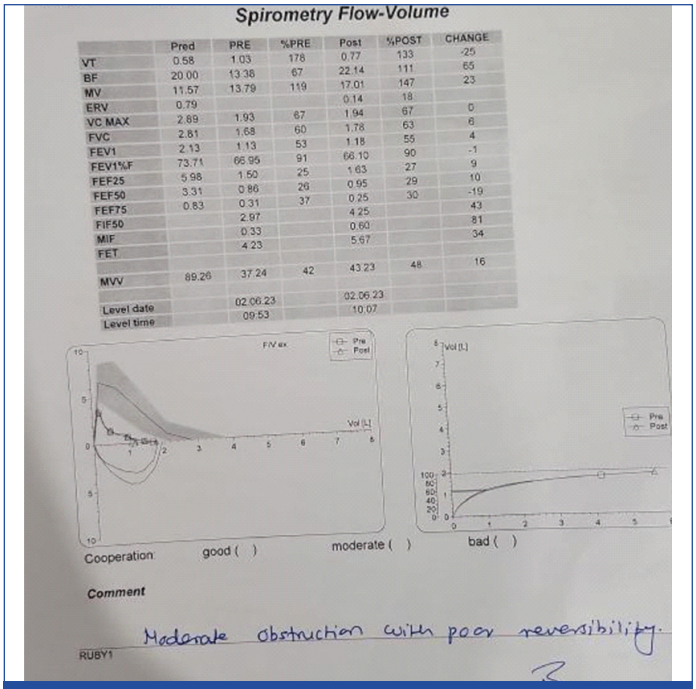


[Table/Fig-5]: Showing CECT chest with arrow representing right pelural effusion.

Spirometry showed moderate obstruction with poor reversibility [Table/Fig-6]. The CT of the brain revealed a mild hypodense area in the right half of the midbrain, indicating a subacute to chronic infarct, with diffuse cerebral atrophy and chronic bilateral periventricular white matter ischaemic changes. Cardiology and pulmonary evaluations were conducted, and fitness was obtained from the respective departments. The patient continued nebulisation using Budamate the night prior to and the morning of surgery.

Consents for Surgical Intensive Care Unit (SICU) admission and ventilator support were obtained preoperatively. The patient was given antihypertensive medication, Amlodipine 10 mg, on the morning of surgery and was kept Nil By Mouth (NBM) for eight hours. The patient's fitness was assessed under ASA3, all consents were checked, SICU was confirmed, and the patient was nebulised in the morning, after which he was shifted to the operation theatre. All standard ASA monitors were attached.

An 18G epidural was placed at the L2-L3 intervertebral space, followed by preoxygenation with 100% oxygen for three minutes. The patient was induced with inj. Glycopyrrolate 0.2 mg, inj.



[Table/Fig-6]: Showing spirometry report.

Midazolam 1 mg, inj. Fentanyl 160 mcg, inj. Propofol 200 mg, inj. Succinylcholine 100 mg, and inj. Vecuronium 6 mg i.v. Intubation was performed with an 8.5 cuffed endotracheal tube, and the patient was placed on a closed circuit with controlled ventilation. After securing the tube in position, air entry was checked in both lungs. A 7Fr triple lumen central line was secured, along with a 20G intracath in the left radial artery.

After intubation, the patient experienced a sudden drop in Blood Pressure (BP), for which infusion norad was started at a rate of 3 mL/hr. Subsequently, the patient had an episode of tachycardia and increased BP, leading to the initiation of infusion NTG at a rate of 1.2 mL/hr. During the kidney resection, there were three instances of BP variation accompanied by tachyarrhythmia, which were managed with infusions of norad and Nitroglycerine (NTG) (according to vitals) and inj. Loxicard (2 mg/kg) as shown in [Table/Fig-7]. Intraoperative arterial blood gas analysis was conducted, as shown in [Table/Fig-8].

[Table/Fig-7]: Showing intraoperative variation in haemodynamics and their management.

For analgesia, epidural top-ups were administered with varying concentrations and dosages based on vital signs, detailed in [Table/Fig-9]. Throughout the surgery, the patient's haemodynamics were maintained through epidural analgesia with five doses.

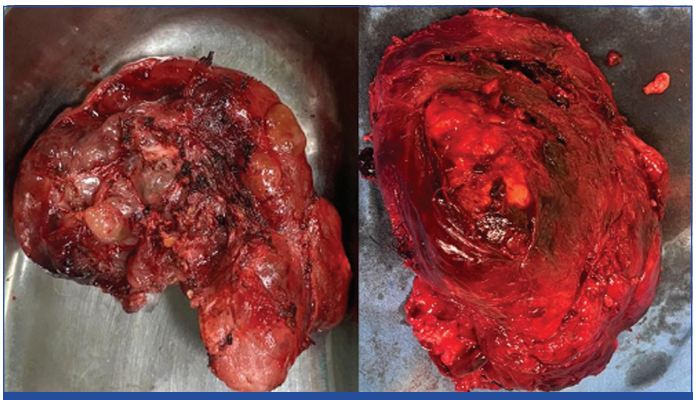
Parameters	11:20 AM	13:00 PM	14:35 PM
pH	7.42	7.33	7.38
pCO2	40	52	45
pO2	98	138	148
Na/K/Ca	137/4.1/1.08	136/3.7/1.13	138/3.7/1.14
Glucose	86	130	132
Lactate	1.2	0.9	0.8
HCO3	25.9	27.4	26.6
Hb	11.2	11.2	10.5

[Table/Fig-8]: Showing intraoperative ABGs done.

S. No.	Timing	Drug dosage	Drug concentration
1.	11:35 AM	3 mg	Test dose inj LIGNO-ADR
2.	11:50 AM	8 mg	0.125% inj Bupivacaine
3.	12:32 PM	8 mg	0.125% inj Bupivacaine
4.	1:12 PM	6 mg	0.125% inj Bupivacaine
5.	2:30 PM	8 mg	0.125% inj Bupivacaine

[Table/Fig-9]: Showing epidural dosage and drug concentration given during case.

Five hours post-surgery, after observing spontaneous adequate respiratory efforts, a reversal agent was administered in the correct dosage, and the patient was extubated without any complications. [Table/Fig-10] shows the resected tumour from the surgery. The patient's vital signs were BP 127/72 mmHg, HR 87 bpm, and SpO_2 100% on 5 L/min O_2 flow. The post-anaesthesia recovery score was 10/12. The patient was placed on 5-6 L O_2 with a Hudson's mask.



[Table/Fig-10]: Showing resected tumour.

Postoperatively, the patient was transferred to the ICU for observation, where he maintained stable status on oxygen support. Later, he was shifted to the ward on postoperative day 2.

DISCUSSION

This case exemplifies the complex anesthetic considerations in an elderly patient with multiple comorbidities undergoing robot-assisted nephrectomy for a suspected catecholamine-secreting adrenal tumour. Successful management involved a comprehensive preoperative evaluation, meticulous intraoperative monitoring, and a multimodal anesthetic approach. Recently, robotic surgeries have gained popularity due to their minimally invasive nature [1]. The case discussed above presents significant perioperative challenges in anesthetic management [2]. The patient's advanced age (75 years) placed him at increased risk for perioperative complications. Elderly patients frequently present with reduced physiological reserve and multiple comorbidities that affect perioperative outcomes [3].

Sprung J et al., demonstrated that patients aged over 70 years undergoing noncardiac surgery have a significantly higher incidence of postoperative complications, particularly cardiovascular and pulmonary events [4]. Our patient had coexisting cardiovascular, respiratory, and neurological conditions, which substantially increased his perioperative risk.

A notable feature of this case was the fluctuating BP observed during the preoperative evaluation, as well as the significant haemodynamic instability during tumour manipulation. These findings raise suspicion for a catecholamine-secreting tumour, such as a pheochromocytoma, despite the radiological suggestion of an adrenal adenoma. Ramakrishna H reported that approximately 5-10% of incidentally discovered adrenal adenomas may be functionally active, producing excess catecholamines, cortisol, or aldosterone [5]. The classic triad of symptoms in pheochromocytoma includes headache, sweating, tachycardia, or palpitations with paroxysmal hypertension; however, many patients present with nonspecific symptoms or may be asymptomatic [6].

The intraoperative management of patients with suspected catecholamine-secreting tumours requires special consideration. Kinney MA et al., emphasised the importance of adequate alpha-adrenergic blockade before beta-blockade in patients with pheochromocytoma to prevent hypertensive crises and cardiovascular collapse [7]. In our case, the patient was already on long-term antihypertensive therapy, which may have provided partial adrenergic blockade. The observed haemodynamic fluctuations during tumour manipulation were successfully managed with vasoactive medications, including norepinephrine and nitroglycerin infusions.

Combined general and epidural anaesthesia, as utilised in our patient, offers several advantages for high-risk patients undergoing abdominal surgery. Guay J et al., in a meta-analysis of randomised controlled trials, demonstrated that neuraxial blockade combined with general anaesthesia reduces postoperative mortality and morbidity compared to general anaesthesia alone [8]. Epidural analgesia provides excellent pain control, attenuates the surgical stress response, and improves postoperative respiratory function [9]. In our patient, intraoperative epidural analgesia with bupivacaine may have contributed to the observed haemodynamic stability by blocking sympathetic responses to surgical stimulation.

The patient's recent history of cerebrovascular accident (one month before surgery) presented an additional anesthetic challenge, as it is necessary to maintain cerebral perfusion to prevent secondary neurological injuries. Mashour GA et al., reported that patients with recent strokes have a higher risk of perioperative stroke recurrence, with risks peaking within three months of the initial event [10]. The American College of Cardiology/American Heart Association (ACC/AHA) guidelines recommend delaying elective noncardiac surgery for at least three months after an ischaemic stroke, if possible [11]. In our case, the surgery was conducted approximately one month after the stroke, likely due to the urgency of managing the renal mass.

The anesthetic management focussed on maintaining cerebral perfusion pressure and avoiding both hypertension and hypotension, which could lead to haemorrhagic transformation or cerebral hypoperfusion, respectively. The management of bronchial asthma in the perioperative period is critical to prevent bronchospasm, which can be life-threatening under anaesthesia. The perioperative management of bronchial asthma is essential as it may lead to bronchospasm, and special anesthetic considerations are required to prevent this condition [12]. Our patient had a history of bronchial asthma with a recent exacerbation one week before surgery. Woods and Sladen emphasised the importance of preventing bronchospasm by avoiding triggering factors, such as airway instrumentation, without achieving adequate depth of anaesthesia [12]. Our approach included preoperative nebulisation, careful airway management, and monitoring intraoperatively, along with bronchodilator therapy postoperatively.

The use of robotic technology in urological surgery has increased significantly over the past decade due to its advantages over open or laparoscopic approaches [13]. However, robotic surgery presents specific anesthetic challenges, including prolonged steep Trendelenburg positioning, pneumoperitoneum, and limited access to the patient during the procedure [14]. Lee JR reported that pneumoperitoneum in combination with Trendelenburg positioning can lead to significant cardiopulmonary changes, including increased mean arterial pressure, central venous pressure, and airway pressures, with decreased functional residual capacity [15].

To prevent haemodynamic instability caused by catecholamine storms during pheochromocytoma surgery, a comprehensive approach is required. Preoperative evaluation and optimisation are crucial. In the intraoperative phase, techniques such as deepening anaesthesia and using vasodilators like sodium nitroprusside or nicardipine, along with magnesium sulfate and the short-acting alpha-blocking agent phentolamine to manage hypertension, must be employed. Finally, postoperative care includes sufficient fluid replacement and the use of vasopressors to prevent hypotension. These effects can be particularly problematic in elderly patients with reduced cardiopulmonary reserve. Our anesthetic management involved careful positioning, monitoring of airway pressures, and vigilant haemodynamic management to mitigate these risks.

Postoperatively, our patient was transferred to the surgical intensive care unit for continued monitoring due to his high-risk status. This approach aligns with recommendations by Pearse RM et al., who found that extended postoperative monitoring in high-risk surgical patients reduces morbidity and mortality [16]. The patient's uneventful recovery and transfer to the ward on postoperative day 2 suggest the effectiveness of our perioperative management strategy.

CONCLUSION(S)

This case highlights the successful anesthetic management of an elderly patient with multiple comorbidities undergoing robot-assisted nephrectomy for a suspected catecholamine-secreting adrenal tumour. The perioperative course was complicated by significant haemodynamic fluctuations, particularly during tumour manipulation, suggesting a functionally active adrenal tumour. A comprehensive preoperative evaluation, combined general-epidural anaesthesia, meticulous intraoperative monitoring, and judicious use of vasoactive medications were key to the successful outcome. This case underscores the importance of individualised anesthetic planning, multidisciplinary collaboration, and vigilant perioperative care in high-risk elderly patients undergoing complex robotic urological procedures.

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