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Case Report

Anaesthesia Section

Role of Thoracic Epidural Analgesia in Retroperitoneal Rhabdomyosarcoma Surgery in an Adult: A Case Report

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ABSTRACT

Rhabdomyosarcoma is an adult soft tissue sarcoma of mesenchymal origin. Retroperitoneal rhabdomyosarcomas can reach gigantic size before the development of clinical symptoms and necessitate extensive resection, making anaesthetic management daunting. The following is a case presentation of a 58-year-old male patient with a four-month history of progressively worsening abdominal swelling due to a gigantic poorly differentiated retroperitoneal rhabdomyosarcoma. Preoperative anaemia was diagnosed and adequately treated, and normal organ function tests were obtained. Patient optimisation was followed by tumour resection under the cover of an association of thoracic epidural analgesia with General Anaesthesia (GA). An epidural catheter was placed at T10, and intraoperative analgesia was achieved by infusion of local anaesthetic, with low opioid requirement and haemodynamic stability being achieved. Induction was with etomidate, fentanyl, and vecuronium, and smooth tracheal intubation was performed to prevent dental trauma. Intraoperatively, the patient developed Supraventricular Tachycardia (SVT). Arterial blood gas analysis revealed hypokalaemia as the etiology, with a potassium level of 2.8 mmol/L. Intravenous (i.v.) potassium replacement was initiated, which restored normal rhythm stability as the potassium level normalised to 3.9 mmol/L. The operation was uneventful, following which reversal of neuromuscular blockade was achieved with sugammadex, and extubation was smooth. 0.125% bupivacaine at 7 mL/hr was infused through the epidural catheter postoperatively for 48 hours with satisfactory recovery and pain control. The case indicates the need for proper preoperative assessment, anticipating a difficult airway, cautious use of a thoracic epidural for perioperative pain management, and cautious observation for metabolic derangement like hypokalaemia, which causes intraoperative arrhythmias for successful anaesthesia management.

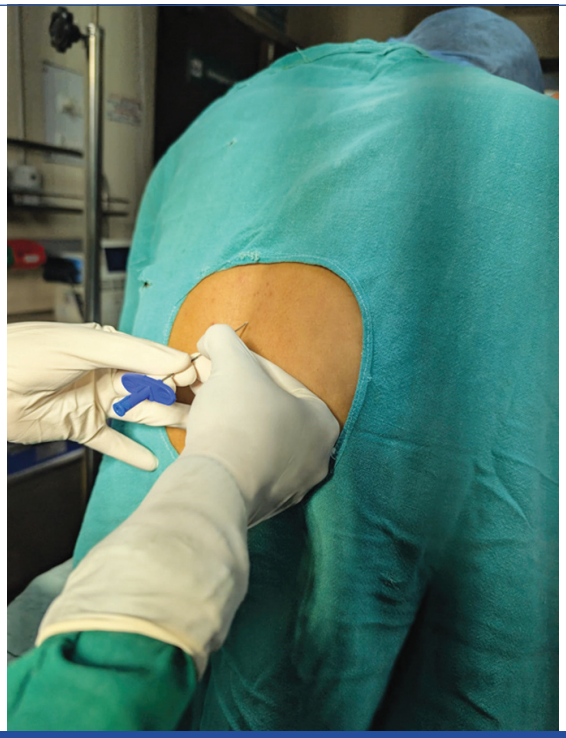
Keywords: Cardiac arrhythmias, Erythrocytosis, General anaesthesia, Retroperitoneal neoplasms

CASE REPORT

A 58-year-old male presented to the emergency department with a four-month history of increased abdominal swelling. It began insidiously with progressively worsening swelling and dull, muffled abdominal pain. There were no associated urinary or gastrointestinal symptoms, systemic symptoms, or history of previous diseases, surgery, or drug allergy. Contrast-Enhanced Computed Tomography (CECT) of the abdomen and pelvis showed a giant heterogeneous soft-tissue mass in the left iliac and lumbar area, highly suggestive of malignant neoplasm. Image-guided biopsy and histopathology showed poorly differentiated rhabdomyosarcoma. The patient was planned for surgical resection of the mass.

Pre-anaesthetic check-up revealed stable vital parameters (pulse 62/min, blood pressure 128/74 mmHg, SpO_2 99% on room air). Airway examination revealed bucked and protruding upper incisors, Mallampati classification grade II, adequate mouth opening, and normal cervical movement. Laboratory results revealed a haemoglobin level of 9.4 g/dL, which increased to 10.7 g/dL after transfusion. Total leukocyte count was 5,300/mm^3, platelet count was $2.23\times10^5/mm^3$, prothrombin time was 12.2 seconds, and international normalised ratio was 1.01. Liver function tests, renal function tests, and electrolytes were within normal limits. The Electrocardiogram (ECG) and chest radiograph were normal. The patient was classified as having an American Society of Anaesthesiologists (ASA) physical status of II.

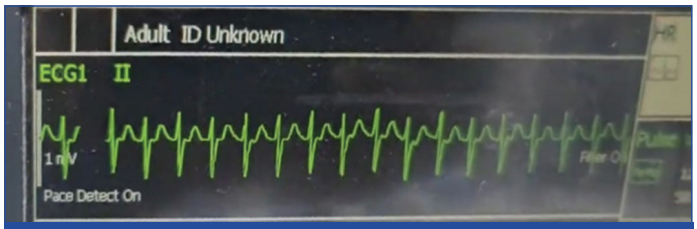
Nil per os status for the day of surgery was checked, and the patient was wheeled into the operating theatre. ASA standard monitors (ECG, non-invasive blood pressure, pulse oximeter, and capnograph) were applied. Two i.v. broad-bore cannulas were inserted. Cross-matching of blood and blood products was prescribed and kept on standby for possible profuse blood loss during tumour resection. Initiation of perioperative analgesia with regional anaesthesia was performed by the insertion of an epidural catheter via the T10 interspace using an 18-gauge Tuohy's needle [Table/Fig-1]. Exclusion of intravascular or intrathecal placement was confirmed by injection of 3 mL 2% lignocaine with adrenaline test dose.



[Table/Fig-1]: Thoracic epidural catheter insertion at the T10 interspace using an 18-gauge Tuohy needle for perioperative analgesia.

The i.v. glycopyrrolate 0.2 mg, midazolam 1 mg, fentanyl 100 mcg, etomidate 20 mg, and vecuronium 6 mg were used to induce GA. Tracheal intubation was done with an 8.0 mm cuffed Endotracheal Tube (ETT). Bilateral chest auscultation and capnography verified placement of the tube. Anaesthesia maintenance utilised oxygen, air, isoflurane, and intermittent i.v. vecuronium, and continuous epidural infusion with 0.25% bupivacaine 7 mL/hr.

Intraoperative course was further complicated by the appearance of SVT as seen in [Table/Fig-2]. The i.v. metoprolol was administered. Serum potassium (K) was 2.8 mmol/L on arterial blood gas analysis. The i.v. potassium chloride (KCl) was given under close monitoring. KCl 40 mmol was infused over two hours, followed by a maintenance infusion. Arrhythmia was corrected by normalising potassium to 3.9 mmol/L, and the sinus rhythm normalised. Normal haemodynamics were restored, and the rest of the procedure continued uneventfully thereafter.



[Table/Fig-2]: ECG monitors showing SVT.

Following procedure completion, reversal of any residual neuromuscular blockade was achieved with sugammadex, and extubation was performed after ensuring adequate spontaneous ventilation, intact airway reflexes, and haemodynamic stability. Postoperatively, the patient was shifted to the surgical Intensive Care Unit (ICU), where an epidural 0.125% bupivacaine 7 mL/hr infusion was continued for 48 hours as a step towards good analgesia and an uneventful postoperative course.

DISCUSSION

Rhabdomyosarcoma is a soft-tissue malignancy of mesenchymal origin and skeletal muscle differentiation. Although, it is the most frequent soft tissue sarcoma in children, it is rare in adults, with a poor prognosis. Retroperitoneal rhabdomyosarcomas are presented as bulky masses at presentation owing to the expanse of the abdominal cavity and are late presenters with nonspecific abdominal pain or distension. Operative resection during the intraoperative period is the norm. It poses a challenge to anaesthesiologists in the form of risks of extensive dissection, massive bleeding, and the need for close perioperative monitoring. Cross-matching of blood is a reasonable precaution in anticipation of haemorrhage before extensive tumour resection. In the present case, these anticipated challenges guided meticulous preoperative planning and preparedness for major blood loss [1,2].

Thoracic epidural anaesthesia is an active part of anaesthetic practice in major abdominal and retroperitoneal surgery. Maximum intraoperative and postoperative analgesia was ensured by placement of the epidural catheter. Continuous epidural infusion of local anaesthetics avoids operative stress response, offers dynamic pain relief, and facilitates postoperative respiratory mechanics through deep breathing and coughing without dysesthesia. A thoracic epidural block would decrease intraoperative opioid usage optimally and then prevent postoperative opioid-induced ileus and respiratory depression. Sympathetic blockade through epidural would also allow haemodynamic stability during tumour handling by preventing catecholamine surges. Similar strategies for minimising sympathetic overactivity and maintaining cardiovascular stability were pivotal in the cases reported by Mathias RM et al., and Kyaw MT and Maung ZM where stress-related arrhythmias occurred in the setting of metabolic derangements [3-6].

Intraoperative arrhythmia caused by hypokalaemia may occur despite normal preoperative values due to fasting, perioperative fluid shift, redistribution, or occult loss. Pharamacological antiarrhythmic therapy was effective, and i.v. potassium supplementation raised the serum potassium level to 3.9 mmol/L, which promptly restored a normal sinus rhythm. This underlines the importance, first and foremost, of delineating and managing the intrinsic cause of arrhythmias instead of relying on antiarrhythmic medication. The present case parallels those by Shoeb AM et al., and Kyaw MT and Maung ZM where supraventricular and ventricular arrhythmias were directly linked to hypokalaemia and resolved only after electrolyte correction, underscoring hypokalaemia as the primary reversible trigger [6-9].

Anaesthetic management was maximised to achieve haemodynamic stability and atraumatic emergence. Induction was performed with etomidate as it possesses the best haemodynamic profile. Vecuronium-induced neuromuscular blockade was reversed at the end of surgery using sugammadex to ensure an uneventful return of spontaneous respiration. Extubation was performed after achieving proper effort, airway reflexes, and hemodynamic stability. Forty-eight hours of epidural infusion with opioid-free 0.125% bupivacaine 7 mL/hr postoperatively was continued, which was effective in causing analgesia and facilitating early mobilisation. Careful anaesthetic drug selection and vigilant perioperative management were crucial in preventing further hemodynamic deterioration and facilitating recovery once metabolic abnormalities were corrected [10-12].

Thorough preoperative assessment, anticipation of airway difficulty, stern intraoperative monitoring, thoracic epidural blockade, and balanced GA under perioperative management were beneficial. Early diagnosis and reversal of hypokalaemia were the pillars for intraoperative stabilisation of SVT and a smooth, anaesthetic, and surgical outcome [5,7]. A consistent finding across all cases summarised in [Table/Fig-3] [5,6,9] is that early recognition of hypokalaemia and aggressive potassium supplementation, rather than escalation of antiarrhythmic therapy alone, was decisive in achieving rhythm control and favourable outcomes.

Author	Case description	Management	Takeaway
Present case	58/M with retroperitoneal rhabdomyosarcoma; anticipated difficult airway; intraoperative refractory arrhythmias due to hypokalaemia	GA with etomidate, fentanyl, vecuronium, and thoracic epidural catheter; intraoperative hypokalaemia corrected with i.v. potassium; postoperative epidural analgesia	Highlights the importance of anticipating airway difficulty, multimodal anaesthesia, and aggressive hypokalaemia correction to stabilise arrhythmias
Mathias RM et al., [5]	Case 1: 30/F post laparoscopic cholecystectomy/ appendicectomy → recurrent ventricular fibrillation, K=2.2 mmol/L. Case 2: 78/M hypertensive post laparoscopic cholecystectomy → pulseless ventricular tachycardia/ventricular fibrillation, K=2.4 mmol/L	Repeated cardiopulmonary resuscitation/ defibrillation, i.v. KCl through a central venous catheter, amiodarone, calcium gluconate; high cumulative KCl (220 mmol and 210 mmol/24h); intensive care unit monitoring; both stabilised	Severe postoperative hypokalaemia can precipitate malignant arrhythmias; early detection and aggressive i.v. potassium supplementation are lifesaving.
Shoeb AM et al., [9]	Case 1: 60/F with lower respiratory tract infection → SVT, K=2.4 mmol/L, borderline hypomagnesemia. Case 2: 65/M with lower respiratory tract infection → multifocal atrial tachycardia, hypokalaemia. Case 3: 55/M with diabetes mellitus and hypertension→ paroxysmal SVT, K=2.59 mmol/L, borderline hypomagnesemia	Synchronised cardioversion, amiodarone, diltiazem, adenosine, i.v. KCl; two patients stabilised, and one left against medical advice	Hypokalaemia produces diverse supraventricular arrhythmias; coexisting hypomagnesemia worsens instability; correcting electrolytes is essential.

Kyaw MT and Maung ZM [6]	Case 1: 80/F with atrial fibrillation and shock → K=2.4 mmol/L, borderline magnesium. Case 2: 38/F with SVT → K=2.7 mmol/L. Case 3: 36/F alcoholic with ventricular bigeminy → K=2.59 mmol/L, borderline magnesium	I.v amiodarone, i.v. and oral KCl, magnesium supplementation when indicated; arrhythmias reversed once K normalised, though one patient left against medical advice	Hypokalaemia may manifest as atrial fibrillation, SVT, or ventricular ectopy; borderline hypomagnesemia often coexists; early correction prevents malignant arrhythmias.

[Table/Fig-3]: Summary of intraoperative arrhythmias associated with hypokalaemia and their management in reported cases [5,6,9].

CONCLUSION(S)

The perioperative care of adult retroperitoneal rhabdomyosarcoma poses significant anaesthetic challenges because it can cause extensive blood loss, airway compromise, and demands adequate multimodal analgesia. This case highlights the crucial role of thoracic epidural analgesia in offering excellent intraoperative stability and postoperative pain control, thus ensuring uneventful recovery. It highlights the importance of close intraoperative monitoring for metabolic derangements, as even normally functioning electrolytes can drop abruptly under surgical stress. The early identification of hypokalaemia as the cause of SVT and the aggressive and early correction of potassium played a key role in preventing a potentially lethal arrhythmic complication. A well-planned anaesthetic plan, anticipation of problems, and prompt corrective maneuvers are paramount in achieving safe results for patients with resection of giant retroperitoneal tumours.

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