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RETROPERITONEAL PLEOMORPHIC SARCOMA ENCASING THE RIGHT KIDNEY: PERIOPERATIVE CHALLENGES AND ANESTHETIC MANAGEMENT

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Abstract

Background: Retroperitoneal sarcomas are rare malignant tumors, accounting for less than 1% of all malignancies. Pleomorphic sarcoma is an uncommon aggressive subtype that often presents late and requires extensive surgical resection. When encasing the kidney, these tumors present significant surgical and anesthetic challenges.

Case Presentation: A 60-year-old male (ASA III) presented with a progressively enlarging abdominal mass over four months. Imaging revealed a retroperitoneal sarcoma encasing the right kidney, and biopsy confirmed pleomorphic sarcoma. Preoperative evaluation showed stable cardiopulmonary function and normal laboratory parameters. The patient underwent laparotomy with en bloc right radical nephrectomy and tumor excision under combined thoracic epidural and general anesthesia. Invasive monitoring included a left radial arterial line and right internal jugular central venous catheter. Induction was achieved with glycopyrrolate (0.2 mg), midazolam (1 mg), fentanyl (150 µg), propofol (120 mg), and atracurium (40 mg). Anesthesia was maintained with oxygen, nitrous oxide, isoflurane, and epidural bupivacaine with fentanyl. Blood loss was approximately 1000 mL, managed with crystalloids and transfusion of two units of packed red blood cells. Hemodynamics remained stable throughout. The patient was electively ventilated overnight in the SICU and successfully extubated on postoperative day one. He was discharged on postoperative day six after an uneventful recovery.

Conclusion: Retroperitoneal pleomorphic sarcomas with renal involvement require multidisciplinary planning, invasive monitoring, and tailored anesthetic management. A combined epidural–general anesthesia technique, judicious fluid therapy, and elective postoperative ventilation can optimize outcomes in these high-risk surgeries.

Keywords: Retroperitoneal sarcoma, Pleomorphic sarcoma, Radical nephrectomy, Invasive monitoring, Epidural anesthesia, Elective ventilation

INTRODUCTION

From the anesthetic perspective, these cases demand meticulous perioperative planning due to their complex physiological implications. Key challenges include the risk of major blood loss from tumor resection near major vessels, prolonged operative times, and large fluid shifts that can affect hemodynamic stability. The presence of a large retroperitoneal mass may also impact ventilation by restricting diaphragmatic excursion, necessitating careful intraoperative ventilatory management. Advanced monitoring, including invasive arterial pressure and possibly central venous access, is often required for real-time assessment and rapid intervention. Maintenance of renal perfusion to the remaining kidney, prevention of hypothermia, and judicious transfusion strategies are essential components of intraoperative care. Postoperatively, these patients frequently require high-dependency or intensive care unit monitoring to manage pain, detect early bleeding, and support hemodynamic recovery [4].
This case report describes the anesthetic management of a patient with retroperitoneal pleomorphic sarcoma encasing the right kidney, focusing on strategies to anticipate and address perioperative challenges for optimal surgical and recovery outcomes

Case Presentation

A 60-year-old male, Mr. Krishna Moorthy, ASA III, presented with a gradually enlarging abdominal mass over four months. There were no associated gastrointestinal, respiratory, or constitutional symptoms. He had no comorbidities, surgical history, or significant family history.

Baseline hematological investigations revealed hemoglobin of 11 g/dL, total leukocyte count and platelet count within normal limits, and normal coagulation parameters of PT -14 , INR -1.1 , APTT - 28. Renal function tests, including serum creatinine and blood urea nitrogen, were within reference ranges, indicating preserved renal function despite tumor encasement of the right kidney. Liver function tests were also normal, suggesting no hepatic compromise.

Electrocardiography demonstrated normal sinus rhythm with EF of 55% no evidence of ischemic changes or arrhythmias. A chest radiograph showed clear lung fields. Contrast-enhanced computed tomography (CECT) of the abdomen and pelvis revealed a large, heterogeneous, lobulated retroperitoneal mass measuring approximately 20 × 15 cm, with areas of necrosis and enhancement. The lesion was seen encasing the right kidney and abutting the inferior vena cava, with displacement of adjacent bowel loops. There was no evidence of distant metastases or significant lymphadenopathy. Ultrasound-guided biopsy of the mass confirmed the diagnosis of high-grade pleomorphic sarcoma. Airway was adequate with MMG -2 and spine palpable with no deformities .

Intraoperative Course:

The patient was managed under combined epidural–general anesthesia. Standard ASA monitoring was supplemented with invasive lines, including a left radial arterial line for beat-to-beat blood pressure measurement and a right internal jugular central venous catheter for CVP monitoring, fluid administration, and vasoactive drug delivery. A thoracic epidural catheter was inserted at the T10–T11 interspace; after a negative test dose of 3 mL 2% lignocaine with adrenaline, a bolus of 6 mL 0.25% bupivacaine with 50 µg fentanyl was administered for preemptive analgesia. Induction was achieved with glycopyrrolate 0.2 mg, midazolam 1 mg, fentanyl 150 µg, propofol 120 mg IV, and atracurium 40 mg, followed by endotracheal intubation with an 8.0 mm cuffed tube. Anesthesia was maintained with oxygen–nitrous oxide (50:50) and isoflurane (0.8–1.2% end-tidal), with intermittent epidural top-ups of 0.25% bupivacaine and fentanyl, and supplemental atracurium boluses for muscle relaxation.

Intraoperatively, an estimated blood loss of 1300 mL was managed using a goal-directed fluid strategy, guided by continuous invasive arterial pressure monitoring, CVP trends (maintained between 8–12 cm H_2O), and urine output assessment. A total of 3.5 L of fluids was administered, including 2 units of packed red blood cells. The transfusion decision was individualized, based on hemodynamic parameters, surgical field assessment, and anticipated ongoing losses rather than fixed volume replacement. Maintaining adequate preload without fluid overload was prioritized to support renal perfusion and optimize oxygen delivery, with urine output maintained at 350 mL over the 4.5-hour procedure.

The surgery—midline laparotomy with right radical nephrectomy and excision of a 20 × 15 cm retroperitoneal mass—was completed without intraoperative hemodynamic instability. In view of the prolonged operative time, significant fluid shifts, and ASA III status, the patient was electively shifted intubated to the SICU on midazolam infusion (0.05 mg/kg/hr) for overnight ventilation. He was extubated uneventfully on postoperative day 1, continued on epidural analgesia for 48 hours, mobilized early, and discharged on postoperative day 6 in stable condition.

DISCUSSION

Major retroperitoneal tumor resections are associated with significant anesthetic challenges due to the risk of massive blood loss, marked fluid shifts, prolonged surgical duration, and the need for meticulous hemodynamic control. In this case, perioperative management followed a **goal-directed anesthesia protocol** designed to optimize perfusion and oxygen delivery while avoiding fluid overload.

Monitoring and Significance

Standard ASA monitoring (ECG, NIBP, SpO_2, $EtCO_2$, and temperature) was supplemented with advanced invasive modalities. A radial arterial line provided continuous beat-to-beat blood pressure monitoring and

facilitated rapid detection of hemodynamic instability as well as timely arterial blood gas, lactate, and hemoglobin assessment. Central venous catheterization enabled vasoactive drug administration and CVP measurement, which, when combined with dynamic indices, helped guide fluid therapy.

The anesthesia workstation's integrated arterial waveform analysis allowed for **stroke volume variation (SVV)** and **pulse pressure variation (PPV)** monitoring. These dynamic parameters were used to assess preload responsiveness in real time, providing a more accurate guide for fluid administration compared to static measurements alone. Such monitoring aligns with Enhanced Recovery After Surgery (ERAS) and modern goal-directed therapy recommendations.

Perioperative Fluid Management

Balanced crystalloids were the primary fluid of choice. Maintenance was kept at a minimal effective rate, with boluses administered only when SVV/PPV indicated fluid responsiveness, urine output dropped below 0.5 mL/kg/hr, or lactate levels suggested hypoperfusion. The approach aimed to maintain a neutral fluid balance, preventing tissue edema and potential impairment of respiratory or bowel function postoperatively.Blood transfusion was initiated on observing the allowable blood loss and hemodynamic fluctuation, ensuring adequate oxygen-carrying capacity while minimizing unnecessary transfusions. Vasopressors such as norepinephrine were started early if hypotension persisted despite appropriate fluid therapy, thus avoiding excessive crystalloid administration.

Anesthetic Technique and Protocol

A combined general anesthesia and thoracic epidural technique was employed to provide optimal intraoperative conditions and superior postoperative analgesia. Epidural analgesia reduced the need for higher volatile anesthetic concentrations, minimized the surgical stress response, and contributed to hemodynamic stability. Intraoperative activation was monitored for any drop in Blood pressure and moderations were made .

Postoperative Considerations

At the conclusion of surgery, the patient's volume status was reassessed, confirming the absence of significant fluid overload or hypovolemia. Stable hemodynamics, effective analgesia, and normothermia permitted early extubation in the ICU. This case highlights that a **goal-directed-based perioperative strategy** combined with multimodal analgesia can improve outcomes in high-risk, prolonged abdominal surgeries.

CONCLUSION

Retroperitoneal pleomorphic sarcoma resections with renal involvement are high-risk procedures, often associated with massive fluid shifts, blood loss, and prolonged operative times. Optimal perioperative management hinges on **precise fluid therapy**, guided by **goal-directed protocols** rather than fixed-volume replacement. Using advanced hemodynamic monitors to track real-time stroke volume, cardiac output, and dynamic preload indices allows titration of balanced crystalloids and blood products to maintain adequate perfusion while avoiding fluid overload. This tailored approach not only minimizes postoperative complications such as pulmonary edema and tissue edema but also supports faster recovery. In this case, the combination of vigilant invasive monitoring, judicious transfusion strategy, and multimodal analgesia via combined epidural–general anesthesia provided a stable intraoperative course and favorable postoperative outcome.

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