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THROUGH THE CUT AND BEYOND: PRECISION ANESTHETIC MANAGEMENT IN A YOUNG FEMALE UNDERGOING LEFT HEPATECTOMY FOR HEPATIC ADENOMA

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Abstract

Background: Hepatic adenomas (HCAs) are rare benign liver tumors, strongly associated with oral contraceptive use and typically affecting young women. While often asymptomatic, large or symptomatic adenomas carry risks of rupture, hemorrhage, and malignant transformation. Resection is recommended for high-risk lesions. Anesthetic management of hepatic resection is challenging due to potential massive hemorrhage, need for meticulous fluid balance, and risk of postoperative hepatic dysfunction.

Case Presentation: We describe the anesthetic management of a 19-year-old female with seizure disorder who presented with recurrent abdominal pain. Imaging revealed a 6 cm hepatic adenoma in segments II and III of the left lobe. She underwent elective left hepatectomy under general anesthesia with invasive hemodynamic monitoring, careful volume management, and strategies to minimize blood loss. Intraoperative blood loss was limited to 300 mL, requiring transfusion of one unit of packed red blood cells and fresh frozen plasma. Postoperatively, she was electively ventilated, extubated on the first postoperative day, and had an uneventful recovery.

Conclusion: This case highlights that successful anesthetic management of hepatic adenoma resection requires careful preoperative preparation, intraoperative vigilance with blood conservation measures, and close postoperative monitoring. Low central venous pressure anesthesia, judicious fluid therapy, and multidisciplinary coordination ensured favorable outcomes in this young patient.

INTRODUCTION

Hepatic adenomas (HCAs) are uncommon benign epithelial liver tumors, with a strong predilection for young women, often linked to prolonged oral contraceptive use [1]. The incidence of HCA is estimated at 3–4 cases per 100,000 women annually, though this may be underestimated due to incidental and asymptomatic cases [2]. The clinical significance of HCA lies not in its benign nature but in its potential for complications, particularly hemorrhage, rupture, and malignant transformation into hepatocellular carcinoma [3,4]. Hemorrhage occurs in up to 30% of patients, sometimes presenting as life-threatening intraperitoneal bleeding [5].

Current management guidelines advocate resection for adenomas larger than 5 cm, symptomatic tumors, and all adenomas in males, given the risk of malignant change [6]. MRI has emerged as the diagnostic modality of choice, offering superior characterization compared to CT, especially with hepatobiliary contrast agents [7,8].

From the anesthetic standpoint, hepatic resections are complex procedures with high intraoperative and postoperative risks. Blood loss remains one of the most significant challenges, often requiring transfusion and associated with worse outcomes [9]. Techniques such as low central venous pressure (CVP) anesthesia, goal-directed fluid management, and

the use of antifibrinolytics have been shown to reduce intraoperative bleeding [10,11]. Postoperatively, patients require close monitoring for complications including bile leaks, hemorrhage, or post-hepatectomy liver failure [12].
This case describes the anesthetic management of a young female undergoing elective left hepatectomy for HCA, focusing on strategies employed to minimize intraoperative blood loss and optimize recovery.

Case Report

A 19-year-old female weighing 54 kg, with a history of well-controlled seizure disorder, presented with recurrent abdominal pain. MRI of the abdomen revealed a 6 cm homogenous, well-defined lesion involving segments II and III of the liver, consistent with hepatic adenoma, supplied by the left hepatic artery. She had no history of oral contraceptive use. On examination, she was healthy with no jaundice, ascites, or signs of chronic liver disease. Cardiopulmonary examination was unremarkable.
Laboratory evaluation showed hemoglobin 9.3 g/dL, normal liver function tests, and normal coagulation profile (INR 1.1, PT 12 s). After optimization and counseling, elective left hepatectomy was planned. Blood and blood products were arranged in anticipation of intraoperative blood loss.

Preoperative Management

The patient's anemia was partially corrected with iron supplementation, and antiepileptic medications were continued. Anesthetic planning prioritized invasive monitoring, blood conservation strategies, and maintenance of stable hemodynamics with low CVP to minimize blood loss.

Intraoperative Management

After confirming adequate intravenous access, anesthesia was induced with midazolam (1 mg IV), propofol (2 mg/kg), and fentanyl (2 µg/kg), followed by atracurium (0.5 mg/kg) to facilitate intubation. The trachea was intubated smoothly, and anesthesia was maintained with isoflurane in oxygen–nitrous oxide mixture.
Following induction, a thoracic epidural catheter was placed at the T8–T9 interspace under sterile precautions for intra- and postoperative analgesia. A test dose of lignocaine with adrenaline was given, and intraoperative analgesia was supplemented with intermittent doses of epidural local anesthetic and opioid mixture. The use of epidural not only provided excellent pain control but also contributed to hemodynamic stability and reduced intraoperative opioid requirements.
Monitoring included ECG, SpO_2, end-tidal CO_2, invasive arterial pressure (via left radial artery), central venous pressure (via right internal jugular vein), urine output, and core temperature. During parenchymal transection, a low central venous pressure (CVP) was maintained through restricted fluid administration, optimizing surgical field visibility and minimizing venous bleeding.
Transient hypotension during liver mobilization was managed with small volume fluid boluses and a low-dose norepinephrine infusion, avoiding over-transfusion. Normothermia was maintained with forced-air warming blankets. Estimated blood loss was 300 mL.The four-hour procedure remained hemodynamically stable, and epidural analgesia facilitated smooth intraoperative management.

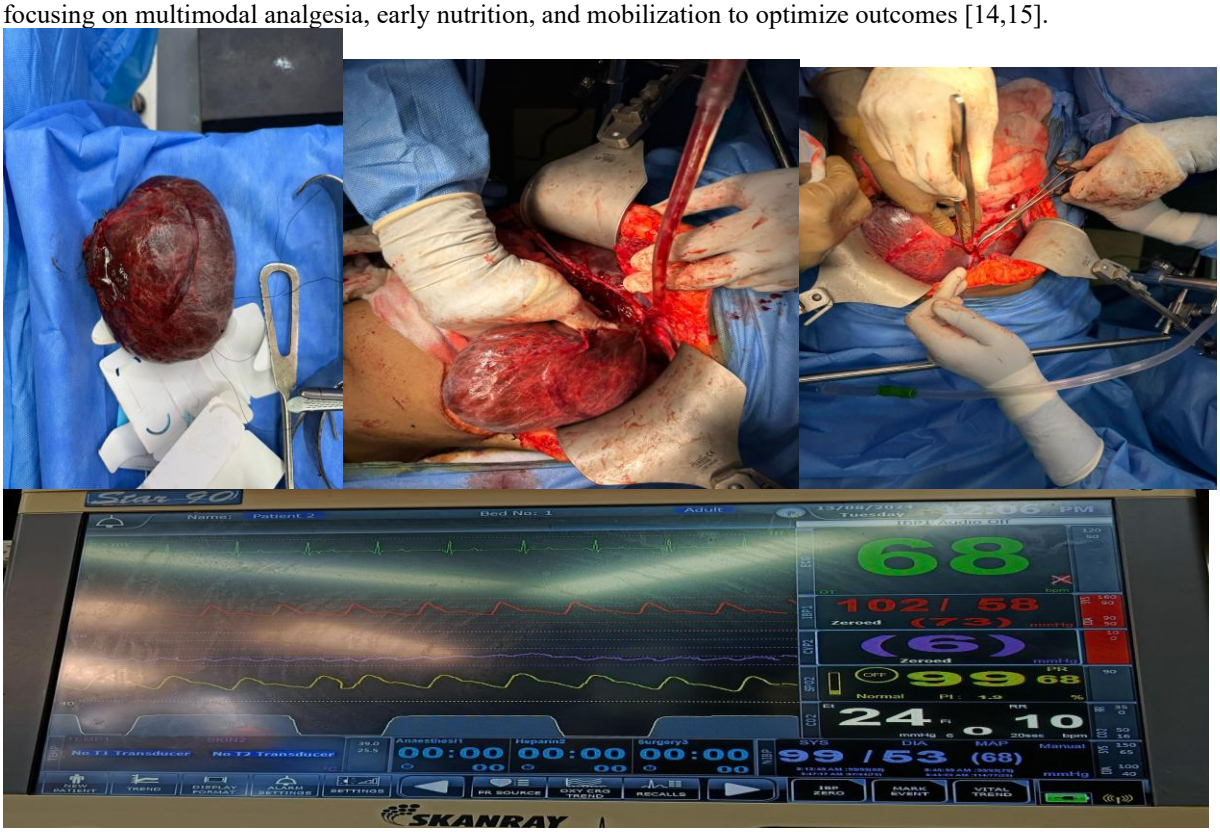
Postoperative Management

The patient was transferred intubated to the ICU for elective ventilation. She was extubated on postoperative day (POD) 1 after fulfilling weaning criteria. Pain control was provided with epidural analgesia and intravenous acetaminophen.
Liver function and coagulation remained within normal limits. Ultrasound abdomen on POD 3 revealed no intra-abdominal collection or bile leak. The epidural catheter was removed, and the patient was mobilized. She was shifted to the surgical ward on POD 3 and discharged after an uneventful recovery.

DISCUSSION

Hepatic adenoma resection, while curative, poses significant anesthetic challenges. The foremost concern during liver surgery is intraoperative hemorrhage, which is directly linked to morbidity, mortality, and postoperative complications [9]. Blood conservation strategies are therefore paramount.
The low central venous pressure (CVP) technique, achieved through careful fluid restriction and anesthetic depth, has been consistently shown to reduce intraoperative blood loss [10]. However, this must be balanced against risks of hypotension, renal hypoperfusion, and air embolism [11]. In this patient, judicious crystalloid administration combined with invasive monitoring helped maintain low CVP while ensuring adequate perfusion. Hemodynamic instability during liver mobilization was promptly corrected with vasopressors, preventing excessive fluid administration.
Other important strategies include maintaining normothermia to prevent coagulopathy, use of cell salvage in high-risk cases, and availability of antifibrinolytics such as tranexamic acid to reduce bleeding [13]. In our case, estimated blood loss was only 300 mL, demonstrating the effectiveness of vigilant monitoring and low-CVP anesthesia.

Postoperatively, patients undergoing hepatectomy remain at risk of bile leak, hemorrhage, or post-hepatectomy liver failure [12]. Elective ventilation, close monitoring of liver function, and early mobilization contribute to favorable recovery. Enhanced Recovery After Surgery (ERAS) protocols are increasingly being incorporated into liver surgery, focusing on multimodal analgesia, early nutrition, and mobilization to optimize outcomes [14,15].



CONCLUSION

This case illustrates the successful anesthetic management of a young female undergoing left hepatectomy for hepatic adenoma. Through comprehensive preoperative planning, intraoperative blood conservation strategies including low CVP anesthesia, vigilant monitoring, and multidisciplinary coordination, intraoperative blood loss was minimized and recovery was smooth. Safe perioperative strategies remain the cornerstone of favorable outcomes in hepatic resection, even in high-risk surgical procedures.

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