

Anesthesia for Hepatobiliary Surgery



Chris Snowden, MBBS, FRCA, MD^{a,b,*}, James Prentis, MBBS, FRCA^a

KEYWORDS

- Hepatobiliary • Anesthesia • Hepatectomy • Enhanced recovery • Intrathecal • Opiate

KEY POINTS

- Reduced mortality after hepatobiliary surgery is related to improved patient selection, introduction of preoperative embolization techniques, improved intraoperative surgical techniques/equipment, and reduced operative blood loss.
- Alternative therapies (eg, radiofrequency ablation) are being introduced in patients who are unable to tolerate extensive hepatic resections.
- Lowering the central venous pressure during hepatic resection reduces blood loss but must be optimized to avoid hypovolemia and excessive use of vasoconstrictor medication.
- Intrathecal opiates may provide an alternative postoperative pain control regimen to epidural analgesia, especially where there is abnormal coagulation.

INTRODUCTION

Hepatobiliary (HPB) surgery, variably defined to include pancreatic surgery, and liver and pancreas transplantation, has become a major surgical specialty with explicit training opportunities, mainly as a response to poor surgical outcomes in the early 1970s. The subsequent improvement in HPB surgical outcomes (now usually <5% mortality) has been associated with:

1. The concentration of HPB surgery to large volume centers
2. Better preoperative treatment, including radiologic venous embolization and chemoradiotherapy regimens
3. Introduction of newer surgical techniques and equipment to minimize blood loss (eg, Cavitron ultrasonic aspirator [CUSA] or harmonic scalpel to dissect the liver parenchyma).

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^a Department of Perioperative and Critical Care Medicine, Freeman Hospital, Freeman Road, Newcastle upon Tyne NE7 7DN, UK; ^b Institute of Cellular Medicine, The Medical School, University of Newcastle upon Tyne, Framlington Place, Newcastle upon Tyne NE1 4LP, UK

* Corresponding author. Department of Perioperative and Critical Care Medicine, Freeman Hospital, Freeman Road, Newcastle upon Tyne NE7 7DN, UK.

E-mail address: Chris.Snowden@nuth.nhs.uk

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Alongside these surgical advances, it is recognized that advanced anesthetic management of the HPB surgery patient has significantly contributed to improved outcomes. These advances have come predominantly through more appropriate preoperative patient selection, intraoperative techniques to prevent and manage blood loss, and postoperative enhanced recovery protocols with improved analgesic regimens.

The present article relates primarily to the management of patients undergoing hepatic resection. In this context, we address anesthetic and surgical considerations, including patient selection, alternative surgical management options, the reduction of operative blood loss, introduction of the components of postoperative enhanced recovery, and considerations related to postoperative liver dysfunction and failure.

HEPATIC RESECTION

Outcomes of Hepatic Resection

Hepatic resection is performed for a number of underlying pathologies, including benign or malignant primary tumors, secondary metastases (predominantly colorectal), and liver trauma. Surgical criteria for patient selection are important.¹ If hepatic malignancy is involved, operative resection is established as the only currently available modality of treatment with curative potential.

Patients with untreated but potentially resectable hepatic malignancy have been reported to have a median survival time of less than 6 months,² with virtually no 5-year survival. Surgical treatment for hepatocellular carcinoma prolongs 10-year survival to 15%.³ Five-year survival after hepatic resection for metastases is 33%,⁴ compared with 11% in those not undergoing operative resection. The aim of hepatic resection is to effect clear tumor margins, while ensuring adequate remaining residual liver to prevent postoperative hepatic insufficiency. The relevance of a clear resection margin is reflected in survival. For patients with tumor-free margins greater than 1 cm, a 5-year disease-free survival rate of 35% can be expected. Survival rates are 21% for patients for whom tumor margins are less than 1 cm, and no 5-year survivors can be expected when the margins are involved by tumor.⁵

Hepatic Regeneration

Residual liver volume after surgery is important to postoperative hepatic dysfunction.⁶ The volume of liver that can be safely resected in humans is approximately 80%,⁷ assuming good function in the remaining liver, although there are early reports of survival after resections of 90%.⁸ The potential for these massive resections (or extensive ablations) relies on postoperative hepatic regeneration, which has a complex mechanism.⁹ Under normal circumstances, the human liver initiates regeneration within 3 days and has reached its original size by 6 months,¹⁰ although some studies have shown full restoration at 3 months. Rapid regeneration may allow complete functional recovery within 2 to 3 weeks.¹¹

Preoperative Portal Vein Embolization

If there is a predicted risk of liver failure developing after a procedure, through need to remove large liver components, then the preemptive maneuvers of portal embolization of affected segments, some weeks before resection can stimulate regeneration in the proposed liver remnant, thereby enhancing postoperative liver function.¹²⁻¹⁴ An increase of 40% to 60% in the size of the nonembolized liver can be anticipated in noncirrhotic livers.^{15,16} Similarly, chemoembolization can be used in potentially

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