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# ERCP: Biliary Decompression, Stone Removal, and Stenting

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## Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) is a cornerstone in the diagnosis and treatment of obstructive jaundice, offering therapeutic interventions focused on biliary decompression through stent placement and stone extraction [1].

The selection of an appropriate stent for biliary decompression in obstructive jaundice is a critical decision. Self-expandable metal stents (SEMS) demonstrate superior patency rates compared to plastic stents, making them the preferred choice for malignant obstructions, although they carry a higher risk of pancreatitis [2].

Choledocholithiasis, a frequent cause of obstructive jaundice, has seen significant advancements in its management due to ERCP. Balloon extraction is the primary method for stone removal, often complemented by mechanical lithotripsy for larger or impacted stones [3].

Endoscopic ultrasound (EUS)-guided biliary drainage is emerging as a valuable alternative to ERCP for select cases of obstructive jaundice, particularly when ERCP is unsuccessful or unavailable. This technique offers a potentially safer route for biliary access, bypassing challenges associated with duodenal cannulation in altered anatomy [4].

The management of malignant biliary obstruction frequently involves palliative stenting to alleviate jaundice and enhance the quality of life. While SEMS are generally favored for their longer patency, preventing stent occlusion due to tumor ingrowth or overgrowth remains a challenge [5].

Benign biliary strictures, commonly resulting from cholecystectomy or chronic pancreatitis, represent another significant indication for endoscopic intervention. ERCP facilitates balloon dilatation and the placement of multiple plastic stents across the stricture [6].

ERCP-related complications, including pancreatitis, bleeding, perforation, and cholangitis, necessitate careful consideration and risk mitigation strategies. These strategies encompass meticulous patient selection, appropriate pharmacological prophylaxis, and refined endoscopic techniques [7].

Beyond simple stenting, interventional techniques are vital for managing complex biliary issues. Sphincterotomy, balloon dilatation, and various lithotripsy methods are standard tools for stone removal. In challenging anatomies or post-surgical cases, alternative access methods like percutaneous transhepatic cholangiography may be required [8].

The utility of ERCP extends to the management of less common indications such as Mirizzi syndrome and biliary-enteric fistulas. Successful endoscopic management in these complex scenarios often relies on a multidisciplinary approach and advanced endoscopic expertise [9].

Ongoing advancements in endoscopic technologies and refinements in existing techniques continuously enhance the safety and efficacy of interventions for obstructive jaundice. These include improvements in stent materials, imaging guidance, and the development of minimally invasive approaches for complex biliary pathologies [10].

## Description

Endoscopic retrograde cholangiopancreatography (ERCP) serves as a primary modality for diagnosing and treating obstructive jaundice, with therapeutic strategies primarily centering on biliary decompression via stent placement (plastic or self-expandable metal stents) and the removal of biliary stones [1].

The choice of stent for achieving biliary decompression in cases of obstructive jaundice is paramount. Self-expandable metal stents (SEMS) offer prolonged patency rates in comparison to plastic stents, positioning them as the preferred option for malignant obstructions, although they are associated with an increased risk of pancreatitis [2].

Choledocholithiasis, a common etiology of obstructive jaundice, has benefited immensely from ERCP interventions. Balloon extraction represents the principal technique for stone removal, frequently augmented by mechanical lithotripsy for managing larger or impacted stones [3].

Endoscopic ultrasound (EUS)-guided biliary drainage is emerging as a significant alternative to ERCP in specific scenarios of obstructive jaundice, particularly in patients where ERCP has failed or is not feasible. Techniques such as EUS-guided choledochoduodenostomy or hepaticogastrostomy offer a potentially safer pathway for biliary access, circumventing the difficulties of duodenal cannulation in surgically altered anatomy [4].

Malignant biliary obstruction management often incorporates palliative stenting to alleviate jaundice and improve patient quality of life. While SEMS are generally considered superior due to their longer patency, challenges persist in preventing stent occlusion from tumor ingrowth or overgrowth, driving research into combination therapies and novel stent designs [5].

Benign biliary strictures, frequently stemming from cholecystectomy or chronic pancreatitis, constitute another important indication for endoscopic intervention. ERCP enables balloon dilatation and the placement of multiple plastic stents across the stricture, with repeated interventions potentially leading to stricture remodeling and resolution, though surgical intervention may be necessary for refractory cases

[6].

ERCP-associated complications, such as pancreatitis, bleeding, perforation, and cholangitis, remain a notable concern. Strategies to mitigate these risks involve careful patient selection, judicious use of pharmacological prophylaxis, and precise endoscopic techniques, with advanced imaging and adjuncts like over-the-scope clips aiding in complication management [7].

Interventional techniques beyond straightforward stenting are essential for addressing complex biliary pathologies. Sphincterotomy, balloon dilatation, and mechanical, electrohydraulic, or laser lithotripsy are standard interventions for stone removal. In cases of difficult biliary access or post-surgical anatomy, alternative approaches like percutaneous transhepatic cholangiography (PTC) may be required [8].

The application of ERCP also extends to the management of less frequent conditions like Mirizzi syndrome and biliary-enteric fistulas. The successful endoscopic management of these complex presentations typically necessitates a collaborative, multidisciplinary approach and a high level of endoscopic skill [9].

Continuous advancements in emerging technologies and the refinement of established endoscopic techniques are consistently improving the safety and effectiveness of interventions for obstructive jaundice. These advancements encompass improvements in stent materials, imaging guidance, and the development of minimally invasive strategies to manage increasingly complex biliary pathologies [10].

## Conclusion

Endoscopic retrograde cholangiopancreatography (ERCP) is a critical tool for diagnosing and treating obstructive jaundice, focusing on biliary decompression with stents and stone removal. Different stent types, such as self-expandable metal stents (SEMS) and plastic stents, are chosen based on the cause of obstruction and anticipated duration of drainage. Choledocholithiasis is managed with balloon extraction and lithotripsy, while benign strictures are treated with dilatation and stenting. Endoscopic ultrasound-guided biliary drainage offers an alternative approach for challenging cases. Managing malignant obstructions often involves palliative stenting. ERCP carries risks of complications like pancreatitis and bleeding, necessitating careful technique and patient selection. Advanced techniques and ongoing technological improvements continue to enhance the safety and efficacy of biliary interventions.

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## Conflict of Interest

None.

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