



# Contribution of Endoscopic Retrograde Cholangiopancreatography (ERCP) in the Treatment of Bilio-Pancreatic Pathologies: Experience from the Agadir Region

Maryem Boussouab<sup>1</sup>, Ghassan Chleh<sup>1</sup>, Fatima Zahra Boubakr<sup>1</sup>, Amine Bentayeb<sup>2</sup>, Mehdi Zouaoui<sup>1</sup>, Yassine Chait<sup>1</sup>, Youssef Hnach<sup>2</sup>, Mbarek Azouaoui<sup>1</sup>, Nourdin Aqodad<sup>1</sup>

<sup>1</sup>Department of Gastroenterology, University Hospital Center Souss Massa, Agadir, Morocco

<sup>2</sup>Department of Gastroenterology, Military Hospital Oued Eddahab, Agadir, Morocco

Email: maramboussouab@gmail.com

**How to cite this paper:** Boussouab, M., Chleh, G., Boubakr, F.Z., Bentayeb, A., Zouaoui, M., Chait, Y., Hnach, Y., Azouaoui, M. and Aqodad, N. (2025) Contribution of Endoscopic Retrograde Cholangiopancreatography (ERCP) in the Treatment of Bilio-Pancreatic Pathologies: Experience from the Agadir Region. *Open Access Library Journal*, 12: e13383.

<https://doi.org/10.4236/oalib.1113383>

**Received:** April 2, 2025

**Accepted:** May 27, 2025

**Published:** May 30, 2025

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## Abstract

**Introduction:** Endoscopic retrograde cholangiopancreatography (ERCP) is a key technique for managing biliary and pancreatic diseases, combining endoscopy and radiology. Initially a diagnostic tool, ERCP is now primarily used for therapeutic interventions, supported by advancements in MRI and endoscopic ultrasound. Despite its effectiveness, ERCP carries risks that depend on patient conditions and procedural complexity. This study evaluates ERCP's role in treating biliary diseases and associated complications in a regional setting. **Materials and Methods:** A retrospective study was conducted over four years (2020-2023) at Agadir Regional Hospital and Oued Eddahab Agadir Military Hospital. The study included all patients undergoing ERCP for biliary or pancreatic pathology. Data were collected from medical records, and statistical analysis was performed using Jamovi software. **Results:** A total of 77 patients were included, with a mean age of 62.1 years. The majority were women (sex ratio F/M = 1.3). The most common indication for ERCP was biliary lithiasis (75.3%), followed by tumor pathology (23.3%). Among tumor cases, pancreatic head adenocarcinoma (72.2%) was the most frequent, followed by cholangiocarcinoma. Management included metal (55%) and plastic (22%) stent placements. Biliary lithiasis was complicated by pancreatitis and/or cholangitis in 15.5% of cases. The bile duct was successfully catheterized in 93% of cases, with clearance achieved in 86.2% of patients. Complications were reported in 5% of cases, including mild pancreatitis, digestive perforation, and hemorrhage. One patient died due to pulmonary embolism. **Conclusion:** ERCP remains a crucial procedure for managing biliary and pancreatic diseases, particularly for lithia-

sis and tumor-related strictures. It allowed effective biliary drainage in tumor cases (77.8%) and successful bile duct clearance in 92.5% of lithiasis cases, with a low complication rate (5%).

## Subject Areas

Gastroenterology

## Keywords

Endoscopic Retrograde Cholangiopancreatography, Bilio-Pancreatic Junction, Biliary Lithiasis

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## 1. Introduction

Endoscopic retrograde biliary-pancreatic catheterization plays a crucial role in the treatment of biliary and pancreatic diseases, combining endoscopic and radiological techniques [1].

The first cannulation of the ampulla of Vater was performed by McCune *et al.* in 1968, allowing visualization of the biliary tree and pancreatic ducts, and the first endoscopic sphincterotomy was performed in 1974 [2] [3].

Initially, ERCP was the technique of choice for bilio-pancreatic ductal exploration. Today, it is rarely used for diagnostic purposes and is more often a precursor to an endoscopic therapeutic procedure, thanks to new imaging techniques such as MRI and endoscopic ultrasound [4].

Complications are well known and depend on the patient's condition and the complexity of the procedure, necessitating careful selection of indications and adequate follow-up to assess long-term complications [1] [4] [5].

Over the years, several studies have helped better define the indications, benefits, and complications of ERCP. Despite its effectiveness, this technique remains associated with significant challenges, particularly in cases of altered gastrointestinal anatomy, complex strictures, or large stones. Preventing complications, especially post-ERCP pancreatitis, remains a priority. Various strategies, such as the use of NSAIDs or prophylactic pancreatic stents, have been studied to reduce this risk [6] [7].

Moreover, practices vary from one center to another depending on the operators' expertise, the protocols in place, and the available technical resources. In this context, generating local data becomes essential to better adapt management strategies.

Our study thus aims to address this gap by providing a detailed description of the experience of two hospital centers in the Agadir region, evaluating the indications, techniques used, outcomes achieved, and complications encountered.

## 2. Materials and Methods

We conducted a cross-sectional, descriptive, and retrospective study over a 4-year

period (January 2020 – December 2023), involving all patients admitted to the Regional Hospital of Agadir and the Military Hospital Oued Eddahab in Agadir for the management of biliopancreatic diseases.

**Inclusion criteria:**

- Patients aged over 18 years;
- All patients admitted to the Regional Hospital of Agadir and the Military Hospital Oued Eddahab in Agadir with benign or malignant biliary obstruction;
- Complete medical records, including ERCP reports and usable clinical, biological, and radiological data.

**Exclusion criteria:**

- Patients with contraindications to endoscopic biliary sphincterotomy (e.g., bleeding disorders);
- Incomplete medical records.

Data were collected using a pre-established structured data collection sheet based on ERCP reports and patients' medical records. For each included patient, epidemiological data (age, sex, etc.) as well as clinical, biological, endoscopic, and radiological features (ultrasound and/or abdominal CT scan, and possibly MRCP) were gathered to determine the nature of the obstruction and confirm the cause of biliary blockage.

All patients underwent a pre-anesthesia consultation and were hospitalized at least one day before the procedure. They all received adequate information about the examination. The procedure was performed under general anesthesia with systematic intubation, on fasting patients, and with prophylactic antibiotic therapy.

The common bile duct (CBD) was catheterized using a sphincterotome inserted through the papillary orifice. In cases of conventional catheterization difficulty, the endoscopist performed an infundibulotomy to access the CBD directly. Fluoroscopic opacification of the CBD allowed visualization of the number, size, and location of stones, the diameter of the main bile duct (**Figure 1**), and the presence and location of any stenosis. After sphincterotomy, stone extraction was performed using a balloon catheter or a Dormia basket. Placement of a plastic or metal stent was also performed, depending on the indication.

In our study, a large stone was defined as one with a size >15 mm. Choledocholithiasis with multiple stones was defined as the presence of more than three stones in the CBD. A peri-diverticular papilla was defined by the presence of a diverticulum adjacent to the papilla.

Statistical analysis was performed using the Jamovi software. Qualitative variables were expressed as percentages, and quantitative variables as means with standard deviations.

### 3. Results

Seventy-seven patients were included, with a mean age of 62.1 years  $\pm$  18. The

female-to-male sex ratio was 1.3, favoring women.

Biliary lithiasis was the primary indication for ERCP in 75.3% of cases (n = 58), followed by tumor pathology in 23.3% (n = 18), with only one case of a hydatid cyst fistulized into the bile ducts (**Table 1**).

Tumor pathology was dominated by pancreatic head adenocarcinoma compressing the main bile duct in 72.2% of cases (n = 13), followed by hilar cholangiocarcinoma in 11% (n = 2), two cases of choledochal cholangiocarcinoma, and one case of ampullary carcinoma. Management involved the placement of a metal stent in 55% of cases (n = 10) and a plastic stent in 22% (n = 4) (**Table 1**).

**Table 1.** Indications for ERCP.

Indication	Number (%)
<b>Biliary lithiasis</b>	<b>58 (75.3%)</b>
<b>Tumoral pathology</b>	<b>18 (23.3%)</b>
Pancreatic head adenocarcinoma	13 (72.2%)
Hilar cholangiocarcinoma	2 (11%)
Choledochal cholangiocarcinoma	2 (11%)
ampullary carcinoma	1 (5.5%)
<b>Hydatid cyst fistulized into the bile ducts</b>	<b>1 (1.2%)</b>

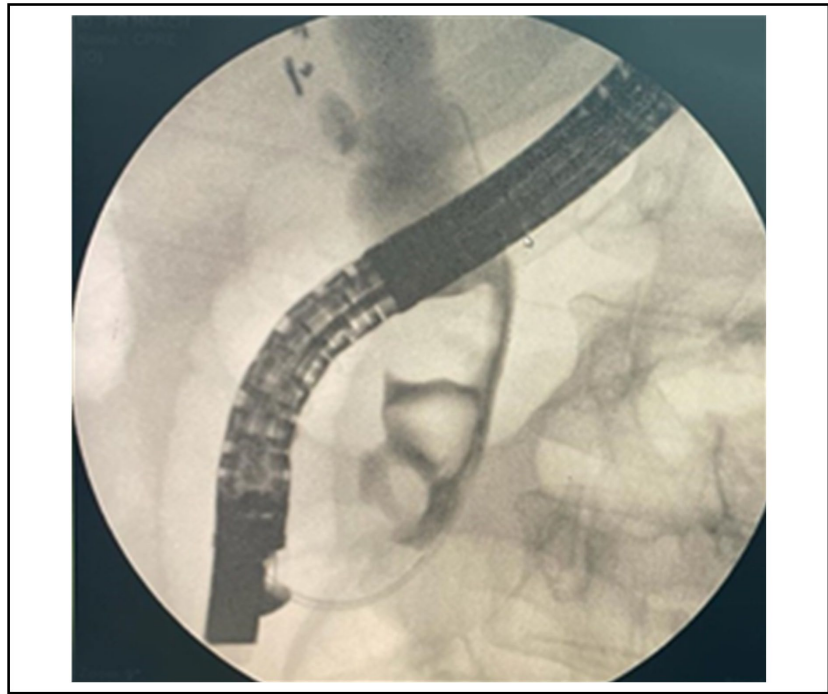
**Table 2.** Endoscopic and cholangiographic data of lithiasic pathology.

Parameters	Number (%)
Peri-diverticular papilla	6 (10.3%)
Catheterization rate	54 (93%)
Failure of papilla catheterization	4 (6.9%)
Dilated common bile duct (CBD)	51 (88%)
Average CBD diameter	13+/-4 mm (7 - 25 mm)
Types of Stones	
Single stone	24 (44%)
Large stone	15 (27.7%)
Choledochal stone impaction	10 (18.5%)
CBD Clearance	50 (86.2%)

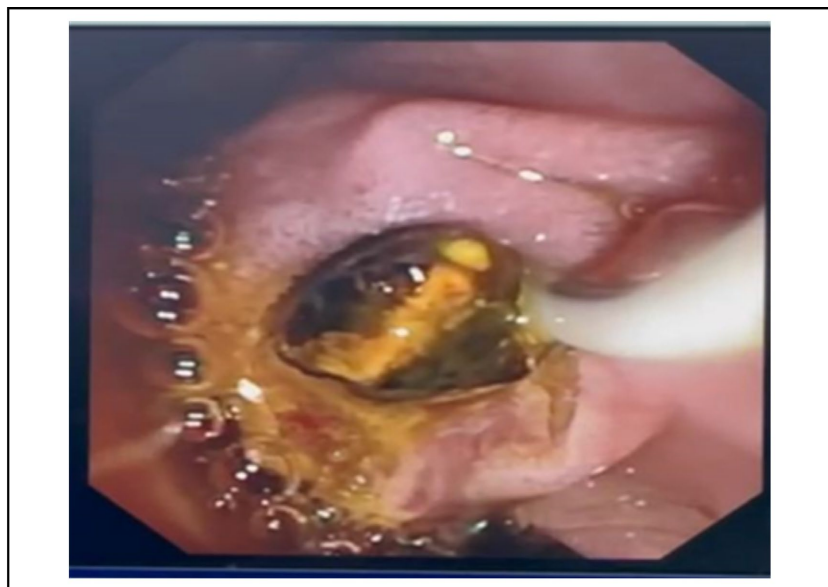
Biliary lithiasis was complicated by pancreatitis and/or cholangitis in 15.5% of cases (n = 9). A peri-diverticular papilla was identified in 10.3% of cases (n = 6), and papilla catheterization failed in 6.8% of cases (n = 4).

The bile duct was successfully catheterized in 93% of cases (n = 54), and was dilated in 88% (n = 51), with a mean diameter of 13 mm  $\pm$  4.4 (7 - 25 mm). One or more calculi were detected in 79.3% of patients (n = 46), of whom 41.3% (n =

24) had a single calculus, 17.2% (n = 10) had bile duct impaction, and 25.8% (n = 15) had a large calculus (>15 mm) (**Figure 2**). Biliary stenting was performed in 13.7% of patients (n = 8), and bile duct clearance was achieved in 86.2% of cases (n = 50) (**Table 2**).



**Figure 1.** ERCP showing the presence of three large stones in a dilated common bile duct.



**Figure 2.** Extraction of a large bile stone.

The rate of patients who experienced complications was 5% (n = 4):

There were two cases of acute pancreatitis, likely due to inadvertent passage of

the guidewire into the main pancreatic duct. These cases were classified as mild, with no organ failure. Management consisted of conservative medical treatment, including strict fasting, intravenous fluid therapy, analgesics, and close biological monitoring. Both cases had a favorable outcome.

One case of gastrointestinal bleeding, secondary to hemorrhagic sphincterotomy, was controlled by balloon tamponade.

One case of retroperitoneal digestive perforation, diagnosed immediately, occurred following an excessively wide sphincterotomy. Surgical intervention was required, with the placement of a bilio-digestive drain. Postoperative recovery was favorable, with the return of bowel function and normalization of infectious parameters after antibiotic therapy.

Finally, we report the death of a 70-year-old female patient with advanced pancreatic cancer, which occurred due to massive pulmonary embolism.

#### 4. Discussion

ERCP is the gold-standard technique for treating biliary and pancreatic obstructions and has been shown to be superior to surgical and percutaneous drainage in terms of morbidity and quality of life [8].

Biliary and pancreatic pathologies are primarily dominated by lithiasis and tumor-induced strictures [9]. Biliary lithiasis is a common condition, with stones in the main bile duct occurring in 10% - 15% of patients with gallbladder lithiasis due to migration [10]. Malignant biliary strictures present a diagnostic and therapeutic challenge requiring a multidisciplinary approach [11].

In our study, lithiasis was the primary indication for ERCP in 75.3% of cases (n = 58), followed by tumor pathology in 23.3% (n = 18). This aligns with the findings of the literature, where bile duct lithiasis is the leading cause of biliary obstruction, although neoplastic causes are increasingly frequent, particularly in patients over 50 years old [12].

Concerning neoplastic pathology, pancreatic head cancer (72.2%, n = 13) and cholangiocarcinoma (16.6%, n = 3) were the most frequent tumors. Similar results were reported by Dridi *et al.*, Drouet *et al.*, and Benabdeslam *et al.* [13]-[15], whereas Errahmi [16] noted a predominance of cholangiocarcinoma.

The management of malignant biliary strictures is mostly palliative, as these tumors are often diagnosed at an advanced stage. The development of endoscopic instrumental techniques has taken a central role compared to palliative surgical procedures, which had a mortality rate of approximately 20% within one month [17] [18]. Endoscopic retrograde biliary drainage has therefore become an essential component of the therapeutic approach for malignant biliary strictures [19]. Among our patients, biliary drainage involved the placement of a metallic stent in 55% of cases (n = 10) and a plastic stent in 22% of cases (n = 4), with a technical success rate of 77.8%. This result is comparable to literature data, where the success rate of endoscopic biliary drainage ranges between 72.5% and 98.5% [20]-[22].

Currently, endoscopic treatment is the primary approach for common bile duct lithiasis, whether simple or complicated, yielding satisfactory results with lower morbidity and mortality rates [23] [24]. In our study, lithiasis-related disease was complicated by pancreatitis and/or cholangitis in 15.5% of cases (n = 9). This finding is consistent with Seddik *et al.* [25], who reported a cholangitis rate of 18%. However, other studies, such as those by Benkirane *et al.* [26] and Moussadek *et al.* [27], reported higher complication rates of 31% and 39%, respectively.

Large common bile duct stones pose a known challenge for endoscopic treatment [28] [29]. In our study, the rate of common bile duct cannulation was 93% (n = 54), consistent with literature data. Various studies [25]-[27] have highlighted the importance of additional maneuvers to facilitate stone extraction, particularly in cases of multiple and/or large stones. In our series, 18.5% of patients (n = 10) had common bile duct stone impaction, and 27.7% (n = 15) had a large stone (diameter >15 mm).

In our population, bile duct cannulation failed in 6.8% of cases (n = 4), a rate comparable to that reported in the literature, which ranges between 1% and 16% [30] [31]. The common bile duct clearance rate in our study was 95.5%, similar to data reported in two meta-analyses: 92% [32] and 87.1% [33].

The safety of ERCP was excellent in our patients, with an overall complication rate of 5%. In the literature, this rate varies between 5% and 10%, depending on the operator's experience and patient-specific factors [30] [34]. These complications, although rare, highlight the need for rigorous management of the procedure and prompt, appropriate care. The use of preventive measures such as prophylactic NSAID administration, early identification of anatomically complex situations, and multidisciplinary management of adverse events can help reduce their frequency and severity.

Our study presents certain limitations. Firstly, its retrospective nature constitutes a significant methodological constraint. Indeed, data collection from medical records exposes the study to a risk of selection bias (linked to the inclusion of patients with complete files only), as well as information bias (particularly in cases of missing data or subjective interpretations of procedural reports).

Moreover, this study was conducted in two hospitals within the same region, which may limit the generalizability of the results to other populations or healthcare settings with different resources.

However, several factors help to mitigate the impact of these limitations on the validity of our findings. First, the structured collection of data using a standardized extraction form ensured consistency in case analysis. Second, the number of patients included over a four-year period provides a realistic representation of ERCP practice in our setting. Finally, the results are consistent with existing literature, thereby strengthening the credibility of the conclusions drawn.

## 5. Conclusion

ERCP remains the preferred procedure for managing bilio-pancreatic conditions,

primarily lithiasis and tumor-induced strictures. In our study, it enabled biliary drainage via prosthesis placement in 77.8% of cases with tumor pathology and achieved bile duct clearance in 92.5% of patients with lithiasis, with a low complication rate of approximately 5%.

### Conflicts of Interest

The authors declare no conflicts of interest.

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