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# Pericystic-Digestive Anastomosis for Hepatic Hydatid Cysts: Indications, Outcomes, and a Surgical Decision Algorithm

**Stere Popescu[1,2,3], Tina Popescu[4], Bogdan Obada[2,5]*, Teodor Ștefan Nițu[1,2], Irina Nițu[1,2], Maria Sabina Neacșu[1,2], Ana Maria Grigorescu[1,2], Florin Gabriel Pănculescu[2], Florin Daniel Enache[2,6], Mihai Victor Lupașcu[2], Iulian Manac[2,6], Daniel Ovidiu Costea[1,2]**

[1]Department of General Surgery, Emergency Hospital of Constanța, Romania
[2]Ovidius University, Faculty of Medicine and Pharmacy, Constanța, Romania
[3]Department of Anatomy, Faculty of Medicine, Ovidius University, Constanța, Romania
[4]Hospital Pharmacy, Emergency Hospital of Constanța, Romania
[5]Department of Orthopedics and Traumatology, Emergency Hospital of Constanța, Romania
[6]Department of Pediatric Surgery and Pediatric Orthopedics, Emergency Hospital of Constanța, Romania

***Corresponding author:**
Bogdan Obada, MD, PhD
Ovidius University
Faculty of Medicine and Pharmacy,
Constanța, Romania
Department of Orthopedics and
Traumatology, Emergency Hospital
of Constanța
145 Tomis Boulevard, 900591
Constanța, Romania
E-mail: bogdanobada@yahoo.com

## Rezumat

***Anastomoza perichisto-digestivă în chisturile hidatice hepatice: indicații, rezultate și algoritm decizional chirurgical***

*Introducere:* Anastomoza perichisto-digestivă este o opțiune chirurgicală rar utilizată, dar valoroasă, în tratamentul chistului hidatic hepatic complicat.
*Material şi metodă:* Studiul retrospectiv a inclus 24 de pacienți operați între 2010 şi 2023 într-un centru de chirurgie generală din România. Au fost analizate indicațiile intraoperatorii, tipurile de anastomoză efectuate şi evoluția postoperatorie.
*Rezultate:* Anastomoza perichisto-jejunală în Y a fost utilizată la 19 pacienți, iar perichistogastrostomia la 5. Toți pacienții prezentau fistulă biliară comunicantă intraoperator (≥ 5 mm). Nu au existat decese sau reintervenții. Complicațiile minore au inclus sindrom febril tranzitoriu (12,5%), întârzierea tranzitului intestinal (8,3%) şi o colecție subhepatică drenată percutanat (4,1%). Imagistica de urmărire a arătat regresia progresivă a cavităților restante.
*Concluzii:* Anastomoza perichisto-digestivă poate fi o soluție sigură şi eficientă în cazuri atent selecționate, cu chisturi mari, centrale, cu fistule biliare şi perichist bine organizat. Pe baza experienței clinice şi a literaturii actuale, propunem un algoritm decizional practic pentru orientarea indicației chirurgicale în echinococoza hepatică complicată.

**Cuvinte cheie:** chist hidatic hepatic, anastomoză perichisto-digestivă, fistulă biliară, jejunostomie Roux-en-Y, tratament chirurgical, selecția cazurilor, algoritm decizional

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## Abstract

*Introduction:* Pericystic-digestive anastomosis is a rarely used but valuable surgical option in the management of complicated hepatic hydatid cysts.

*Materials and Methods:* This retrospective observational study included 24 patients operated between 2010 and 2023 in a general surgery center in Romania. We analyzed intraoperative decision-making, type of anastomosis, and postoperative outcomes.

*Results:* Roux-en-Y jejunostomy was performed in 19 patients, and pericystogastrostomy in 5. All patients had intraoperatively confirmed biliary fistulas ≥5 mm. There were no deaths or reinterventions. Minor complications included transient febrile syndrome (12.5%), delayed bowel transit (8.3%), and one percutaneously drained subhepatic collection (4.1%). Follow-up imaging showed progressive reduction of residual cavities in all cases.

*Conclusions:* When correctly indicated, pericystic-digestive anastomosis provides safe and effective internal drainage for large, centrally located cysts with biliary fistulas and well-organized pericysts. Based on clinical experience and current literature, we propose a practical decision-making algorithm to guide surgical management in complicated hepatic echinococcosis.


**Keywords:** hepatic hydatid cyst, pericystic-digestive anastomosis, biliary fistula, Roux-en-Y jejunostomy surgical treatment, case selection, decision-making algorithm

## Introduction

Hepatic hydatid cyst (HHC) represents the most frequent localization of echinococcosis in humans and continues to be a therapeutic challenge in endemic areas such as Romania (1). Although the past decades have brought significant progress in minimally invasive procedures, pharmacological therapy, and imaging techniques, complicated or large-volume cases still require a well-chosen surgical intervention tailored to each patient (2,3). In recent years, the management of complex cases of hepatic echinococcosis has been increasingly re-evaluated in clinical practice. This therapeutic challenge has been recognized for decades. International guidelines such as the WHO Informal Working Group on Echinococcosis (IWGE) and the WSES (World Society of Emergency Surgery) recommend an algorithmic approach to hepatic echinococcosis, prioritizing minimally invasive techniques (e.g., PAIR – puncture, aspiration, injection, reaspiration) for simple cysts, while reserving surgery for complex or ruptured cysts, cysts with biliary communication, and those resistant to medical treatment (4). According to international consensus guidelines, these strategies should be tailored based on cyst stage, location, and patient status (5). The full therapeutic spectrum for CE ranges from percutaneous to extensive surgical approaches (3).

Surgical treatment of HHC ranges from conservative procedures, such as drainage of the residual cavity, to radical interventions, including total pericystectomy or hepatic resections. The choice of technique depends on multiple factors: the size and location of the cyst, the presence of a biliary fistula, the degree of pericyst organization, and the experience of the surgical team (6,7,8).

Within this therapeutic spectrum, pericystic-digestive anastomosis is a rarely used but potentially valuable option in very selective cases, especially when conventional drainage techniques fail or are contraindicated. Its utility has been described in a limited number of series, mostly before the era of advanced laparoscopy. However, its potential for physiological internal drainage, in the presence of a large residual cavity and a communicating biliary fistula, especially in the context of modern hepato-biliary surgery. Hydatid cysts are typically classified based on imaging criteria, which help guide the selection of treatment options (9). Similar remarks regarding the declining use of this technique were made in Romanian surgical literature (10).

Despite its limited use, recent literature lacks comprehensive retrospective analyses focused specifically on pericystic-digestive anastomosis in modern surgical settings. Given the potential benefits in carefully selected patients, a reappraisal of this technique is warranted.

This retrospective observational study does not aim to compare surgical techniques, but rather to illustrate the role of a tailored approach in select clinical scenarios.

The aim of this study is twofold: to analyze the

outcomes of 24 cases of hepatic hydatid cysts treated with pericystic-digestive anastomosis over a 13-year period; and to propose a practical decision-making algorithm for patient selection, based on anatomical, clinical, and intraoperative criteria, integrating current guidelines with real-world surgical experience.

## Materials and Methods

This retrospective observational study included 24 patients diagnosed with complicated hepatic hydatid cysts who underwent pericystic-digestive anastomosis between 2010 and 2023 at a general surgery center in Constanța, Romania. These cases were selected from a total of 526 patients operated for hepatic hydatid disease during the same period, representing 4.56% of all interventions.

Case selection was based on intraoperative findings of a large residual cavity, well-organized pericyst, and the presence of a significant biliary fistula, where classical drainage methods were considered insufficient or inappropriate. Patients undergoing other types of surgical treatment (PAIR, subtotal pericystectomy, hepatic resections, external drainage alone) were not included in this study.

This is not a comparative study and no control group was used. The purpose was to document and analyze outcomes following a specific surgical technique in a selected subgroup of patients, not to statistically validate the method.

Data were collected from medical records, operative reports, and imaging studies. The following variables were analyzed: patient age and sex, cyst location (segments II, III, V, VI), presence or absence of a communicating biliary fistula, type of anastomosis performed, postoperative complications, and average hospital stay.

All procedures were performed via open surgery, using either subcostal or midline incisions. A standardized operative protocol was followed and adapted to each case, consisting of the following steps:

1. The operative field was isolated with pads soaked in hypertonic saline (20%) to prevent dissemination of hydatid contents;
2. Hydatid fluid was evacuated via a dependent puncture, followed by instillation of a scolicidal agent (either 20% sodium chloride or iodine solution);
3. Cystotomy was performed in the most dependent area, followed by careful exploration of the cavity and identification of biliary fistulas;
4. Cholecystectomy was performed in all patients. This was done to eliminate a potential site of biliary stasis and prevent late biliary complications, especially in cases with known or suspected hydatid-biliary communication;
5. Primary endoscopic sphincterotomy was performed prior to surgery in all patients, as a preventive measure to reduce biliary pressure and the risk of postoperative bile leakage. This approach was adopted as part of the institutional management protocol for hydatid cysts with biliary involvement.

The pericystic-digestive anastomosis was created using the hollow organ closest to the most dependent portion of the cyst. In 19 patients, a Roux-en-Y excluded jejunal loop was used; in 5 cases, the anastomosis was made to the stomach. Jejunal anastomoses were performed laterally on a supramesocolic excluded loop, with the jejuno-jejunostomy located 30-40 cm distal to the anastomosis.

Postoperative follow-up included abdominal ultrasonography and computed tomography (CT) at 3 and 6 months, and annually thereafter. Cholangiography was performed selectively. The mean follow-up duration was 4 years. Six patients were lost to follow-up.

## Results

A total of 24 patients were included in the study: 13 men and 11 women, with a mean age of 51 years (range: 29-74 years). Most of the cysts were located in the right hepatic lobe (16 cases, 66.7%), followed by the left lobe (8 cases, 33.3%). Intraoperatively, a communicating biliary fistula was identified in all patients, with diameters ranging from 5 to 8 mm.

Regarding the type of anastomosis, Roux-en-Y pericystic jejunostomy was performed in 19 patients (78.8%), while pericystogastrostomy was used in 5 cases (20.8%). The type of anastomosis was determined intraoperatively, based on the anatomical proximity of the cyst to the jejunum or stomach. The correlation between cyst location and the type of anastomosis performed is summarized in *Table 1*.

The average postoperative hospital stay was 13-14 days (range: 8-23 days). While no major complications were observed, patients were routinely monitored for bile leakage, anastomotic integrity, and residual collections before discharge. The extended hospital stay reflected the institutional

**Table 1.** Correlation between cyst location and type of anastomosis

| Segment location | No. of patients | Type of anastomosis | Biliary fistula present |
|---|---|---|---|
| Segment V | 10 | Roux-en-Y jejunostomy | Yes |
| Segment VI | 6 | Roux-en-Y jejunostomy | Yes |
| Segment II | 3 | Pericystogastrostomy | Yes |
| Segment III | 5 | Pericystogastrostomy | Yes |

postoperative protocols for hydatid disease with biliary communication, rather than complications per se.

The postoperative course was favorable in all cases:

1. Transient febrile syndrome occurred in 3 patients (12.5%) between days 3 and 7, resolving with antibiotics;
2. Delayed bowel transit was noted in 2 patients (8.3%) and managed conservatively;
3. One patient (4.1%) developed a moderate subhepatic collection (6 cm), which was successfully drained percutaneously.

The distribution of these postoperative complications is illustrated in *Fig. 1.*

No deaths or reinterventions were recorded. No anastomotic leaks, stenosis, or fistulas occurred during hospitalization or follow-up.

Follow-up imaging (ultrasound and CT) at 3 and 6 months, then annually, showed progressive reduction or complete resolution of the residual cavities in all followed patients. No recurrence, abscesses, or biliary complications were detected during the mean follow-up period of 4 years (range: 3-10 years).

Six patients (25%) were lost to follow-up after the first year and were excluded from long-term outcome evaluation.

These outcomes confirm the technical feasibility and safety of pericystic-digestive anastomosis in a carefully selected patient population, when performed in specialized surgical centers.

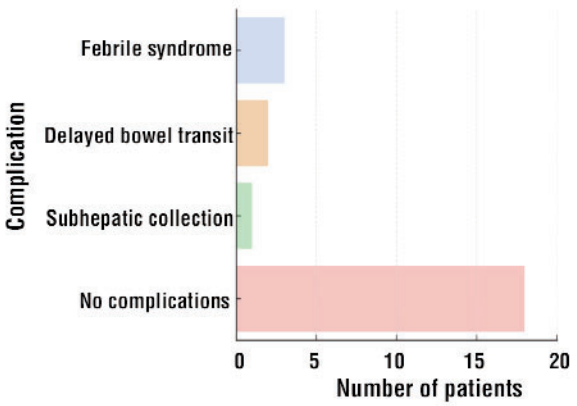


**Figure 1.** Postoperative Complications (n=24)

## Discussion

The surgical management of hepatic hydatid cysts (HHC) continues to generate debate, particularly in complicated cases where the choice between conservative and radical approaches must balance efficacy, safety, and recurrence risk. Although minimally invasive procedures such as PAIR (puncture, aspiration, injection, reaspiration) and laparoscopic pericystectomy have gained widespread acceptance for selected cyst types, complex or centrally located cysts with biliary communication remain a therapeutic challenge. Although PAIR remains effective in selected cases, long-term results remain controversial in cysts with biliary involvement (11).

According to the WHO Informal Working Group on Echinococcosis (IWGE), surgery remains the treatment of choice in cases of cysts larger than 10 cm, infected cysts, or those with cystobiliary communication, especially when located centrally (4). The 2020 WSES guidelines similarly endorse surgery in complicated echinococcosis, recommending a case-by-case approach based on cyst type, location, and surgeon experience (12).

In this context, pericystic-digestive anastomosis is a rarely used but technically feasible option for internal drainage in selected patients. Several studies suggest that radical surgery, particularly when combined with perioperative albendazole, remains a valid option in selected cases (13). While modern trends have favored radical procedures or laparoscopic interventions, this technique offers a physiological, low-pressure outflow path for residual cavity content and bile in cases where pericystectomy is unsafe or contraindicated (6).

Our experience with 24 patients over a 13-year

period demonstrates that pericystic-digestive anastomosis can be performed safely, with low morbidity and no mortality, provided that the pericyst is well organized and the cyst has a declivous anatomical position. The absence of major complications or recurrences during follow-up supports the technique's efficacy in selected indications.

Other authors have reported similar findings. In a 2014 comparative study, Acar et al. showed that Roux-en-Y cystojejunostomy was effective in managing giant cysts with bile leakage, reducing postoperative drainage duration compared to partial cystectomy (14). Other reports have also highlighted the utility of jejunal drainage in giant cysts with fistulas (15). Stapled or reinforced anastomoses are sometimes considered in order to improve surgical outcomes, depending on the clinical context. A recent retrospective analysis by Ferhatoglu et al. (2021) also highlights that conservative surgery remains relevant in high-risk patients with central lesions and difficult biliary fistulas (7).

In our series, the decision to associate routine cholecystectomy and preoperative endoscopic sphincterotomy was made to reduce postoperative bile stasis and pressure. This strategy is supported by data showing that sphincterotomy reduces the incidence of persistent biliary leakage after cyst surgery and with previous reports on managing postoperative biliary complications (16). Biliary decompression remains an important adjunct in managing cystobiliary fistulas, helping reduce postoperative bile leakage.

The main indication for pericystic-digestive anastomosis remains the presence of a large, central cyst with a wide biliary fistula and a well-defined pericyst wall. Intrabiliary rupture remains a well-documented complication in hepatic echinococcosis, requiring tailored drainage strategies (17). These features favor a secure internal connection with the digestive tract, providing long-term resolution without external drainage. Conversely, this approach is contraindicated in subphrenic locations, calcified or friable pericysts, and when no adjacent hollow organ is accessible (18,19).

Compared to percutaneous methods (PAIR), this approach requires open surgery, which limits its indication in elderly or comorbid patients. However, in young or middle-aged patients with complex cysts and biliary communication, it offers a safe alternative to extensive liver resections. Moreover, our data show that Roux-en-Y jejunostomy, while technically more demanding, ensures a unidirectional drainage path and minimizes the risk of reflux.

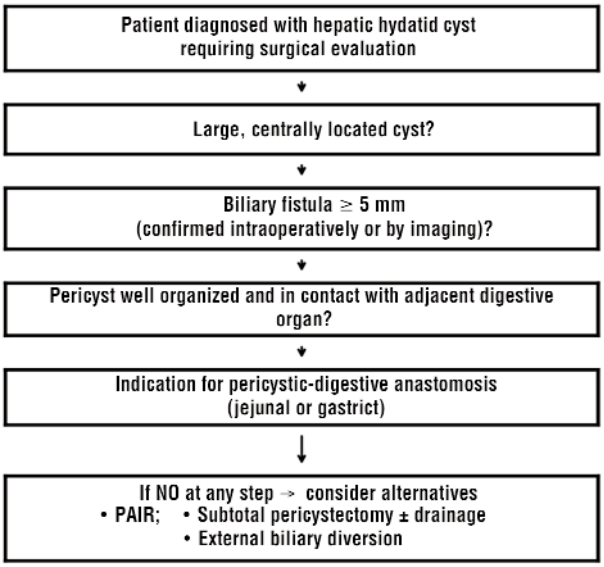


**Figure 2.** Proposed algorithm for selecting pericystic-digestive anastomosis in HHC

The main limitation of our study is its retrospective design and lack of a control group. In addition, the number of cases, while significant for a rare technique, remains insufficient to establish broad recommendations. However, the long-term follow-up and uniform surgical approach enhance the value of our observations.

We believe that pericystic-digestive anastomosis still deserves a place in the surgical armamentarium for hepatic hydatid disease, especially in referral centers where hepatobiliary surgery expertise is available. A tailored, anatomy-based approach, guided by preoperative imaging and intraoperative findings, can lead to favorable outcomes.

The proposed decision-making algorithm (*Fig. 2*) may serve as a practical tool in evaluating the suitability of this technique and integrating it alongside other modern strategies.

## Conclusions

Pericystic-digestive anastomosis represents a viable surgical option in the management of selected cases of complicated hepatic hydatid cysts. When properly indicated - in the presence of a large residual cavity, wide biliary fistula, and well-organized pericyst - it offers a physiological method of internal drainage, with low complication rates

and good long-term outcomes.

Although rarely used today, this technique remains relevant, particularly in centrally located cysts where radical surgery is either high-risk or impractical. Its safety and reproducibility, as demonstrated in our retrospective series, support its continued inclusion in the therapeutic arsenal of hepatobiliary surgery.

A careful case-by-case approach, guided by anatomical and intraoperative criteria, remains essential. The proposed decision-making algorithm may assist surgeons in identifying candidates for this technique and integrating it with current treatment standards. Similar decision pathways have been proposed by other authors in selected complex cases (11).

Key prerequisites for successful application of this procedure include:

1. A well-organized pericyst capable of holding a secure suture;
2. A dependent hepatic location;
3. Patency of the main biliary tract.

Although infrequently used in contemporary practice, pericystic-digestive anastomosis remains relevant in surgical management, being a safe, reproducible, and effective technique when applied judiciously.

Further prospective studies are needed to validate these findings in larger patient populations and to compare pericystic-digestive anastomosis with other contemporary surgical and minimally invasive approaches.

### *Conflict of Interest*

The authors declare no conflict of interest. All authors contributed equally and share collective authorship.

### *Ethical Statement*

All procedures performed in this study were in accordance with the ethical standards of the 1964 Helsinki Declaration and its later amendments. Given the retrospective nature of the study and the absence of any experimental interventions, approval from an ethics committee was not required.

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