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Case Report

Management of NSAID-Induced Penetrating Gastric Ulcer Complicated by Hemorrhagic Cholecystitis: The Role of Percutaneous Transhepatic Biliary Drainage [☆]

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ABSTRACT

Non-steroidal anti-inflammatory drugs (NSAIDs) are commonly used for their analgesic and anti-inflammatory effects but can lead to serious gastrointestinal complications. This report illustrates the management of an NSAID-induced penetrating gastric ulcer with subsequent postoperative hemorrhagic cholecystitis. A 68-year-old female with chronic NSAID use presented with epigastric pain and was diagnosed with a penetrating gastric ulcer extending into the retroperitoneum. The surgical management required a shift from a minimally invasive robotic-assisted approach to an open procedure due to unexpected intraoperative findings. The postoperative period was notable for the development of hemorrhagic cholecystitis that was managed with percutaneous transhepatic biliary drainage, highlighting the role of interventional radiology in complex postoperative care. NSAID use significantly increases gastrointestinal risks, leading to complications such as ulcers that may penetrate into adjacent structures, including the retroperitoneum. The management of penetrating gastric ulcers typically involves complex surgical procedures, highlighted in this scenario by the necessity for an antrectomy followed by a Billroth II reconstruction to address the extensive damage and restore gastrointestinal continuity, which is essential for patient recovery. In this case, the development of hemorrhagic cholecystitis postoperatively was effectively managed with a percutaneous transhepatic biliary drain, demonstrating the importance of interventional radiology in managing postoperative complications and the need for a multidisciplinary approach. This case report elucidates the management of NSAID-induced pen-

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etrating gastric ulcer that extended into the retroperitoneum, necessitating an antrectomy with Billroth II reconstruction. A gastric ulcer is generally classified as "large" if it exceeds 2 centimeters in diameter. These ulcers pose greater risks of complications such as perforation, penetration into adjacent organs, bleeding, and obstruction, necessitating more complex and comprehensive management strategies. The postoperative complication of hemorrhagic cholecystitis was effectively managed via interventional radiology, highlighting the critical role of minimally invasive techniques in addressing severe postoperative complications.

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Introduction

Gastrointestinal perforations present a formidable emergency in medical practice, marked by the leakage of gastrointestinal contents into the peritoneal cavity due to a disruption in the continuity of the gastrointestinal tract [1]. Among the various causes, the use of nonsteroidal anti-inflammatory drugs (NSAIDs) stands out as a significant risk factor due to their action on inhibiting the cyclooxygenase (COX) enzyme, which can compromise the protective mucosal lining of the stomach [2,3]. This case report presents an intricate scenario of diagnosing and managing a penetrating gastric ulcer induced by excessive NSAID consumption, which extended into the retroperitoneum and was further complicated by postoperative hemorrhagic cholecystitis [4,5].

The rarity and critical nature of penetrating gastric ulcers, especially those breaching into the retroperitoneum, calls for a comprehensive and collaborative management strategy that combines surgical acumen with radiologic expertise [6]. This article delves into the surgical decision-making and execution challenges encountered during the management of this case, including the transition from a minimally invasive to an open surgical approach due to unexpected intraoperative complications. Moreover, it elaborates on the innovative application of percutaneous transhepatic biliary drainage as a method to address postoperative biliary complications [7].

Given the widespread use of NSAIDs and their potential to cause severe gastrointestinal injuries, effective management strategies for penetrating ulcers and their complications are crucial [8]. Penetrating gastric ulcers often necessitate significant surgical intervention, such as antrectomy followed by Billroth II reconstruction, to restore gastrointestinal continuity and prevent further morbidity [9]. The Billroth II reconstruction involves removing the distal part of the stomach (distal gastrectomy) and connecting the remaining stomach to the jejunum (gastrojejunostomy), bypassing the duodenum. This approach addresses the immediate structural damages caused by the ulcer and prepares the digestive system for a recovery that minimizes future complications [10].

The occurrence of hemorrhagic cholecystitis in the postoperative phase poses additional challenges, requiring timely and innovative responses, particularly when prior surgical alterations like a Billroth II reconstruction complicate conventional endoscopic procedures [11]. Interventional radiology techniques, such as percutaneous transhepatic biliary drainage, become essential in these scenarios to manage ob-

structions and mitigate inflammation effectively [12]. This integrated approach showcases the necessity for a multidisciplinary approach and skills in both the surgical and postoperative management of NSAID-induced gastrointestinal events [13].

Case presentation

A 68-year-old female with a notable medical history of chronic obstructive pulmonary disease (COPD) and combined systolic and diastolic heart failure presented to the emergency department (ED) with severe epigastric pain, nausea, and vomiting. These symptoms had progressively worsened over 10 days following the patient's reported consumption of twelve Aleve (naproxen sodium) tablets daily for a week and a half preceding her abdominal pain onset. This excessive intake of nonsteroidal anti-inflammatory drugs (NSAIDs) prompted concern for NSAID-induced gastrointestinal complications.

On initial evaluation, computed tomography (CT) of the abdomen and pelvis revealed an abnormality suggestive of a penetrating ulcer extending into the retroperitoneum from the gastric antral area (Figs. 1 and 2). The imaging also noted local inflammatory changes spreading into the mesentery and mucosal edema, causing marked thickening of the transverse colon.

Given the urgency and complexity of the case, the patient underwent a robotic-assisted diagnostic laparoscopy, lysis of adhesions (LOA), partial gastrectomy, and gastrojejunostomy. A significant finding was identified during the surgical exploration: a large posterior ulcer located at the pylorus. This ulcer had extended upwards onto the stomach and downwards onto the duodenum, occupying about 50% of the width of the pyloric channel. Essentially, the entire posterior aspect of the pylorus was compromised, measuring approximately 4 cm in length. Given the extensive nature of this ulcer and its critical location, the option of a primary repair was deemed inappropriate due to the high risks of potential leakage and obstruction. Consequently, a decision was made to proceed with an antrectomy, removing the affected section to ensure a more secure and obstruction-free gastrointestinal continuity.

Following the antrectomy, a Billroth II reconstruction was performed to restore the integrity and functionality of the gastrointestinal tract. A Billroth II reconstruction involves removing the distal part of the stomach (distal gastrectomy) and attaching the remaining stomach directly to the jejunum (gas-

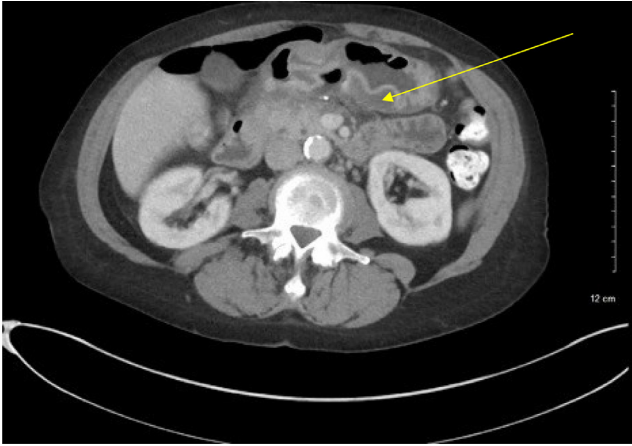


Fig. 1 – Axial CT abdomen showing peri gastric edema with wall thickening, particularly in the antral and distal fundal region (yellow arrow). It also reveals pneumoperitoneum at the top of the image, which indicates perforation of hollow viscera.

trojejunostomy), bypassing the duodenum. This surgical judgment was crucial in managing the severe structural damage caused by the ulcer, aiming to provide a durable solution to the patient's complex gastrointestinal issue.

Postoperatively, the patient experienced a complicated course. Initially, she stabilized and was discharged; however, she soon represented on postoperative day 11 with epigastric and right upper quadrant abdominal pain, leading to a series of laboratory tests that revealed an elevated WBC count of $28.7 \times 10^3/\mu\text{L}$, indicating a severe inflammatory or infectious process. Liver function tests showed markedly elevated AST at 1073 U/L, ALT at 465 U/L, and total bilirubin at 2.3 mg/dL, suggesting significant hepatic and biliary involvement.

Initial ultrasound (US) imaging revealed heterogeneous echogenic content in the gallbladder, indicative of sludge versus hemorrhage and possible liver cirrhosis (Fig. 3). A subsequent computed tomography (CT) scan of the abdomen and pelvis with intravenous contrast confirmed mild intrahepatic biliary dilation and high attenuation material suggestive of gallstones and sludge in the gallbladder and common bile duct (Fig. 4). To further delineate the biliary pathology and assess for the presence of blood products within the biliary system, a magnetic resonance cholangiopancreatography (MRCP) was performed.

The MRCP showed a dilated common bile duct measuring up to 1 cm, with T2 intermediate signal densities in the common bile duct and gallbladder lumen and hypointense signals indicative of cholelithiasis. T1-weighted imaging revealed hyperintense signals suggesting biliary sludge, though blood products could not be ruled out. These findings supported the possibility of hemorrhagic cholecystitis (Figs. 5-7).

MRCP provided superior soft tissue contrast and detailed imaging of the biliary and pancreatic ducts, confirming the presence of hemorrhagic components and guiding the decision for percutaneous transhepatic biliary drainage. Each imaging modality was critical in addressing specific clinical questions, with US and CT providing initial diagnostic



Fig. 2 – Sagittal CT abdomen and pelvis with the red arrow pointing at abnormality with the suggestion of a penetrating ulcer into the retroperitoneum of the gastric antral area. An absence of enhancing tissue indicates a penetrating ulcer posteriorly between the stomach and the pancreatic head/body junction. Local inflammatory changes are noted that extend into the mesentery and possibly with wall enlargement of the transverse colon.

confirmation and MRCP offering detailed visualization essential for planning subsequent interventions. For management, the patient was started on intravenous antibiotics (Piperacillin/Tazobactam, Metronidazole, and Cefepime).

Given the recent surgery and the complexities associated with the patient's altered anatomy post-Billroth II, a less invasive approach was preferred to mitigate the risks of additional surgical interventions. Therefore, the decision was made to perform a percutaneous transhepatic cholangiogram (Fig. 8). This procedure not only allowed for the diagnosis but also the immediate management of the complete obstruction within the mid-common hepatic duct. Through this technique, an internal/external biliary drain was successfully placed, navigating through the obstructed duct to alleviate the condition and manage the cholecystitis effectively. This strategic approach minimized further surgical risks and provided a crucial management pathway in the delicate postoperative phase.

Given the anatomical context and the clinical scenario, it is plausible that the obstruction within the mid-common hep-

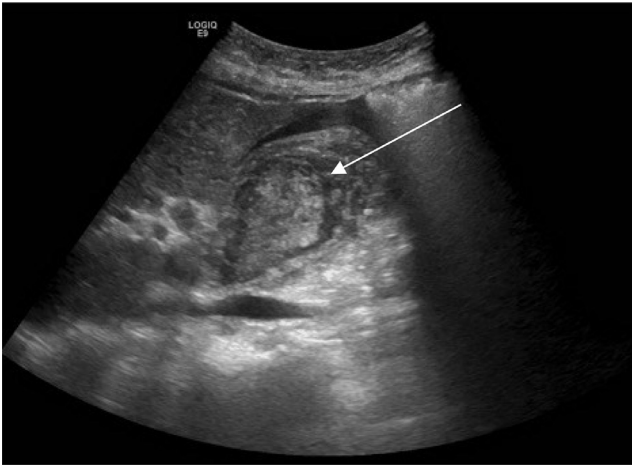


Fig. 3 – Right upper quadrant ultrasound, the white arrow shows heterogeneous echogenic content of the gallbladder, which may represent sludge or hemorrhage; there is also a thickened gallbladder wall.

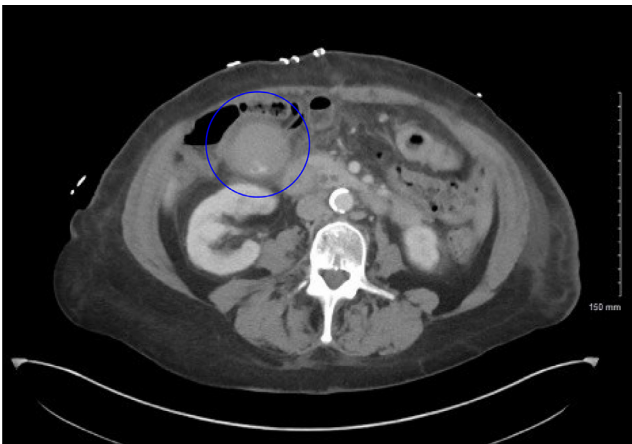


Fig. 4 – Axial CT with contrast of the abdomen, there is high density within the gallbladder (blue circle).

atic duct was caused by a clot, particularly in light of the hemorrhagic cholecystitis diagnosis.

Postdrainage, the patient's clinical status improved, with notable reductions in WBC, AST, ALT, and bilirubin levels over the next few days. The drain placement was uneventful, with no immediate post-procedural complications. Follow-up included monitoring the drain output and serial laboratory tests to ensure continued improvement. The patient remained stable and was scheduled for a follow-up cholangiogram 6 weeks postdrainage to assess the biliary system and plan further interventions, if necessary, such as expectant management, cholecystectomy alone, or cholecystectomy with common bile duct exploration. Given the recent major surgery and ongoing recovery, this cautious approach aimed to reduce the risk of further complications.

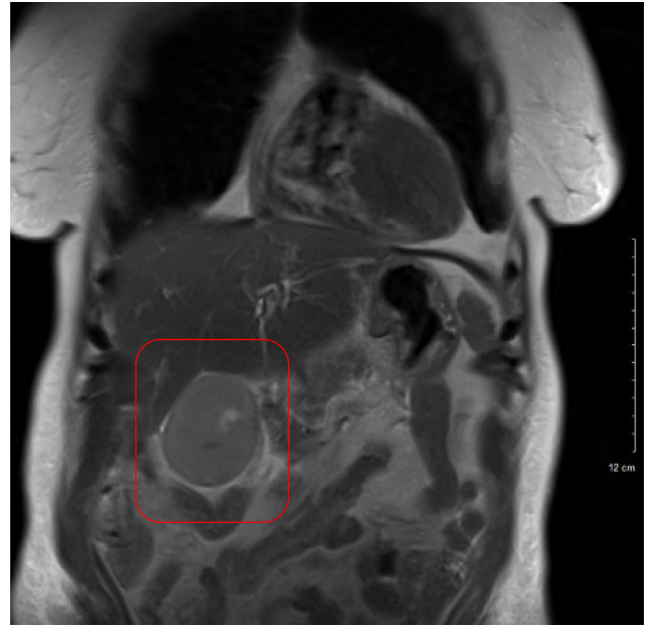


Fig. 5 – Coronal T2 MRCP shows the abnormal appearance of the gallbladder with T2 intermediate signal intensity seen within the gallbladder lumen (red rectangle) concerning for hemorrhagic cholecystitis.



Fig. 6 – Axial T2 MRCP with abnormal appearance of the gallbladder with T2 hypointense material seen within the gallbladder lumen and in the common bile duct, concerning for possible hemorrhagic cholecystitis.

Discussion

This case report details the complex clinical journey of a 68-year-old female who developed a severe gastrointestinal complication attributed to excessive NSAID use, leading to a penetrating gastric ulcer, and subsequent postoperative hemorrhagic cholecystitis.

The patient's presentation with epigastric pain, nausea, and vomiting following high NSAID intake was suspicious of NSAID-induced gastrointestinal damage [14]. NSAIDs are known to compromise the gastric mucosal barrier, increas-

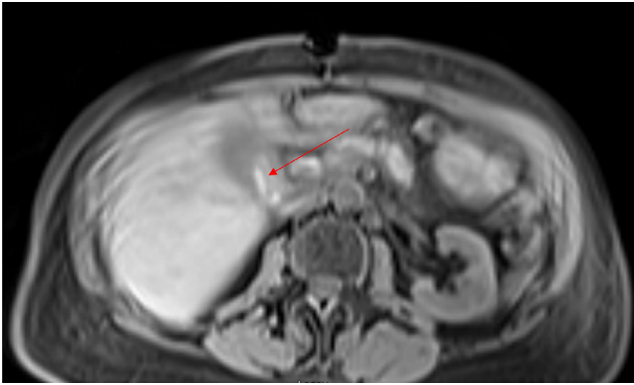


Fig. 7 – MRCP with the hyperintense signal on T1-weighted imaging within the gallbladder lumen (red arrow), which may reflect the possibility of blood products.

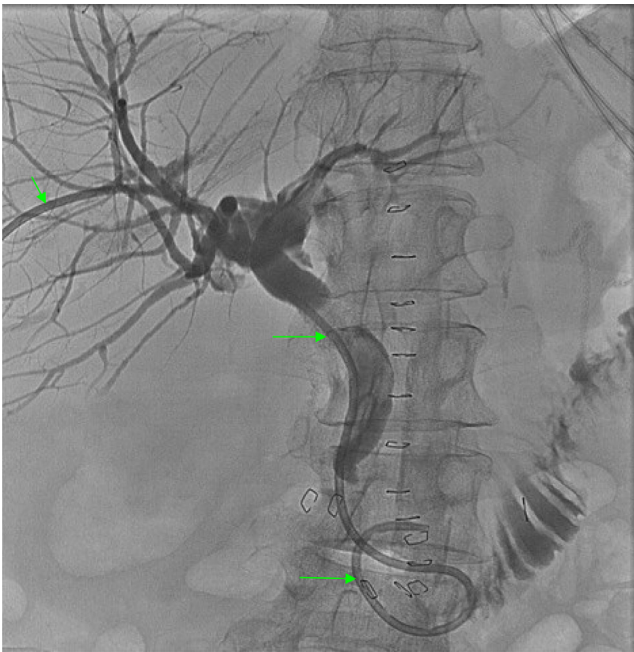


Fig. 8 – Successful percutaneous transhepatic cholangiogram demonstrating complete obstruction within the mid-common hepatic duct which was successfully traversed with an angled glide catheter and straight guidewire into the duodenum. Successful percutaneous transhepatic 8 French internal/external biliary drain placement (green arrows).

ing the risk of ulcers [15]. The use of computed tomography (CT) was pivotal in identifying the penetrating gastric ulcer [16].

Initial management with robotic-assisted diagnostic laparoscopy transitioning to an open procedure due to intraoperative challenges exemplifies the need for flexibility in surgical strategy. Pathological examination confirmed the presence of a perforation associated with the ulcer, acute serositis, and

chronic gastritis with intestinal metaplasia but no dysplasia or carcinoma. The patient's postoperative course was complicated by hemorrhagic cholecystitis, a rare but serious condition [17].

Percutaneous transhepatic cholangiography and biliary drain placement demonstrate an effective, less invasive approach to managing biliary complications when traditional surgical interventions are not feasible [18]. This strategy effectively relieved the biliary obstruction and managed the patient's symptoms, showcasing the essential role of interventional radiology in postoperative complication management [19].

A structured follow-up plan is essential for managing the percutaneous drain placed for biliary decompression. The plan includes performing a cholangiogram through the percutaneous transhepatic cholangiography (PTC) 6 weeks after the initial placement. This delay is strategic, allowing sufficient time for the patient's condition to stabilize postantrectomy and for any inflammation from the surgery to subside, thus minimizing the risk of complications during further interventions [20].

Once the cholangiogram is performed, it will provide crucial insights into the status of the biliary system. If the duct appears clear and there are no signs of residual obstruction or other complications, expectant management may be continued, closely monitoring the patient for any signs of recurrent issues. However, more aggressive interventions might be necessary if the cholangiogram reveals persistent or new obstructions. Options include a cholecystectomy, which could be performed alone or with an exploration of the common bile duct to ensure thorough resolution of the obstruction [21]. Given the patient's prior Billroth II reconstruction, endoscopic retrograde cholangiopancreatography (ERCP) poses significant challenges and risks; thus, surgical options may lean towards a trans-cystic laparoscopic approach or potentially open surgery depending on the complexity of the patient's anatomy and surgical history [22].

The decision to proceed with surgery will also consider the patient's overall recovery from the recent antrectomy. Delaying significant surgical interventions until at least 6 to 8 weeks postoperatively can significantly reduce the risks associated with premature reoperation [23]. This cautious approach ensures that any decision for further surgery is made with the utmost consideration for the patient's healing and overall health. Regular follow-ups and discussions of these options will be crucial to adapting the management plan based on the patient's evolving clinical condition and the findings from the upcoming cholangiogram.

Considering the potential utility of interventional radiology, the option of embolization of a bleeding vessel demonstrating extravasation was evaluated. Given the patient's stable condition postdrainage and absence of significant bleeding complications, this approach was deemed unnecessary. However, embolization remains a feasible option in cases where persistent bleeding or significant vascular involvement is detected, offering a minimally invasive alternative to surgical intervention. In this case, the multidisciplinary team decided to continue with the current management plan, focusing on careful monitoring and follow-up imaging to guide any future interventions.

In postoperative patients, particularly those who have undergone major abdominal surgery like an antrectomy with Billroth II reconstruction, the suspected causes of hemorrhagic cholecystitis include surgical stress and trauma, altered biliary anatomy, and anticoagulation therapy used to prevent thromboembolic events. Additionally, the inflammatory response to surgery and potential postoperative infections or sepsis can exacerbate gallbladder inflammation, increasing the risk of hemorrhage. These factors collectively contribute to the development of this rare but severe complication in the postoperative setting.

Conclusion

This article details the management of an NSAID-induced penetrating gastric ulcer in a 68-year-old female, which led to postoperative hemorrhagic cholecystitis. The ulcer extensively involved the pylorus and extended into both the stomach and duodenum, necessitating an antrectomy with Billroth II reconstruction to restore gastrointestinal continuity. Postoperatively, the development of cholecystitis in the patient required the placement of a percutaneous transhepatic biliary drain. The drain, placed to manage postoperative cholecystitis, is scheduled for reassessment via cholangiography 6 weeks after its insertion. This upcoming evaluation is critical as it will dictate whether additional surgical interventions are necessary, allowing for timely adjustments to the treatment plan based on the detailed findings and the patient's ongoing clinical needs.

Patient consent

We confirm that we have obtained written, informed consent from the patient for the publication of this case report. The patient has been thoroughly informed about the details that will be published and understands the implications of the publication. The written consent is stored securely and is available for review by the editorial team upon request.

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