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RESEARCH ARTICLE

GALLSTONE ILEUS 46 YEARS POST-CHOLECYSTECTOMY DUE TO DUODENAL DIVERTICULUM

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Abstract

Gallstone ileus is a rare cause of small bowel obstruction that is typically seen in older females with multiple comorbidities. Gallstone ileus is most commonly caused by the passage of a gallstone through a cholecystoduodenal fistula, in the setting of chronic cholecystitis, with stone impaction most frequently seen in the terminal ileum. We present a rare case of gallstone ileus in a 51 year old female that formed 4 decades after cholecystectomy, likely due to the presence of a small duodenal diverticulum. This case highlights the need for the inclusion of gallstone ileus in the differential diagnosis for patients presenting with bowel obstruction even after cholecystectomy.

Introduction:-

Gallstone ileus is a rare cause of mechanical small bowel obstruction, accounting for approximately 1–4% of cases overall and up to 25% of non-strangulated small bowel obstructions in elderly patients [5,9]. It is classically seen in older adults, disproportionately affecting females, and is frequently associated with multiple comorbidities and chronic cholecystitis [4]. The condition most commonly results from migration of a large gallstone through a cholecystoduodenal fistula, allowing passage of the stone into the gastrointestinal tract [5,9]. Obstruction most often occurs at the terminal ileum due to its relatively narrow lumen and decreased peristalsis.Diagnosis is based on clinical presentation and characteristic imaging findings, most notably Rigler's triad: small bowel obstruction, gallbladder wall thickening, pneumobilia, and an ectopic gallstone [7]. Standard treatment involves surgical excision of the obstructing gallstone, with or without takedown of the cholecystoduodenal fistula depending on patient risk factors. Gallstone ileus carries a high morbidity and mortality rate as well, likely due to the patient population often having an ASA score of 3-4 [1].

While gallstone ileus is most commonly associated with an intact gallbladder and cholecystoduodenal fistula formation, its occurrence after remote cholecystectomy presents a diagnostic challenge [3,5]. In such cases, alternative sources of gallstones must be considered, including intestinal diverticula [2,9].Duodenal diverticula are a relatively common anatomic finding, with a reported prevalence of approximately 5–22% on radiologic imaging and up to 20–30% in autopsy series, making them the second most common site of gastrointestinal diverticula after the colon [6]. Their incidence increases with age, and the majority arise from the second portion of the duodenum, most frequently in a periampullary location [10]. More than 90% of duodenal diverticula are asymptomatic and

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discovered incidentally, requiring no intervention. Treatment is reserved for rare complications, including biliary or pancreatic obstruction, duodenal obstruction, diverticulitis, perforation, or hemorrhage [8].We report a case of gallstone ileus presenting approximately four decades after cholecystectomy, believed to originate from a duodenal diverticulum, highlighting a rare and under-recognized pathophysiologic mechanism.

Case presentation:

A 51-year-old woman with past medical history significant for type II diabetes mellitus presented to the emergency department with altered mental status following several days of persistent nausea and vomiting. Initial evaluation revealed a high-grade small bowel obstruction, with laboratory studies notable for an elevated lactate level of 7 mmol/L, acute kidney injury, and metabolic alkalosis. Her surgical history was notable only for a cholecystectomy performed during childhood. She had no other prior abdominal surgeries.

Computed tomography of the abdomen and pelvis demonstrated markedly dilated loops of small bowel in the distal ileum caused by an intraluminal ovoid mass (Figures 1A-C). Given concern for bowel ischemia in the setting of lactic acidosis and high-grade obstruction, the patient was taken emergently to the operating room for exploratory laparotomy. Intraoperatively, the bowel was evaluated and the source of obstruction was found in the terminal ileum, where a large intraluminal mass was discovered. The associated bowel at the obstruction site was noted to be ischemic and non-viable. A decision was made to resect the mass en bloc with this short segment of ischemic bowel, and a side-to-side stapled small bowel anastomosis was created. The resected small bowel was opened on the back table and a 4-cm gallstone was identified and later confirmed by pathology (Figure 2). The remainder of the gastrointestinal tract was evaluated, and no additional stones were identified. The right upper quadrant was evaluated at the time of surgery, confirming the absence of a gallbladder with no other abnormalities noted.

The patient tolerated the procedure well. Postoperatively, she had an expected ileus with delayed return of bowel function, requiring prolonged hospital stay and total parental nutrition. She was discharged home on postoperative day 10 in stable condition once she had return of bowel function and was tolerating diet. Postoperative magnetic resonance imaging was subsequently performed and confirmed the presence of a small duodenal diverticulum (Figure 3). Given the patient's remote history of cholecystectomy, it was hypothesized that the gallstone likely developed within the duodenal diverticulum prior to migrating distally through the gastrointestinal tract, resulting in an unusual presentation of gallstone ileus decades after cholecystectomy.

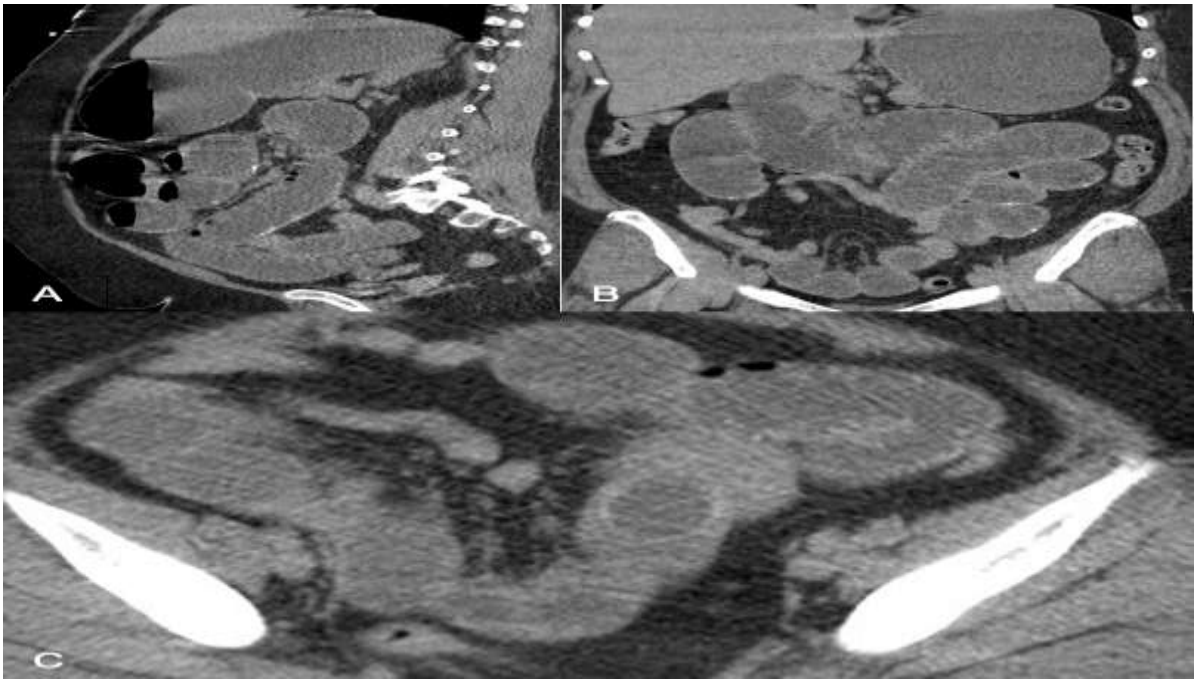

Figure 1.A: CT Sagittal view, multiple dilated loops of bowel and air fluid level. B: CT coronal view, C: CT, Axial view gallstone located in terminal ileum

Figure 2. Gross photograph of the gallstone measuring approximately 4 cm, removed from terminal ileum during exploratory laparotomy

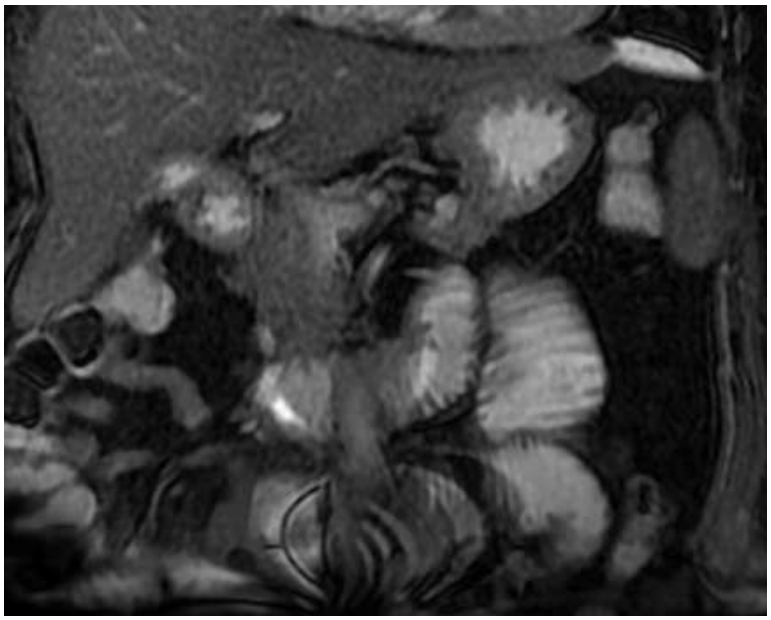

Figure 3. Postoperative MRI of the abdomen demonstrating a 1.6 x 1.4 cm duodenal diverticulum

Discussion:-

Gallstone ileus post cholecystectomy challenges the traditional pathogenic model, since removal of the gallbladder eliminates the primary source of gallstone formation. Previously reported post-cholecystectomy cases most commonly involve residual gallstones, remnant cystic duct calculi, or unrecognized biliary-enteric fistulas [3]. In the present case, the patient underwent cholecystectomy during childhood and had no evidence of a biliary–enteric fistula. Previously reported cases of post-cholecystectomy gallstone ileus have described delayed presentations ranging from 24-35 years. Reported mechanisms include retained stone, diverticular stasis, or remnant biliary pathology. A comparison of published cases with the present case is summarized in Table 1.

Table 1. Published cases of gallstone ileus post-cholecystectomy and comparison with present case, including proposed mechanism and surgical management

Author	Years after cholecystectomy	Proposed mechanism	Stone size (cm)	Site of obstruction	Surgical management	Outcome
Saedon et al.	24 years	Jejunal diverticulum harboring retained stones	3.3	Distal small bowel	Enterolithotomy	Recovered
Helmy et al.	25 years	Small bowel diverticulosis retaining stone	2.0	Proximal ileum	Enterolithotomy	Recovered
Gordon et al.	35 years	Possible retained; chronic inflammatory stenosis masked by hernia	3.0	Terminal ileum	Segmental bowel resection	Recovered
Present case	46 years	Duodenal diverticulum acting as nidus for stone retention	4.0	Terminal ileum	Enterolithotomy	Recovered

Alternative mechanisms for gallstone ileus have been infrequently described, including intraluminal stone formation within intestinal diverticula [2,9]. Duodenal diverticula are relatively common, particularly in older adults, and are often asymptomatic. In rare circumstances, these diverticula may serve as sites for gallstone formation due to stasis and local changes in bile salt concentration. In this case, postoperative magnetic resonance imaging demonstrated a duodenal diverticulum, supporting the hypothesis that the gallstone may have formed intraluminally before migrating distally and causing obstruction. While definitive proof of stone origin is not possible, the absence of a gallbladder and lack of fistulous communication suggest this alternative mechanism as the most plausible explanation.

The diagnosis of gallstone ileus is often delayed due to its nonspecific presentation and rarity. Computed tomography remains the imaging modality of choice, with findings that may include small bowel obstruction, ectopic gallstone, and pneumobilia (Rigler's triad). However, all three findings are present in only a minority of cases, and diagnosis may be challenging when classic features are absent, as in post-cholecystectomy patients [5]. This case highlights the importance of maintaining a broad differential diagnosis for small bowel obstruction, even in patients post-cholecystectomy.Surgical intervention remains the mainstay of treatment for gallstone ileus. Options include enterolithotomy alone or in combination with bowel resection when ischemia or nonviable bowel is present. Definitive fistula repair is typically deferred or omitted in high-risk patients due to increased morbidity [5]. In this case, prompt surgical exploration was warranted given concern for bowel ischemia, resulting in an uncomplicated postoperative recovery.

Conclusion:-

Gallstone ileus remains an uncommon cause of small bowel obstruction and is particularly rare in patients with a remote history of cholecystectomy. This case highlights an atypical pathophysiologic mechanism in which a duodenal diverticulum may serve as the source of gallstone formation in the absence of an intact gallbladder or

cholecystoduodenal fistula. Recognition of this alternative mechanism is important, as gallstone ileus should remain in the differential diagnosis for small bowel obstruction even in post-cholecystectomy patients. Early consideration and prompt surgical management are essential to improve outcomes given the increased morbidity and mortality related to gallstone ileus.

Summary Points:

- Gallstone ileus can occur decades post-cholecysectomy and should remain in differential diagnosis.
- Duodenal diverticulum may serve as a rare nidus.
- CT imaging is essential for diagnosis.
- Rigler's triad remains a classic radiologic finding.

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