

Research Article

The diagnostic dilemma of gallbladder volvulus: Report of a case

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Abstract

Gallbladder volvulus is a rare condition that typically affects elderly patients who present with a presumed diagnosis of acute cholecystitis. Often preoperative imaging is unable to definitively diagnosis volvulus. A 90 year old female presented with a four day history of abdominal pain and was found to have peritoneal signs on examination. CT scan was obtained concerning for necrosis of the gallbladder. She was taken for emergent laparoscopic cholecystectomy, which was converted to an open procedure upon the realization of volvulus. The patient's postoperative recovery was uneventful and she was discharged to a nursing facility on postoperative day four. Gallbladder volvulus should be considered in the differential diagnosis of the elderly patient with presumed acute cholecystitis.

Introduction

Gallbladder volvulus is a known but rare condition that often presents with acute abdomen in the elderly population. Less than 500 cases have been previously reported and the incidence is unknown. Only a few have reported a preoperative diagnosis of gallbladder volvulus, and imaging remains non-diagnostic. Patients are presumed to have acute cholecystitis in the setting of normal liver function testing. Gallbladder volvulus requires immediate operative intervention to avoid potential complications, while acute cholecystitis usually does not require immediate surgical attention. Though this is a rare condition, it is important to include gallbladder volvulus in the differential diagnosis when evaluating an elderly patient with acute onset of right upper quadrant pain.

Case report

A 90 year old female with no past surgical history presented with four days of abdominal pain, nausea, vomiting and anorexia. She reported no fevers or change in bowel habits. Physical examination revealed an afebrile hemodynamically stable patient. Her abdomen was soft, mildly distended but was extremely tender to palpation at the right upper quadrant region. The tenderness was associated with involuntary guarding. No mass was appreciated. The remainder of her physical exam was within normal limits. Laboratory evaluation revealed a white blood cell count of 14,800 and normal liver function test. CT scan of the abdomen and pelvis revealed a distended and likely necrotic gallbladder without cholelithiasis (Figure 1). This was associated with fat stranding and a significant amount of pericholecystic fluid. The patient was taken to the operating room for laparoscopic cholecystectomy. Upon diagnostic laparoscopy, the patient's gallbladder was found to be distended, necrotic and volvulized on its mesentery, along the axis of the cystic duct and cystic artery (Figure 2 and 3). As the anatomy was unclear, the case was converted to an open procedure via a right subcostal incision. The gallbladder was detorsed and the cystic duct and artery were then clearly identified and ligated. The gallbladder was noted to be nonadherent to the liver and was easily resected. The

patient's postoperative course was uneventful and she was discharged to a skilled nursing facility on postoperative day four. Final pathology revealed acute cholecystitis with extensive hemorrhage, focal acute inflammation and loss of surface mucosa. No cholelithiasis was identified.

Discussion

Acute torsion of the gallbladder is a rare entity in the United States. Initially reported by Wendel in 1898 [1], this phenomenon has been described by several authors internationally and seems to have become more common in the past decade.



Figure 1. CT scan demonstrating enlarged gallbladder (labelled GB) without stones.

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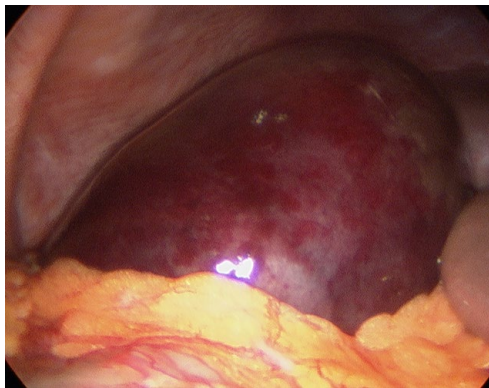


Figure 2. Intraoperative photo of distended and necrotic gall bladder.

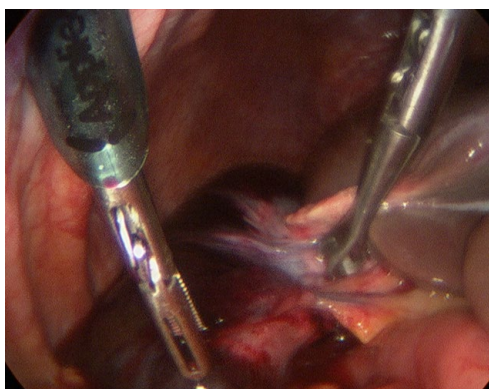


Figure 3. Intraoperative photo of twisted cystic duct pedicle.



Figure 4. Twisted cystic duct pedicle on CT scan.

This condition often occurs in elderly, thin females, who present with acute abdomen and signs suggestive of acute cholecystitis, specifically right upper quadrant pain without jaundice. A spectrum of abdominal exam findings has been described. Findings have included mild right upper quadrant pain, palpation of a mass, frank peritonitis [2,3], or suspected acute appendicitis [4,5]. On laboratory evaluation, these patients do not exhibit signs of biliary obstruction or elevation of liver function tests. However, leukocytosis may be present, indicating an inflammatory response. Our patient presented with this clinical picture, including peritoneal signs on exam and no signs of biliary obstruction on laboratory evaluation.

Table 1 summarizes all of the reported cases in the English

literature since the advent of laparoscopic cholecystectomy by Enrich Muhe [6]. As described above, most of these patients are elderly female patients who presented with RUQ pain without a palpable abdominal mass. In most cases, the initial diagnosis was acute or acalculous cholecystitis. However, seven out of 45 cases were diagnosed as gallbladder volvulus preoperatively. Interestingly, a majority of these cases were diagnosed on CT scan, which is not the traditional imaging modality for gallbladder pathology. In hind-sight, our patient's torsion was visible on CT scan. Unlike our patient, most of the patients who presented with gallbladder volvulus did not have peritonitis or an acute abdomen. They therefore underwent further workup with hepatobiliary iminodiacetic acid (HIDA) scan, magnetic resonance imaging (MRI), or magnetic resonance cholangiopancreatography (MRCP), which revealed findings of a volvulized gallbladder.

From a clinical standpoint, gallbladder volvulus can show up on imaging as a distended, hydropic gallbladder with thickened wall and pericholecystic fluid. It has been previously suggested that ultrasound may be the instrumental for the diagnosis, with a triad of radiologic findings including: anterior localization of the gallbladder; increased volume of the gallbladder; and a severely thickened, multilayered gallbladder wall [14]. Our patient's physical exam prompted evaluation in the emergency department with a CT scan. Chen *et al.* suggested that gallbladder volvulus can be identified on the CT scan using the "U to 9 to O" sign [34]; however, this sign was not evident on our patient's imaging. Upon retrospective review of our patient's CT scan, one can appreciate a twist of the gallbladder along the axis of the cystic duct (Figure 4). The use of MRCP to diagnose gallbladder volvulus has been reported [20,26]. However, the majority of these patients present with an acute abdomen, requiring prompt surgical intervention, thus negating any additional studies; a result, only 1% of reported cases of gallbladder volvulus were diagnosed preoperatively [41].

Conclusion

The exact cause of gall bladder volvulus remains unknown. Suggested mechanisms for torsion include: congenital deformities, a long peritoneal mesentery, generalized visceroptosis, forceful peristalsis of nearby organs, cholelithiasis, or atherosclerosis of the cystic artery [10,18]. The acute torsion initially results in venous congestion of the gall bladder, leading to engorgement of the organ, followed by acute internal hemorrhage as the mucosa becomes necrotic. This clinical entity has been described sporadically in the literature and remains a rare or under-reported phenomenon. While this diagnosis has been made radiographically, the use of imaging is difficult in cases where patients present with peritonitis requiring emergent operation.

The gallbladder in a gallbladder volvulus case can be resected laparoscopically; however, the triangle of Calot may be difficult to be identified due to torsion of the gallbladder along the cystic duct axis. Therefore, laparotomy may be necessary in order to safely evaluate the anatomy prior to its resection. To summarize, although rare, it is important to consider gallbladder volvulus as a differential diagnosis in the elderly patient with right upper quadrant pain and peritonitis, especially if the clinical situation does not permit time for additional radiographic studies.

Conflict of interest

Anuradha R. Bhama, MD and other co-authors have no conflict of interest.

Table 1. Gall bladder volvulus case reports since advent of laparoscopic cholecystectomy in 1986.

	Author, year	N	Age	Sex	Signs & Symptoms	Peritonitis	Attempted Methods of Diagnosis	Suspected preop diagnosis	Method of Diagnosis	Lap v Open	Outcome
1	McHenry [7]	2	87	F	epigastric pain	no	AXR, US	AC	exploration	open	uncomplicated
			80	F	generalized abdominal pain	no	AXR	partial large bowel obstruction	exploration	open	uncomplicated
2	Van der Veken [8]	1	83	F	RLQ pain	no	AXR	acute appendicitis	exploration	open	uncomplicated
3	Alden [9]	2	78	F	RUQ pain	no	US	AC	exploration	open	uncomplicated
		1	91	F	chest and abdominal pain	no	US	AC	exploration	open	uncomplicated
4	Macdonald [10]	1	74	M	RUQ pain and abdominal mass	no	none	AC	exploration	open	uncomplicated
5	Gonzalez-Fisher [11]	1	56	F	RUQ pain	no	US	AC	exploration	open	uncomplicated
6	Nguyen [12]	1	91	F	crampy abdominal pain	no	AXR, US, CT,	AC	exploration	laparoscopy	uncomplicated
7	Schroder [13]	1	18	F					exploration	laparoscopy	
8	Hamdi [14]	1	90	F	RUQ pain	no	AXR, US	AC	exploration	open	uncomplicated
9	McAleese [15]	1	85	F	RUQ pain	no	US	AC	exploration	laparoscopy	postoperative bleeding diverticuli requiring readmission
10	Christoudias [16]	1	82	F	left chest pain	no	US	AC	exploration	laparoscopy	uncomplicated
11	Losken [17]	1	80	F	epigastric pain	no	AXR	bowel obstruction	AC	open	uncomplicated
12	Ikematsu [18]	6	77-91	F							
13	Khosraviani [19]	1	86	F	RUQ pain and abdominal mass	no	US	AC	exploration	not commented	uncomplicated
14	Usui [20]	1	78	F	epigastric pain	no	CT, US, MRI, MRCP,	GBV	MRCP	open	uncomplicated
15	Rajagopal [21]	1	70	F	RUQ pain and abdominal mass	no	US, CT	AC	exploration	open	uncomplicated
16	Kim [22]	1	73	F	n/a	n/a	n/a	n/a	n/a	n/a	n/a
17	Ortiz-Gonzalez [23]	1	90	F	RUQ pain	yes	AXR	acute appendicitis	exploration	open	uncomplicated
18	Cho [24]	1	94	F	RLQ pain and abdominal mass	no	CT	GBV	CT	laparoscopy	uncomplicated
19	Shaikh [25]	2	79	M	RUQ pain	no	US, CT	hydrops of GB	exploration	open	uncomplicated
			84	M	RUQ pain	no	US	AC	exploration	laparoscopy	uncomplicated
20	Matsuhashi [26]	1	54	F	RUQ pain	no	US, CT, MRI, MRCP	necrotic gall bladder	exploration	open	uncomplicated
21	Tarhan [27]	1	70	M	RUQ pain	no	AXR, US	AC	exploration	open	wound infection
22	Faure [28]	1	84	F	RUQ pain and abdominal mass	no	US, CT	GBV	CT	laparoscopy	uncomplicated
23	Kimura [29]	1	11	M	RUQ pain	no	US, CT, MRI	GBV	MRI	laparoscopy	uncomplicated
24	Malherbe [30]	2	86	F	RUQ pain	no	US, CT, EUS	AC	exploration	open	uncomplicated
			80	F	diffuse abdominal pain w palpable mass	no	CT	AC	exploration	laparoscopy	postoperative pleural effusions
25	Caliskan [31]	1	79	F	RUQ pain and abdominal mass	no	US	acalculous cholecystitis	exploration	open	uncomplicated
26	Lavy [32]	1	85	F	RUQ pain	yes	CT	GBV	CT	not commented	uncomplicated
27	Bagnato [33]	1	85	M	RUQ pain	yes	AXR, US	acalculous cholecystitic	exploration	open	uncomplicated
28	Chen [34]	1	84	F	RUQ pain	no	AXR, CT,	AC	exploration	open	uncomplicated
29	Chittal [35]	1	71	F	cecal volvulus				exploration		
30	Inoue [36]	1	95	M	abdominal pain	no	CT, US, MRI, MRCP,	GBV	CT, MR	laparoscopy	uncomplicated
31	Mouawad [37]	1	99	F	RUQ pain	no	CT, HIDA, ERCP	AC	exploration	open	uncomplicated
32	Alevizos [38]	1	95	F	RUQ pain and abdominal mass	no	CT	n/a	exploration	laparoscopy	uncomplicated
33	Arslan [39]	1	47	M	RUQ pain	yes	US	AC	exploration	open	uncomplicated
34	Miyakura [40]	1	61	F	RUQ pain	no	US, CT	GBV	CT	laparoscopy	uncomplicated

Key: AC = acute cholecystitis; AXR = abdominal x-ray; CT = computed tomography; ERCP = endoscopic retrograde cholangiopancreatography; GBV = gall bladder volvulus; HIDA = hepatobiliary iminodiacetic acid scan; MRCP = magnetic resonance cholangiopancreatography; MRI = magnetic resonance imaging; US = ultrasound

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