



Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Spilled gallstones simulating peritoneal carcinomatosis: A case report and literature review

G.T. Capolupo, G. Mascianà*, F. Carannante, M. Caricato

Geriatric Surgery Unit, University Campus Bio-medico of Rome, Rome, Italy

ARTICLE INFO

Article history:

Received 9 April 2018

Accepted 18 April 2018

Available online 4 May 2018

Keywords:

Gallstones

Peritoneal carcinomatosis

Peritoneal chronic abscess formation

Laparoscopic cholecystectomy

Case report

ABSTRACT

INTRODUCTION: Laparoscopic cholecystectomy (LC) has become the “gold standard” for the treatment of symptomatic gallstones. However, this surgical technique increases the risk of bile duct injury and lost gallstones. Since over 90% of split gallstones never become symptomatic, they often present as incidental findings on CT-scans. Careful removal of as many stones as possible, intense irrigation and suction are recommended. It has been reported that 8.5% of lost gallstones will lead to a complication, most common are abscesses.

PRESENTATION CASE: We report a case of spilled gallstones simulating peritoneal metastases on radiological investigations. Diagnosis was very difficult, not even an US-guided biopsy of the lesion was decisive. Only a diagnostic laparoscopy confirms the diagnosis.

DISCUSSION: The reaction associated with lost gallstones can mimic other causes, such as soft tissue sarcoma, malignant lymphoma or, as in our case peritoneal carcinomatosis.

CONCLUSION: Spilled gallstones are associated with uncommon, but significant complications, and even the diagnosis of such a condition can cause serious difficulties. Serious effort must be made to prevent gallbladder perforation, and accidental stone spillage should be promptly recognized and properly managed.

© 2018 Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Laparoscopic cholecystectomy (LC) is the gold standard for symptomatic cholelithiasis. In experienced hands, it is a safe procedure with low morbidity and mortality. During the surgical procedure one of the most common intra-operative complications is gallbladder perforation with stones spreading into the peritoneal cavity [1]. This incidence varies between 6% and 40% [2,3]. The risk associated with this complication has been considered negligible and remains somehow controversial [2], but Khan et al., [3] confirmed the necessity to remove all lost gallstones during the same procedure, as much as possible with irrigation of the abdomen in order to avoid complications such as Sub-hepatic or Pelvic abscess, Granuloma formation, Port site infection [4]. Our work is in accordance with SCARE criteria [109].

2. Case report

A 73-year-old man underwent laparoscopic cholecystectomy for symptomatic cholelithiasis. The intraoperative course was remarkable only for intraperitoneal spillage of bile and gall-

stones. During the procedure the surgeon retrieved them as much as possible. The anathomopathological examination showed chronic cholecystitis. In second post-operative day abdominal pain occurred associated to urinary retention. The patient underwent plain abdomen X-rays showing kidney stones, and was treated with medical therapy. The patient was discharged on postoperative day 4th. Sixteen months later, the patient was submitted to Uro-TC follow up of urinary stones, which showed some peritoneal nodule with the appearance of neoplastic nodules (the biggest was located in epigastrium of 5 cm width) Fig. 1. US-guided biopsy of the main lesion and the pathology showed inflammatory process. The upper GI tract and colon endoscopy were negative. After a multidisciplinary meeting the patient underwent explorative laparoscopy and removal of peritoneal nodule. Pathological examination of the removed nodule showed a marked inflammatory response of a foreign body type, including giant cell reaction. Foreign material was represented by needles of cholesterol. The patient was discharged one day postoperatively with a clean wound. Follow-up was uneventful (Table 1).

3. Discussion

Laparoscopic cholecystectomy (LC) has become the “gold standard” for the treatment of symptomatic gallstones. The advantages of LC, compared with open cholecystectomy, include smaller inci-

* Corresponding author.

E-mail address: g.masciana@unicampus.it (G. Mascianà).

Table 1

Author	Publication year	Patient (n)	Time after LC
Faour et al. [10]	2017	1	6 years
Lentz et al. [11]	2017	1	2 years
Kim et al. [12]	2016	1	5 months
Ragozzino et al. [13]	2016	1	2 years
Pandit et al. [14]	2016	1	1 year
Moga et al. [15]	2016	1	4 years
Hussain et al. [16]	2016	1	1 year
Grass et al. [17]	2015	1	3 years
Binagi et al. [4]	2015	1	3 years
Bedell et al. [18]	2015	1	3 year
Noda et al. [19]	2014	2	7–13 months
Pazouki et al.	2014	50	10–30 days
Quail et al. [20]	2014	1	5 years
Ahmad et al. [21]	2014	1	2 years
Lee et al. [12]	2013	5	7/18/31/4 (months)/postoperative 2 days
Peravali et al. [23]	2013	2	3–5 years
Morris et al. [24]	2013	1	15 years
Dobradin et al. [25]	2013	1	8 years
Bastianpillai et al. [26]	2013	1	5 months
Anrique et al. [27]	2013	1	14 years
Chatzimavroudis et al. [28]	2012	1	6 months
Singh et al. [29]	2012	1	7 years
Araiet al. [30]	2012	1	4 years
Papadopoulos et al. [31]	2012	1	8 years
Rammohan et al. [32]	2012	1	4 years
Kayashima et al. [33]	2011	1	3 years
Pottakkat et al. [34]	2010	1	11 years
Hussain et al. [35]	2010	1	9 years
Gooneratne et al. [36]	2010	1	14 years
Bouasker et al. [37]	2010	1	8 years
Morishita et al. [38]	2010	1	1 year
Helme et al. [39]	2009	1	3 weeks
Dasari et al. [40]	2009	1	2 years
Maempel et al. [41]	2009	1	10 years
Arishi et al. [42]	2008	1	15 years
Hougardet et al. [43]	2008	1	7 years
Stupak et al. [44]	2007	1	11 years
De Hingh et al. [45]	2007	1	1 year
Pantanowitz et al. [46]	2007	1	7 years
Wehbe et al. [47]	2007	1	10 years
Wittich et al. [48]	2007	1	13 months
Shrestha et al. [49]	2006	1	13 years
Bhati et al. [50]	2006	3	1 week/28 months/7 years
Hand et al. [51]	2006	1	24 months
Iannitti et al. [52]	2006	1	3–5 years
Viera et al. [53]	2006	2	18 months
Van der Lugt et al. [54]	2005	2	15/38 months
Van Hoecke et al.	2004	1	5 years
Castellon-Pavon et al. [55]	2004	1	5 years
Koc et al. [56]	2004	1	6 years
Stevens et al. [57]	2003	1	1 year
Yamamuro et al. [58]	2003	2	8/2 years
Aspelund G et al. [59]	2003	1	10 days
Weiler et al.	2002	1	Immediately (postoperatory)
Papasavas PK et al. [60]	2002	1	15 months
Van Mierlo PJ et al. [61]	2002	1	2 years
Yadav RK et al. [62]	2002	1	1 year
Hawasli A et al. [63]	2002	2	4 years/2 years
Pavlidis TE et al. [64]	2002	1	4 months
Albrecht RM et al. [65]	2002	2	14 days/39 month
Famulari C et al. [66]	2002	1	23 months
Boterill et al.	2001	1	2–5 years
Daoud et al.	2001	1	7 months
Narreddy SRet al. [67]	2001	2	na*
Werber YB et al. [68]	2001	1	6 months
Yao CC et al. [69]	2001	1	2 years
Gretschel S et al. [70]	2001	1	4 months
Battaglia DM et al. [71]	2001	1	9 years
Ok E et al. [72]	2000	1	3 months
Walch C et al. [73]	2000	1	1 year
Bebawi M et al. [74]	2000	1	2 months
Castro MG et al. [75]	1999	1	2–11 months

Table 1 (Continued)

Author	Publication year	Patient (n)	Time after LC
Ong EG et al. [76]	1999	1	4 months
Chopra P et al. [77]	1999	1	2 years
Frola C et al. [78]	1999	1	18 months
Zamir G et al. [79]	1999	4	6 weeks, 6 months/1 year/4 weeks, 9 months, 14 months/1 year, 3 weeks
Groebli Y et al. [80]	1998	2	15–24 months
Sinha AN et al. [81]	1998	1	na*
Parra-Davila E et al. [82]	1998	1	5 years
Petit F et al. [83]	1998	1	immediately/2 weeks
Lutken et al.	1997	1	1 year
Patterson et al. [84]	1997	1	14 months
Memon et al. [85]	1997	1	8 months
Whiting et al.	1997	1	12 months
Vadlamidi et al.	1997	1	20 months
Läuffer JM et al. [86]	1997	1	3 months
McDonald et al.	1997	6	12 days/Immediate/10 days/10 months/2 weeks/18 months
Chanson C et al. [87]	1997	3	27 months, 6 months, 33 months
Patterson EJ et al. [88]	1997	1	14 months
Brueggemeyer MT et al. [89]	1997	4	3 months, 2 months, 5 months/6 days/6 years/2 years
Chin PT et al. [90]	1997	3	8 months/2 months/5 months
Willekes et al.	1996	1	17 months
Zaans Medical Centre	1996	3	7–24 months/10 years
Pfeifer ME et al. [91]	1996	1	2 years
Sichardt G et al. [92]	1996	1	2 years
Stevens GH et al. [93]	1996	1	5 years and 8 months
Huynh T et al. [94]	1996	1	4 days
Neumeyer DA et al. [95]	1996	1	4 months
Rosin D et al. [96]	1995	1	several months
Ponce J et al. [97]	1995	3	months
Freedman AN et al. [98]	1995	1	13 months
Rioux M et al. [99]	1995	1	1 year
Shocket E et al. [100]	1995	1	2 months
Carlin CB et al. [101]	1995	1	8 months
Mellinger JD et al. [102]	1994	1	7 months/2 weeks after
Van Brunt pH et al. [9]	1994	1	2 months
Gallinaro RN et al. [103]	1994	1	8 months
Leslie KA et al. [104]	1994	1	5 months
Catarci M et al. [1]	1993	1	3 months
Eisenstat S et al. [105]	1993	1	4 months
Trerotola SO et al. [106]	1993	1	2 months
Dreznik Z et al. [107]	1993	1	7 months
Nicolai P et al. [108]	1992	2	5 months/11 months

Na: not available.

sions, reduced postoperative pain, and a shorter recovery time. However, limited visualization and the technical challenges of laparoscopy increase the risk of bile duct injury and lost gallstones. Since over 90% of split gallstones never become symptomatic, they often present as incidental findings on CT-scans. Particular locations, such as Morison’s pouch or even intrathoracic stones have been described [5,6]. It has been reported that 8.5% of lost gallstones will lead to a complication. Some risk factors, such as acute cholecystitis with infected bile, pigment stones, prone to higher bacterial contamination, multiple stones (>15), the stone size (>1.5 cm) and age, have been described [7]. Careful removal of as many stones as possible, intense irrigation and suction (10 mm device) and avoidance of spread into difficult accessible sites, as well as the use of intraabdominal bags and laparoscopic graspers are recommended [7].

According to Literature, up to 80%–90% of pigment stones contained bacteria such as Escherichia coli, Klebsiella pneumonia, and Enterococcus [8]. The mean time to abscess formation after LC ranges from 4 months to 10 years [9]. When a peritoneal abscess

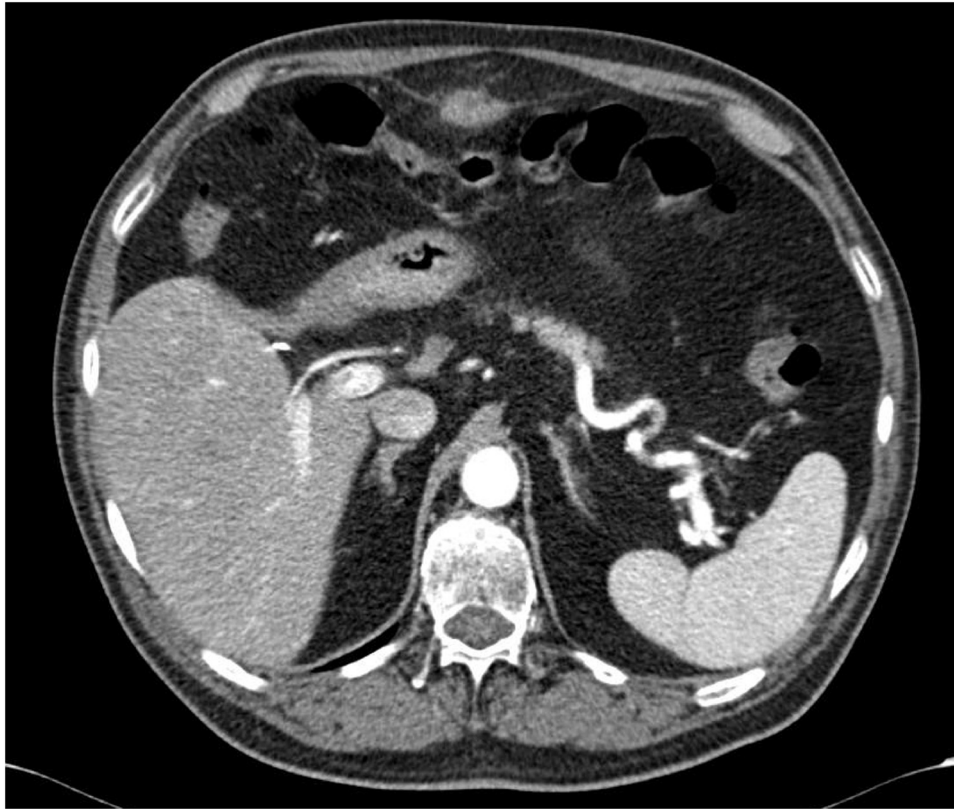


Fig. 1. CT scans of the abdomen and pelvis, demonstrating multiple hyperdense soft tissue nodules mimicking peritoneal carcinomatosis.

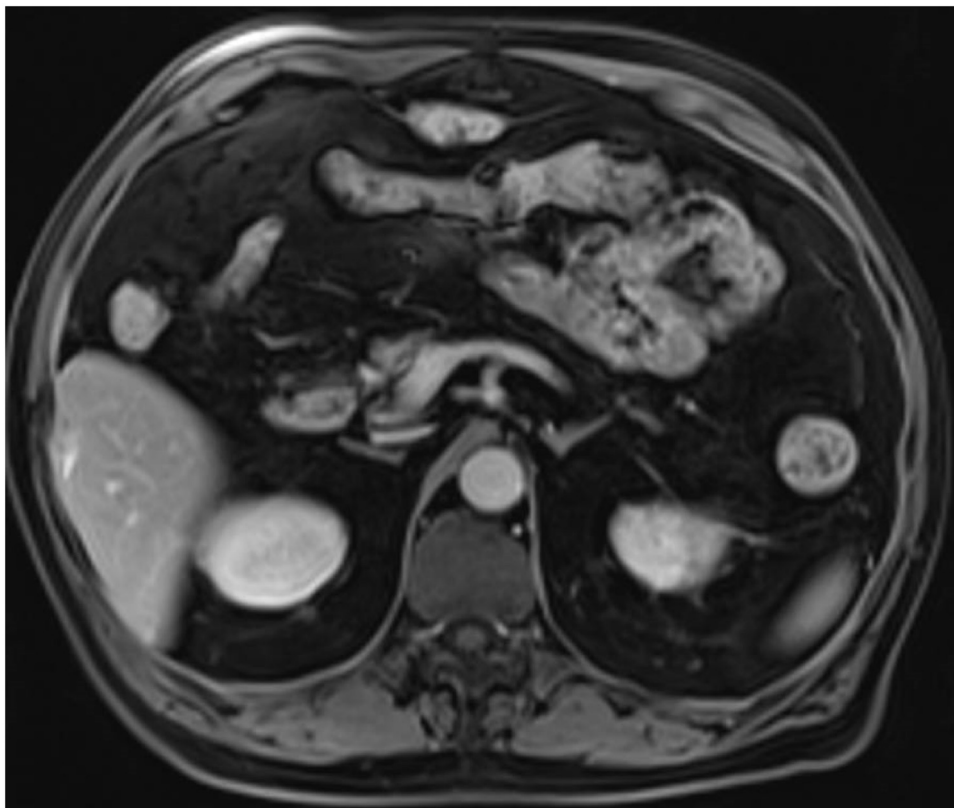


Fig. 2. T1-weighted images shows the mass as an isointense area, compared with the kidneys.

Table 2

Author	Complications	Treatment
Faour et al. [10]	Intra-abdominal cystic mass	Surgical excision
Lentz et al. [11]	Perihepatic, Pulmonary, and Renal Abscesses	Thoracic drainage
Kim et al. [12]	Retroperitoneal mass	On open exploration a 5 cm × 5 cm retroperitoneal mass was excised
Ragozzino et al. [13]	Subphrenic abscess	On surgical exploration a 3 × 3 cm mass was excised
Pandit et al. [14]	Anterior abdominal wall	Surgical exploration and excision
Moga et al. [15]	Abscess right lumbar region	Laparoscopic drainage
Hussain et al. [16]	Sub-costal port site abscess	Surgical excision
Grass et al. [4]	Abdominal wall abscess	Invasive drainage of wound
Binagi et al. [7]	Perihepatic abscess	Laparoscopic removal
Bedell et al. [18]	Pelvic abscess	Laparoscopic removal
Noda et al. [19]	Subhepatic abscess	Percutaneous abscess drainage
Pazouki et al.	Abdominal collection	US-guided percutaneous aspiration
Quail et al. [20]	Chronic lung abscess	VATS, pulmonary decortication, and wedge resection.
Ahmad et al. [21]	pT1a cancer – multiple tumor embedded gallstones on the diaphragm. (metastatic gallbladder tumor)	At laparotomy, multiple tumor embedded gallstones were found on the diaphragm.
Lee et al. [22]	Subhepatic abscess/cul de sac abscess/umbilical fistula/portal fistula/peritonitis	drainage/drainage/prolonged wound care/prolonged wound care/antibiotic administration
Peravali et al. [23]	Abscess-subphrenic abscess with fistulous tract to the skin	Laparoscopic removal
Morris et al. [24]	Dense mesenteric cicatrix causing ileocolic torsion and cecal volvulus	Emergency explorative laparotomy and bowel resection
Dobradin et al. [25]	Fluid collection under the right abdominal musculature compartment	Incision and drainage
Bastianpillai et al. [26]	Multilobulated collection in the right upper quadrant	Explorative laparotomy and drainage
Anrique et al. [27]	Multiple stones incrustated of the pouch of the Douglas	Surgical removal
Chatzimavroudis et al. [28]	Retroperitoneal abscess	CT-guided drainage
Singh et al. [29]	Subhepatic retroperitoneal inflammatory mass	Laparotomic excision of a 4cm × 6 cm retroperitoneal mass
Arai et al. [30]	Subphrenic abscess (possibility of a malignant tumor of hepatic origin)	Wedge resection of the liver and right diaphragm
Papadopoulos et al. [31]	Gallstones embedded in the omentum	Removal during right hemicolectomy
Rammohan et al. [32]	Subphrenic abscess	Laparoscopic drainage
Kayashima et al. [33]	Inflammatory pseudotumor of the liver	Posterior segmentectomy combined with partial resection of the diaphragm
Pottakkat et al. [34]	Dumbbell-shaped abscess in the perihepatic area	Open exploration and abscess drainage
Hussain et al. [35]	Abdominal wall abscess and discharging sinus	Incision drainage and secondary closure of the wound
Gooneratne et al. [36]	Colovesical fistula	Repair of the colovesical fistula
Bouasker et al. [37]	Subcutaneous collection	Drainage of a collection containing a large stone
Morishita et al. [38]	Granuloma	Conservative therapy
Helme et al. [39]	Abscess	US-guided drainage
Dasari et al. [40]	nodules mimicking peritoneal metastases	Laparoscopic viscerolysis
Maempel et al. [41]	Abdominal wall abscess	Incision and drainage of abscess
Arishi et al. [42]	Cystic mass of the rectus abdominis	Surgical removal
Hougard et al. [43]	Fistula of the abdomen	Excision of fistula
Stupak et al. [44]	Subhepatic collection	Percutaneous drainage
De Hingh et al. [45]	Rectovaginal pouch abscess	Surgical removal
Pantanowitz et al. [46]	Left ovary granuloma (cervical cancer)	Surgery (hysteroansectomy)
Wehbe et al. [47]	Mass in the right lower quadrant	Laparoscopic removal
Wittich et al. [48]	Abscess in the pouch of Douglas	Transvaginal hysterectomy for severe metrorrhagia and dysmenorrhea, through a colpotomy incision, 16 gallstones were discovered in the pouch of Douglas
Shrestha et al. [49]	Cholecystocolocutaneous fistula	Excision of fistula
Bhati et al. [50]	Liver abscess/sub-diaphragmatic abscess/sub-diaphragmatic and right flank abscess	Laparotomic excision/laparotomic excision/radiologically guided drainage
Hand et al. [51]	Anterior abdominal abscess with calcified objects.	US-guided drainage, and laparoscopic excision

Iannitti et al. [52]	Subphrenic/pleural abscess	US-guided drainage and laparotomy drainage
Viera et al. [53]	Liver abscess/Morrison pouch abscess	Laparotomic excision/conservative therapy
Van der Lugt et al. [54]	Liver abscess/sub-diaphragmatic abscess	Incision and drainage
Van Hoecke et al.	Fistula with the right liver lobe	Laparoscopic drainage
Castellon-Pavon et al. [55]	Perihepatic abscess	Laparotomic drainage
Koc et al. [56]	Retroperitoneal abscess	Percutaneous drainage
Stevens et al. [57]	Subhepatic abscess	Laparotomic drainage
Yamamuro et al. [58]	Abdominal abscess	Na*
Aspelund G et al. [59]	Hernia	Removal during hernia repair
Weiler et al.	Fistula in the left upper quadrant of the abdominal wall	excision of the scar
Papasavas PK et al. [60]	Right flank abscess	surgical drainage
Van Mierlo PJ et al. [61]	Subhepatic abscess	Laparotomic drainage
Yadav RK et al. [62]	Diaphragmatic abscess	Laparotomic drainage
Hawasli A et al. [63]	Abdominal wall abscess/subdiaphragmatic-subhepatic abscess	Laparotomic drainage/CT-guided aspiration and laparotomic removal
Pavlidis TE et al. [64]	Sinus of the abdominal wall	Surgical removal
Albrecht RM et al. [65]	Sub-epathic abscess/retroperitoneal abscess dissected in right scrotum via an indirect hernia	Percutaneous minimally invasive urological removal
Famulari C et al. [66]	Vescical granuloma	Partial cystectomy
Boterill et al.	3 subhepatic abscess, right gluteal abscess and gluteal sinus	CT-guided and US-guided drainage, open surgical drainage and gluteal sinus excision
Daoud et al.	Colovesical fistula	colonoscopic removal of the stone
Narreddy SRet al. [67]	Abscess	surgery
Werber YB et al. [68]	Subhepatic abscess	right thoracotomy and lobe wedge resection
Yao CC et al. [69]	Abdominal wall abscess lateral to the umbilicus	Abscess excision
Gretschel S et al. [70]	Retrohepatic abscess and dorsal fistulation	abscess drainage, stone removals, and fistula excision
Battaglia DM et al. [71]	Abdominal wall abscess	Abscess excision
Ok E et al. [72]	No complication	surgery (during repair of an incisional hernia)
Walch C et al. [73]	Fat necrosis posterior of the rectus muscle	Conservative treatment
Bebawi M et al. [74]	Bilateral inguinal hernia with incarcerated right side with gallstones at the fundus of the sac attached to the inner wall	Gallstones removing and bilateral reparation of hernia
Castro MG et al. [75]	Cutaneous fistula to the umbilicus and elimination of biliary stones through the urinary tract.	removed by cystoscopy
Ong EG et al. [109]	Cutaneous sinus at the umbilical port site	flexible cystoscope
Chopra P et al. [77]	Subphrenic abscess, cholelithoptysis and pleural empyema	antibiotics
Frola C et al. [78]	Subcutaneous and mesenteric abscess in the periumbilical region	Surgical excision
Zamir G et al. [79]	Subphrenic abscess/infections at the site of the previous epigastric trocar/subhepatic abscess/subhepatic abscess	Percutaneous drainage/incision and drainage/percutaneous drainage,
Groebli Y et al. [80]	Subepathic abscess/right iliopsoas muscle abscess and right abdominal muscles abscess	Diagnostic percutaneous incision and open surgery drainage/diagnostic drainage and open surgery drainage
Sinha AN et al. [81]	Subphrenic abscess	na*
Parra-Davila et al. [82]	Retroperitoneal abscess	drainage ct-guided
Petit F et al. [83]	Subhepatic abscess/obstructive cholangitis (complete irregular stenosis of the CBD, no gallstones)	ultrasound-guided aspiration and antibiotic therapy/cpre (died for septic shock)
Lutken et al.	Fistula in umbilical port and in the right upper port/bladder abscess	fistulas excision/cystoscopy and bladder abscess excision in laparotomy
Patterson et al. [84]	Subphrenic abscess and colcutaneous fistula	laparotomy and drainage, closure of the colonic fistula with a GIA stapler and gallstone was identified and removed
Memon et al. [85]	Pseudo-liver abscess (Pyrexia)	Conservative treatment (Antibiotics)
Whiting et al.	Subphrenic abscess	percutaneous drainage and stone removing with adaptation of routine urological minimally invasive techniques
Vadlamidi et al.	Implanting in the ovaries	wedge resection of both ovary for polycystic disease (yellow globules in both ovaries mimicked tumor deposits)
Lauffer JM et al. [86]	Intraperitoneal abscess located between the right liver lobe and the anterior abdominal wall	laparotomy, removal of the gallstone, and surgical drainage

Table 2 (Continued)

Author	Complications	Treatment
McDonald et al.	Subhepatic abscess, flank abscess/Fistula/Colo-biliary-cutaneous fistula, subcutaneous abscess/Liver abscess/Subphrenic abscess/Subphrenic abscess	2 CT drain, 1 I and D/None/Nasobil. Stent CT drain 1 I and D/CT drain percutaneous lithotripsy/CT drain/Bronchoscopy
Chanson C et al. [87]	One giant right side abscess, abscess of a port site which became a sinus, dyspareunia and tenesmus	Stone extraction
Brueggemeyer MT et al. [89]	Subhepatic and retroperitoneal abscesses/right pleural effusion and a fluid collection in the gallbladder fossa/right flank abscess, retroperitoneal abscess miming renal tumor/sinus tract and precedent abscess on her right posterior superior iliac spine	open surgery excision/percutaneous drainage/excision and drainage, open surgery excision/sinus excission
Chin PT et al. [90]	Abscess superficial to the right hip joint deeply fixed to the underlying tissues (no communication with peritoneal cavity)/abscess in the left hypochondrium/discharging sinus	stone extraction and drainage/laparoscopy drainage and removal of a pigmented calculus/open sinus
Willekes et al.	Empyema	Decortication, drainage, and removal of the stones.
Pfeifer ME et al. [91]	Chronic pelvic pain associated with ovarian cholelithiasis	Diagnostic laparoscopy followed by laparotomy with lysis of adhesions and removal of three to four dozen gallstones
Sichardt G et al. [92]	Pararenal abscess	Open surgery excision (sepsis, patient died)
Stevens GH et al. [93]	Left lobe liver abscess and right lobe hepatocolonic fistula	US – guided drainage and open extended right hemicolectomy, resection and removal of the retained gallstones
Huynh T et al. [94]	Numerous small gallstones were discovered impacted on the bowel wall and mesentery	Laparotomic exploration and removal of retained gallstones
Neumeyer DA et al. [95]	Pleural effusion	Thoracoscopic evacuation of the phlegmon, removal of the spilled gallstones, and repair of the diaphragm
Rosin D et al. [96]	No complication	found in a hernia sac.
Ponce J et al. [97]	Intra-abdominal infection and/or inflammation	drainage
Freedman AN et al. [98]	Incarcerated hernia and an associated abscess cavity miming abdominal wall tumor and subsequently superficial subcutaneous infection	Open surgery herna repair and abscess drainage, incision and drainage the infection site
Rioux M et al. [99]	Mass in the omentum extending into the anterior abdominal wall and subepathic abscess in the right posterior pararenal region miming tumor mass	US guided biopsy and conservative treatment (antibiotics) for omentum mass/drainage of retroperitoneal mass
Shocket E et al. [100]	Abscess to the anterior abdominal wall in the right lower quadrant	incision and drainage
Carlin CB et al. [101]	Abdominal wall abscess	excision and biopsy
Mellinger JD et al. [102]	Abscess of right flank in the region of the inferior lumbar triangle/abscess adjacent/persistent sinus	Incision and drainage/Incision and drainage/resection of the lath rib
Van Brunt pH et al. [9]	Subhepatic abscess	CT-guided needle biopsy and conservative treatment (antibiotics)
Gallinaro RN et al. [103]	Abscess in the posterior upper right flank and subsequently persistent sinus tract	Incision and drainage, open surgery sinus excision
Leslie KA et al. [104]	2 subphrenic abscesses and subsequently a right empyema	open surgery abscesses drainage, percutaneous empyema drainage
Catarci M et al. [1]	Fistula in epigastric port and abscess in direct contact with fistula	explorative laparotomy, abscess and fistula excission
Eisenstat S et al. [105]	Abscess	na*
Trerotola SO et al. [106]	Subhepatic abscess	percutaneous abscess drainage
Dreznik Z et al. [107]	Trocar sites abscess	drainage and stone extraction
Nicolai P et al. [108]	Gallstone in the left iliac fossa surrounded by omentum and eroding into the sigmoid colon/sinus in umbilical porthole	explorative laparotomy, stone removing and repairing of the sigmoid colon/sinus excission

Na: not available.

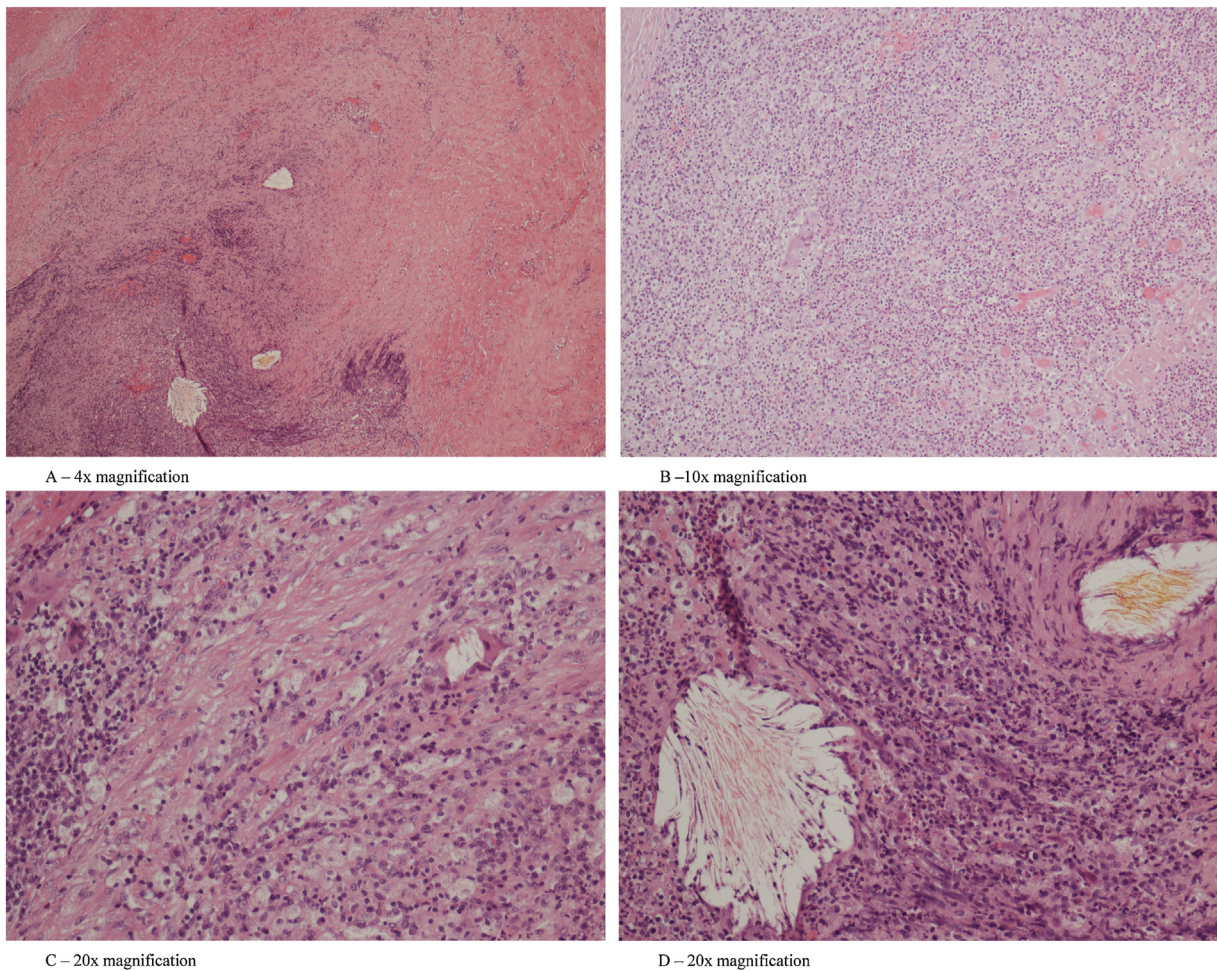


Fig. 3. A – 4x magnification. B – 10x magnification. C – 20x magnification. D – 20x magnification.

or fistula formation occurs months to years after LC, a diagnosis of lost gallstones should be considered (Fig. 2).

The abscess formation associated with lost gallstones can mimic other causes, such as soft tissue sarcoma, malignant lymphoma or, as in our case peritoneal carcinomatosis.

A careful literature search allowed finding 114 papers, reporting 198 cases of complications related to spilled gallstones. The distance from operation to symptoms onset is ranged from one week to fifteen years after surgery. Clinical presentations has been the following: incidental finding in only two cases, pain in one case, abscess in 87 cases, sinus or cutaneous fistula, bowel or organ erosion or fistulisation in 18 cases, in 7 cases no treatment or only antibiotic treatment was required, in 44 cases radiological or surgical drainage, in 56 laparoscopy or laparotomy was needed (Table 2).

4. Conclusion

Spilled gallstones are associated with uncommon, but significant complications. Serious effort must be made to prevent gallbladder perforation, and accidental stone spillage should be promptly recognized and properly managed. If spillage occurs, clear documentation and a high index of suspicion for complications should be maintained for early recognition and treatment of complications from this surgery (Fig. 3).

In our case, the history of laparoscopic cholecystectomy sixteen months prior, along with the finding of peritoneal nodules, made the diagnosis very difficult.

The radiologist plays a critical role in recognising these complications, but, when the radiological investigations are equivocal, diagnostic laparoscopy is recommended to confirm the diagnosis.

Conflicts of interest

All authors disclose any financial and personal relationships with other people or organizations.

Sources of funding

No sources of funding was used for this research.

Ethical approval

This study is exempt from ethnical approval in our institution.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Authors contribution

G.T. Capolupo MD PhD. – G. Mascianà MD – F. Carannante MD: Patient care and management; image contribution.

M. Caricato MD PhD FACS: revision and final approval of the manuscript.

Registration of research studies

This is not a human study, so we don't need a registration of our study.

Guarantor

Prof. Marco Caricato.

References

- [1] M. Catarci, ZF, M. Scaccia, Carboni M Lost intraperitoneal stones after laparoscopic cholecystectomy: harmless sequela or reason for reoperation, *Surg. Laparosc. Endosc. Percutan. Tech.* 3 (1993) 318–322.
- [2] M.A. Yerdel, AI, U. Malkoc, F. Baba, N. Erverdi, I. Pak, et al., The fate of intraperitoneally retained gallstones with different morphologic and microbiologic characteristics: an experimental study, *J. Laparoendosc. Adv. Surg. Tech.* 7 (1997) 87–94.
- [3] M.S. Khan, KM, M.S. Khan, Z.G. Oonwala, Knowledge and practices of general surgeons and residents regarding spilled gallstones lost during laparoscopic cholecystectomy: a cross sectional survey, *Patient Saf. Surg.* 14 (7) (2013) 27.
- [4] F. Grass, FI, V. Bettschart, Abdominal wall abscess after cholecystectomy, *BMC Res. Notes* (2015).
- [5] L. Nayak, MC, G. Gayer, Dropped gallstones: spectrum of imaging findings, complications and diagnostic pitfalls, *Br. J. Radiol.* (2013).
- [6] J.P. Fontaine, IR, R.K. Yantiss, F.J. Podbielski, Intrathoracic gallstones: a case report and literature review, *JLS* 10 (2006) 375–378.
- [7] J. Zehetner, SA, W. Wayand, Lost gallstones in laparoscopic cholecystectomy: all possible complications, *Am. J. Surg.* 193 (1) (2007) 73–78.
- [8] M. Horton, FM, Unusual abscess patterns following dropped gallstones during laparoscopic cholecystectomy, *Am. J. Surg.* 175 (5) (1998) 375–379.
- [9] P.H. Van Brunt, LR, R.J. Lanzafame, Subhepatic inflammatory mass after laparoscopic cholecystectomy. A delayed complication of spilled gallstones, *Arch. Surg.* 129 (8) (1994) 882–883.
- [10] R. Faour, SD, R. Houry, M. Faour, A. Ghazal, Gallstone-related abdominal cystic mass presenting 6 years after laparoscopic cholecystectomy: a case report, *Int. J. Surg. Case Rep.* 32 (2017) 70–72.
- [11] J. Lentz, TM, C.P. Canders, Perihepatic, pulmonary, and renal abscesses due to spilled gallstones, *J. Emerg. Med.* (2017).
- [12] B.S. Kim, JS, H.C. Kim, Spilled gallstones mimicking a retroperitoneal sarcoma following laparoscopic cholecystectomy, *World J. Gastroenterol.* 22 (17) (2016) 4421–4426.
- [13] A. Ragazzino, PM, F. Romano, M. Imbriaco, Intra-Hepatic spillage of gallstones as a late complication of laparoscopic cholecystectomy: MR imaging findings, *Pol. J. Radiol.* 81 (2016) 322–324.
- [14] N. Pandit, SH, H. Kumar, G.R. Verma, Necrotizing soft tissue infection caused by spilled gallstones, *ACG Case Rep. J.* 15 (3) (2016) 212–213.
- [15] D. Moga, PŞ, A. Popenţiu, D. Sora, H. Magdu, Right Retroperitoneal and, Subhepatic abscess; late complications due to spilled stones during laparoscopic cholecystectomy – case report, *Chirurgia (Bucur)* 111 (1) (2016) 67–70.
- [16] K. Hussain, TA, M.S. Wahla, M.A. Mian, J. Masood, Parietalolith a late complication of spilled gallstones, *J. Coll. Physicians Surg. Pak.* (2015).
- [17] S. Binagi, KJ, M. Awad, Immediate postoperative pain: an atypical presentation of dropped gallstones after laparoscopic cholecystectomy, *Case Rep. Surg.* (2018).
- [18] S.L. Bedell, KK, Spilled gallstones after laparoscopic cholecystectomy associated with pelvic pain, *Am. J. Obstet. Gynecol.* 213 (3) (2015) 432.
- [19] Y. Noda, KM, S. Goshima, H. Kondo, H. Watanabe, H. Kawada, N. Kawai, Y. Tanahashi, Peritoneal chronic inflammatory mass formation due to gallstones lost during laparoscopic cholecystectomy, *Clin. Imaging* 38 (5) (2014) 758–761.
- [20] J.F. Quail, SP, D.L. Gramins, Thoracic gallstones: a delayed complication of laparoscopic cholecystectomy, *Surg. Infect. (Larchmt)* 15 (1) (2014) 69–71.
- [21] J. Ahmad, MA, Y. Zen, M.B. Loughrey, P. Kelly, M. Taylor, Spilled gallstones during laparoscopic cholecystectomy, *Ann. R. Coll. Surg. Engl.* 96 (5) (2014) 18–20.
- [22] W. Lee, KJ, Fate of lost gallstones during laparoscopic cholecystectomy, *Korean J. Hepatobiliary Pancreat Surg.* 17 (2) (2013) 66–69.
- [23] R. Peravali, HA, Laparoscopic management of chronic abscess due to spilled gallstones, *JLS* 17 (4) (2013) 657–660.
- [24] M.W. Morris MW Jr, BA, J.M. Harrison, A.J. Anderson, W.B. Vanderlan, Cicatricial cecal volvulus following laparoscopic cholecystectomy, *JLS* 17 (2) (2018) 333–337.
- [25] A. Dobradin, JS, L. Dabul, Gallstone-related abdominal abscess 8 years after laparoscopic cholecystectomy, *JLS* 17 (1) (2013) 139–142.
- [26] C. Bastianpillai, C.P. Neal, M. Patel, G. Garcea, Spontaneous discharge of 'spilled gallstone' with complete resolution of retroperitoneal abscess in a patient treated for putative tuberculosis, *BMJ Case Rep.* (2013).
- [27] D. Anrique, A. Kroker, A.D. Ebert, Blueberry sign: spilled gallstones after cholecystectomy as an uncommon finding, *J. Minim. Invasive Gynecol.* 20 (3) (2013) 329.
- [28] G. Chatzimavroudis, S. Atmatzidis, B. Papaziogas, I. Galanis, I. Koutelidakis, T. Doulias, P. Christopoulos, G. Papadakis, K. Atmatzidis, J. Makris, Retroperitoneal abscess formation as a result of spilled gallstones during laparoscopic cholecystectomy: an unusual case report, *Case Rep Surg* (2012).
- [29] K. Singh, WM, E. Ofori, W. Widmann, A. Alemi, M. Nakaska, Gallstone abscess as a result of dropped gallstones during laparoscopic cholecystectomy, *Int. J. Surg. Case Rep.* 3 (12) (2012) 611–613.
- [30] T. Arai, IT, H. Miyamoto, Spilled gallstones mimicking a liver tumor, *Clin. Gastroenterol. Hepatol.* 10 (11) (2012) A32.
- [31] I.N. Papadopoulos, CS, N. Economopoulos, Asymptomatic omental granuloma following spillage of gallstones during laparoscopic cholecystectomy protects patients and influences surgeons' decisions: a review, *BMJ Case Rep.* (2012).
- [32] A. Rammoohan, SU, S. Jeswanth, P. Ravichandran, Inflammatory pseudotumour secondary to spilled intra-abdominal gallstones, *Int. J. Surg. Case Rep.* 3 (7) (2018) 305–307.
- [33] H.I.T. Kayashima, IT, H. Ueo, N. Tsubokawa, H. Matsuura, D. Okamoto, A. Nakashima, K. Okadome, Inflammatory pseudotumor of the liver in association with spilled gallstones 3 years after laparoscopic cholecystectomy: report of a case, *Asian J. Endosc. Surg.* 4 (4) (2016) 181–184.
- [34] B.S.M. Pottakkat, P. Singh, Abdominal wall abscess due to spilled gallstone presenting 11 years after laparoscopic cholecystectomy, *Clin. J. Gastroenterol.* 3 (6) (2010) 324–326.
- [35] M.I. Hussain, A-AM, M.K. Alam, F.M. Al-Abood, Abdominal wall abscess following laparoscopic cholecystectomy: an unusual late complication of lost gallstones, *J. Coll. Physicians Surg. Pak.* 22 (11) (2010) 763–765.
- [36] D.L. Gooneratne, A rare late complication of spilled gallstones, *N. Z. Med. J.* 123 (1318) (2010) 62–66.
- [37] I. Bouasker, ZA, M.A. El Ouaer, M. Khalfallah, I. Samaali, C. Dziri, Parietal abscess revealing a lost gallstone 8 years after laparoscopic cholecystectomy, *Tunis. Med.* 88 (4) (2010) 277–279.
- [38] K. Morishita, OY, H. Sasaki, T. Yamashiro, K. Okubo, Multiple abdominal granuloma caused by spilled gallstones with imaging findings that mimic malignancy, *Am. J. Surg.* 199 (2) (2010) 23–24.
- [39] S.S.T. Helme, P. Sinha, Complications of spilled gallstones following laparoscopic cholecystectomy: a case report and literature overview, *J. Med. Case Rep.* (2009).
- [40] B.V. Dasari, LW, D.P. Carey, Spilled gallstones mimicking peritoneal metastases, *JLS* 13 (1) (2009) 73–76.
- [41] J.D.G. Maempel, A. Paice, A. Uzkalnis, An unusual hernia: losing a stone is not always a good thing!, *BMJ Case Rep.* (2009).
- [42] A.R. Arishi, RM, M.S. Khan, H. Sumaili, H. Shaabi, N.T. Michael, B.S. Shekhawat, Spilled gallstones: the source of an enigma, *JLS* 12 (3) (2016) 321–325.
- [43] K.B.M. Hougård, BM, Abdominal fistula 7 years after laparoscopic cholecystectomy, *Ugeskr. Laeger* 170 (36) (2008) 2803.
- [44] D. Stupak, CS, F. Kasmin, Y. Lee, J.H. Siegel, Intra-abdominal actinomycosis 11 years after spilled gallstones at the time of laparoscopic cholecystectomy, *Surg. Laparosc. Endosc. Percutan. Tech.* 17 (6) (2007) 542–544.
- [45] I.H. de Hingh, GD, Diagnostic image (345). A woman with abdominal pain and purulent vaginal discharge, *Ned. Tijdschr. Geneesk.* 151 (41) (2007) 2271.
- [46] L. Pantanowitz, PM, J.P. Hunt, Cholelithiasis of the ovary after laparoscopic cholecystectomy: a case report, *J. Reprod. Med.* 52 (10) (2007) 968–970.
- [47] E. Wehbe, VR, E.J. Brumfield, A spilled gallstone, *Med. J. Aust.* 187 (7) (2007) 397.
- [48] A.C. Wittich, Spilt gallstones removed after one year through a colpotomy incision: report of a case, *Int. Surg.* 92 (1) (2007) 17–19.
- [49] B.M. Shrestha, WA, Cholecystocolocutaneous fistula: a case report, *Hepatobiliary Pancreat. Dis. Int.* 5 (3) (2006) 462–464.
- [50] C.S. Bhati, TA, S.R. Bramhall, A tale of three spilled gall stones: one liver mass and two abscesses, *Dig. Surg.* 23 (3) (2006) 198–200.
- [51] A.A. Hand, SM, E. Dunn, Abdominal wall abscess formation two years after laparoscopic cholecystectomy, *JLS* 10 (1) (2006) 105–107.
- [52] D.A. Iannitti, VK, V. Zaydfudim, J. McKee, Subphrenic and pleural abscess due to spilled gallstones, *JLS* 10 (1) (2006) 101–104.
- [53] F.T. Viera, AE, L. Rosa, V. Ravetta, M. Alessiani, P. Dionigi, S. Rossi, Abdominal spilled stones: ultrasound findings, *Abdom. Imaging* 31 (5) (2006) 564–567.
- [54] J.C. van der Lugt, dGP, R.J. Dallinga, L.P. Stassen, Abscess formation due to lost stones during laparoscopic cholecystectomy, *Ned. Tijdschr. Geneesk.* 149 (48) (2005) 2683–2686.
- [55] C.J. Castellón Pavón, FBM, S. Morales Artero, E. Del Amo Olea, Subhepatic abscess as a late complication of missed intraperitoneal gallstone after laparoscopic cholecystectomy, *Gastroenterol. Hepatol.* 27 (10) (2004) 568–572.
- [56] E. Koç, SM, S.U. Oztuğut, C. Ensari, M. Karakurt, N. Ozlem, Retroperitoneal abscess as a late complication following laparoscopic cholecystectomy, *Med. Sci. Monit.* 10 (6) (2004) 27–29.

- [57] S. Stevens, R.H. Cacchione, N.A. O'Rourke, J.W. Allen, Jaundice due to extrabiliary gallstones, *JLS* 7 (3) (2003) 277–279.
- [58] M. Yamamuro, O.B. Owens, Unusual presentations of spilled gallstones, *Surg. Endosc.* 17 (9) (2003) 1498.
- [59] C. Aspelund, H.B. H.J. Isaksson, P.H. Möller, Gallstone in a hernia sac, *Surg. Endosc.* 17 (4) (2003) 657.
- [60] P.K. Pappasavas, C.P. D.J. Gagné, Spilled gallstones after laparoscopic cholecystectomy, *J. Laparoendosc. Adv. Surg. Tech. A* 12 (5) (2002) 383–386.
- [61] P.J. Van Mierlo, D.B.S. J.T. Van Dissel, S.M. Arend, Recurrent staphylococcal bacteraemia and subhepatic abscess associated with gallstones spilled during laparoscopic cholecystectomy two years earlier, *Neth. J. Med.* 60 (4) (2016) 177–180.
- [62] R.K. Yadav, Y.V. P. Garg, S.P. Yadav, V. Goel, Gallstone expectoration following laparoscopic cholecystectomy, *Indian J. Chest Dis. Allied Sci.* 44 (2) (2002) 133–135.
- [63] A. Hawasli, S.D. J. Rizzo, M. Thusay, T.J. Takach, U. Thao, I. Goncharova, Remote complications of spilled gallstones during laparoscopic cholecystectomy: causes, prevention, and management, *J. Laparoendosc. Adv. Surg. Tech. A* 12 (2) (2002) 123–128.
- [64] T.E. Pavlidis, P.B. I.M. Koutelidakis, T.B. Papaziogas, Abdominal wall sinus due to impacting gallstone during laparoscopic cholecystectomy: an unusual complication, *Surg. Endosc.* 16 (2) (2002) 360 (Feb.; Epub 2001 Nov 16).
- [65] R.M. Albrecht, E.B. L. Gibel, J. Locken, A. Champlin, Percutaneous removal of spilled gallstones in a subhepatic abscess, *Am. Surg.* 68 (2) (2002) 193–195.
- [66] C. Famulari, P.G. A. Macri, F. Crescenti, G. Scuderi, G. De Caridi, A.L. Giuseppe, The vesical granuloma: rare and late complication of laparoscopic cholecystectomy, *Surg. Laparosc. Endosc. Percutan. Tech.* 11 (6) (2001) 368–371.
- [67] S.R. Narreddy, G.S. S. Agarwal, C.M. Svr, S. Mandal, Recurrent abscess at site of laparoscopic cholecystectomy port due to spilled gallstones, *Indian J. Gastroenterol.* 20 (4) (2001) 161.
- [68] Y.B. Werber, W.C. Massie, Massive hemoptysis from a lung abscess due to retained gallstones, *Ann. Thorac. Surg.* 72 (1) (2001) 278–279.
- [69] C.C. Yao, W.H. C.C. Yang, C.S. Lin, Abdominal wall abscess secondary to spilled gallstones: late complication of laparoscopic cholecystectomy and preventive measures, *J. Laparoendosc. Adv. Surg. Tech. Part A* 11 (1) (2001) 47–51.
- [70] S. Gretschel, E.C. L. Estevez-Schwarz, P.M. Schlag, Wolf in sheep's clothing: spilled gallstones can cause severe complications after endoscopic surgery, *Surg. Endosc.* 15 (1) (2001) 98.
- [71] D.M. Battaglia, F.V. J. Mamazza, Gallstone in abdominal wall—a complication of laparoscopic cholecystectomy, *Surg. Laparosc. Endosc. Percutan. Tech.* 11 (1) (2001) 50–52.
- [72] E. Ok, S.E. Intra-abdominal gallstone spillage detected during umbilical trocar site hernia repair after laparoscopic cholecystectomy: report of a case, *Surg. Today* 30 (11) (2000) 1046–1048.
- [73] C. Walch, B.G. K. Huffer, On the fate of lost gallstones, *Ultraschall Med.* 21 (4) (2000) 189–191.
- [74] M. Bebawi, W.S. A. Ramcharan, K. Bapat, Incarcerated indirect inguinal hernia: a complication of spilled gallstones, *JLS* 4 (3) (2000) 267–269.
- [75] M.G. Castro, A.A. C.A. Oliveira, A. Vieira Júnior, J.L. Vianna, R.F. Costa, Elimination of biliary stones through the urinary tract: a complication of the laparoscopic cholecystectomy, *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 54 (6) (1999) 209–212.
- [76] E.G. Ong, W.R. Delayed presentation of spilled gallstones, *Journal of laparoendoscopic & advanced surgical techniques, J. Laparoendosc. Adv. Surg. Tech. Part A* 9 (5) (1999) 445–447.
- [77] P. Chopra, K.P. R.J. Mehran, Cholelithiasis and pleural empyema, *Ann. Thorac. Surg.* 68 (1) (1999) 254–255.
- [78] C. Frola, C.F. S. Cantoni, E. Tagliafico, T. Luminati, Peritoneal abscess formation as a late complication of gallstones spilled during laparoscopic cholecystectomy, *Br. J. Radiol.* 72 (854) (1999) 201–203.
- [79] G. Zamir, L.S. D. Pertsemliadis, B. Katz, The fate of the dropped gallstones during laparoscopic cholecystectomy, *Surg. Endosc.* 13 (1) (1999) 68–70.
- [80] Y. Groebli, H.D. P. Tschantz, The migrating spilled stone, *Int. Surg.* 83 (1) (1998) 31–32.
- [81] A.N. Sinha, S.G. A.S. Rao, A. Sinha, Subphrenic abscess following laparoscopic cholecystectomy and spilled gallstones, *Indian J. Gastroenterol.* 17 (3) (1998) 108–109.
- [82] E. Parra-Davila, M.I. J.H. Armstrong, D. Sleeman, J.U. Levi, Retroperitoneal abscess as a complication of retained gallstones following laparoscopic cholecystectomy, *J. Laparoendosc. Adv. Surg. Technol. A* 8 (2) (1998) 89–93.
- [83] F. Petit, V.C. M. Tahrat, A. Coulomb-L'Hermine, F. Capron, D. Franco, Jaundice following laparoscopic cholecystectomy. An unusual complication of spilled stones, *Surg. Endosc.* 12 (5) (1998) 450–451.
- [84] E.J. Patterson, N.A. Don't cry over spilled stones? Complications of gallstones spilled during laparoscopic cholecystectomy: case report and literature review, *Can. J. Surg.* 40 (4) (1997) 300–304.
- [85] M.A. Memon, J.H.J. R.J. Fitzgibbons Jr., Spontaneous erosion of a lost intra-abdominal gallstone through the back eight months following laparoscopic cholecystectomy, *JLS* 1 (2) (1997) 153–157.
- [86] J.M. Läufer, K.L. H.U. Baer, M. Mettler, M.W. Büchler, Clinical manifestations of lost gallstones after laparoscopic cholecystectomy: a case report with review of the literature, *Surg. Laparosc. Endosc.* 7 (2) (1997) 103–112.
- [87] C. Chanson, N.K. P. Petropoulos, [Complications of intraperitoneal gallstones], *Schweiz. Med. Wochenschr.* 127 (33) (1997) 1323–1328.
- [88] E.J. Patterson, N.A. Don't cry over spilled stones? Complications of gallstones spilled during laparoscopic cholecystectomy: case report and literature review, *Can. J. Surg.* 40 (4) (1997) 300–304.
- [89] M.T. Brueggemeyer, S.A. L.C. Thibodeaux, Abscess formation following spilled gallstones during laparoscopic cholecystectomy, *JLS* 1 (2) (1997) 145–152.
- [90] P.T. Chin, B.S. J.P. Percy, Gallstone hip and other sequelae of retained gallstones, *HPB Surg.* (1997) 10.
- [91] M.E. Pfeifer, H.K. S.P. Tho, R.S. Hines, L. Plouffe Jr, Ovarian cholelithiasis after laparoscopic cholecystectomy associated with chronic pelvic pain, *Fertil. Steril.* 66 (6) (1996) 1031–1032.
- [92] G. Sichert, B.H. [Paraneoplastic abscess. Local late complication after laparoscopic cholecystectomy], *Chirurg* 67 (7) (1996) 754–756.
- [93] G.H. Stevens, D.J. A.P. Willig, M.G. Bergmans, Dysmenorrhea related to gallstone spilling after laparoscopic cholecystectomy, *Eur. J. Obstet. Gynecol. Reprod. Biol.* 67 (1) (1996) 63–64.
- [94] T. Huynh, M.D. Early postoperative small bowel obstruction caused by spilled gallstones during laparoscopic cholecystectomy, *Surgery* 119 (3) (1996) 352–353.
- [95] D.A. Neumeyer, L.J. P. Pinkston, Complex pleural effusion associated with a subphrenic gallstone phlegmon following laparoscopic cholecystectomy, *Chest* 109 (1) (1996) 284–286.
- [96] D. Rosin, K.Y. A. Yudich, A. Ayalon, Lost gallstones found in a hernial sac, *J. Laparoendosc. Surg.* 5 (6) (1995) 409–411.
- [97] J. Ponce, C.K. M.J. Hodge, W. Browder, The lost laparoscopic stone. Potential for long-term complications, *Arch. Surg.* 130 (6) (1995) 666–668.
- [98] A.N. Freedman, S.H. Incarcerated paraumbilical incisional hernia and abscess? complications of a spilled gallstone, *J. Laparoendosc. Surg.* 5 (3) (1995) 189–191.
- [99] M.A.A. Rioux, R. Grégoire, C. Dallaire, Delayed peritoneal and retroperitoneal abscesses caused by spilled gallstones: a complication following laparoscopic cholecystectomy, *Abdom. Imaging* 20 (3) (1995) 219–221.
- [100] E. S. Abdominal abscess from gallstones spilled at laparoscopic cholecystectomy. Case report and review of the literature, *Surg. Endosc.* 9 (3) (1995) 344–347.
- [101] C.B. Carlin, K.R.J. H.L. Laws, Spilled gallstones—complications of abdominal-wall abscesses. Case report and review of the literature, *Surg. Endosc.* 9 (3) (1995) 341–343.
- [102] J.D. Mellinger, E.T. E.D. Eddelmon, M.M. Crabbe, Delayed gallstone abscess following laparoscopic cholecystectomy, *Surg. Endosc.* 8 (11) (1994) 1332–1334.
- [103] R.N. Gallinaro, M.F. The lost gallstone. Complication after laparoscopic cholecystectomy, *Surg. Endosc.* 8 (8) (1994) 913–914.
- [104] K.A. Leslie, R.R. J.H. Duff, Lost gallstones during laparoscopic cholecystectomy: are they really benign? *Can. J. Surg.* 37 (3) (1994) 240–242.
- [105] S. E. Abdominal wall abscess due to spilled gallstones, *Surg. Laparosc. Endosc.* 3 (6) (1993) 485–486.
- [106] S.O. Trerotola, L.K. P.C. Malloy, F.A. Osterman Jr., Percutaneous removal of dropped gallstones after laparoscopic cholecystectomy, *Radiology* 188 (2) (1993) 419–421.
- [107] Z. Dreznik, S.N. Trocar site abscess due to spilled gallstones: an unusual late complication of laparoscopic cholecystectomy, *Surg. Laparosc. Endosc.* 3 (3) (1993) 223–224.
- [108] P. Nicolai, F.R. Complications of spilled gallstones, *J. Laparoendosc. Surg.* 2 (6) (1992) 362–363.
- [109] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, Orgill DP, for the SCARE group. The SCARE statement: consensus-based surgical case report guidelines, *Int. J. Surg.* 34 (2016) 180–186.

Open Access

This article is published Open Access at [sciencedirect.com](https://www.sciencedirect.com). It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.