

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: [www.elsevier.com/locate/radcr](http://www.elsevier.com/locate/radcr)

## Case Report

# Dropped gallstones mimicking peritoneal metastasis: A case report

Sarah Garaud, Alexandre Stolz\*

Department of radiology, Hôpital neuchâtelois, Rue de la Maladière 45, 2000 Neuchâtel, Switzerland

### ARTICLE INFO

#### Article history:

Received 15 March 2018

Revised 25 May 2018

Accepted 26 May 2018

#### Keywords:

Dropped gallstones

Calcified peritoneal nodular pattern

Computed tomography

Cholecystectomy

### ABSTRACT

Dropped gallstones is a rare complication after a cholecystectomy. Computed tomography is the modality of choice for diagnosis. Dropped gallstones can be a fortuitous discovery in an asymptomatic patient but it is usually revealed when a complication occurs, most commonly through an abscess. Our case presents a dropped gallstone found during a routine check-up in a patient with a history of small bowel cancer. We will discuss differential diagnosis with others calcified peritoneal nodular patterns, particularly peritoneal carcinomatosis. We will recall the multimodality imaging findings of dropped gallstone and, based on literature, we will review the different sources of calcified peritoneal nodular pattern. The treatment of gallstone drop consequences depends on the clinical aspect.

© 2018 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license.

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## Introduction

Dropped gallstones is the spillage of stones that can occur during a gallbladder perforation in a cholecystectomy. In most situations, gallstones are not symptomatic, even years after their occurrence. Diagnosis is easy using computed tomography (CT), but sometimes, as in the herein case, in a context of cancer follow-up, the diagnostic is difficult and other—benign and malignant—peritoneal nodules with calcification come under discussion.

## Case report

An 84-year-old man consulted our radiology department for his annual CT follow-up for a small bowel gastrointestinal

stromal tumor in complete remission. The patient did not complain of any abdominal pain. He reported a laparoscopic cholecystectomy (LCC) 2 months previously, after an acute cholecystitis with an uneventful postoperative recovery.

Abdominal contrast-enhanced CT showed a centimetric nodule in the anterior compartment of the right subhepatic space with target enhancement and a calcified center, encompassed by fat infiltration (Fig. 1), mimicking an omental implant of carcinomatosis. The small bowel was normal showing no signs of cancer recurrence.

A unique low-intensity nodule, with a calcified center, similar in appearance to a cholelithiasis inside the gallbladder seen on a previous CT (Fig. 2), in a context of recent LCC, oriented us toward the diagnosis of dropped gallstones surrounded by an inflammatory reaction.

The patient was referred for a surgery consultation but the clinical exam was normal. Due to the patient's absence of pain,

\* Corresponding author.

E-mail addresses: [sarah.garaud@h-ne.ch](mailto:sarah.garaud@h-ne.ch) (S. Garaud), [alexandre.stolz@h-ne.ch](mailto:alexandre.stolz@h-ne.ch) (A. Stolz).

<https://doi.org/10.1016/j.radcr.2018.05.017>

1930-0433/© 2018 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)



(a)



(b)

**Fig. 1** – Portal venous phase 5 mm axial (a) and 10 mm coronal (b) abdominal computed tomography images show a 1 cm nodule with target enhancement and with low-intensity and calcified center (arrow), associated with fat infiltration around (\*), hinting at an inflammatory reaction due to a stone spillage in the peritoneal cavity following the laparoscopic cholecystectomy.

surgery was not performed. An annual CT follow-up was suggested.

## Discussion

LCC is associated with gallstones spillage in 5%-40% of procedures [1]. Mostly, patients stay asymptomatic, but in 0.08%-0.3% it results in clinical consequences [2], with complications such as abscesses and fistulas [3]. These consequences are due to stones leading to a low-noise inflammatory reaction, resulting in granulomas. In certain cases, this inflammation can persist and erode tissues adjacent to the stone, which can migrate to different areas like into the retroperitoneum, in the pelvis or above the diaphragm [4,5]. Symptoms can occur on average a few months after an LCC but also years after such an intervention [3].

Typically, dropped gallstones appear on a CT as high-attenuation calcified, but stones composed of cholesterol or low calcium content may not be seen. On a magnetic resonance imaging, stones can be difficult to recognize. On T1-weighted sequences, pigment gallstones were generally hypersignal while cholesterol gallstones were generally hypointense [6]. On T2-weighted images, a gallstone drop can also be hypointense even without enhancement after injection of gadolinium-based contrast agents [3,6]. On an ultrasound, they are presented as hyperechoic foci mobiles, with posterior acoustic shadowing [7].

Intra-abdominal calcification morphology is classified in laminar, sheetlike, or nodular. Laminar calcifications exist in various situations such as long-time peritoneal dialysis. Here, we discuss sources of calcified peritoneal nodular pattern (CPNP) those including dropped gallstones (Table 1).

### Unique calcified peritoneal nodular pattern

In the literature, single CPNP is uncommon. Maatouk et al. reported that retained appendicolith can be seen at ultrasound or CT in different sites including the pelvis, gluteal region,



**Fig. 2** – Prior contrast-enhanced computed tomography of the patient, several months before laparoscopic cholecystectomy, shows the same stone (arrow) in the gallbladder.

**Table 1 – Calcified nodular peritoneal pattern.**

	Benign	Malignant
<b>Unique</b>	Dropped gallstones Large peritoneal loose body Calcified infarcted epiploic appendage Calcified subserosal pedunculated leiomyoma Old abscess or hematoma Retained appendicolith	
<b>Multiple</b>	Multiple calcified lymphadenopathy • Tuberculosis • Pneumocystis carinii • Amyloidosis Peritoneal echinococcosis*	Multiple calcified lymphadenopathy • Lymphoma Calcified nodules of carcinomatosis • Ovarian or primary papillary serous peritoneal carcinomas • Squamous cell lung cancer • Renal cell carcinoma • Melanoma • Colon cancer • Gastric cancer

\* Mostly cystic appearance.

hepatorenal pouch, and subhepatic region. Abscess secondary to retained appendicolith appears as fluid collection containing a focus of high attenuation [8].

Large peritoneal loose body (ie, mice) is a mobile concentric round or oval-shaped well-defined mass containing a central calcification, surrounded by peripheral soft tissue at CT. Low intensity on both T1- and T2-weighted images is classical at magnetic resonance imaging, but a central high-intensity area is also possible on T1-weighted images [9].

In certain situations, diagnoses of infarcted epiploic appendage with a dystrophic calcification, due to aseptic fat necrosis [10] or calcified subserosal pedunculated leiomyoma, can also be discussed, respectively, in case of calcified nodule around the colon or the uterus.

#### Multiple peritoneal nodular patterns with calcification

Multiple calcified mesenteric lymphadenopathies may occur in lymphoma, mostly after treatment, and prior peritoneal infections such as tuberculosis [11] and *pneumocystis carinii*.

Nodular involvement of the omentum, mesentery, and peritoneum is an unusual presentation of amyloidosis, but diagnosis must be considered, particularly with the association of multiple CPNP with areas of coarse dystrophic calcification in abdominal and extra abdominal locations, in the absence of a neoplastic history or chronic infection [12].

Single- or multiple peritoneal cysts with calcified rim can reveal a peritoneal echinococcosis, almost always secondary to intraperitoneal hepatic hydatid cyst rupture [13]. The appearance is cystic rather than a true CPNP.

Malignant multiple CPNPs are mainly due to calcified nodules of carcinomatosis [5]. The presence of multiple calcified peritoneal nodules, especially if associated with extensive omental calcification, suggests the diagnosis of ovarian papillary serous carcinoma in cases of ovarian mass and of primary papillary serous carcinoma in the absence of ovarian mass, particularly in postmenopausal women [14].

Ovarian papillary serous peritoneal carcinomas is a very common source of calcified carcinomatosis but hyperparathyroidism and hypercalcemia from other malignancies such as squamous cell lung cancer, renal cell carcinoma and melanoma [15], colon cancer [16], and mucous-secreting gastric cancer [17] are other sources of CPNP.

The treatment of gallstone drop consequences depends on the clinical aspect. The most common practice is the surgical retrieval of the stone, although there is currently no consensus. As a preventive measure, it is recommended to remove all the dropped gallstones during the LCC, wherever possible. If all the stones could not be removed, the surgeon should transcribe it in the surgical report and inform the patient and his General Practitioner. Clinical consequences being rare, there is currently no systematic follow up for a patient known with a dropped gallstone.

This case illustrates the importance of recognizing dropped gallstone, to avoid mistaking it with other CPNP, particularly in an oncologic context.

#### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.radcr.2018.05.017](https://doi.org/10.1016/j.radcr.2018.05.017).

#### REFERENCES

- [1] Sathesh-Kumar T, Saklani A, Vinayagam R, Blackett R. Spilled gall stones during laparoscopic cholecystectomy: a review of the literature. *Postgrad Med J* 2004;80(940):77–9.
- [2] Agarwal A, Yeh BM, Breiman RS, Qayyum A, Coakley FV. Peritoneal calcification: causes and distinguishing features on CT. *AJR Am J Roentgenol* 2004;182(2):441–5.
- [3] Nayak L, Menias CO, Gayer G. Dropped gallstones: spectrum of imaging findings, complications and diagnostic pitfalls. *Br J Radiol* 2013;86(1028):20120588.
- [4] Karabulut N, Tavasli B, Kiroglu Y. Intra-abdominal spilled gallstones simulating peritoneal metastasis: CT and MR features imaging. *Eur Radiol* 2008;18(4):851–4.
- [5] Ramamurthy NK, Rudralingam V, Martin DF, Galloway SW, Sukumar SA. Out of sight but kept in mind: complications and imitations of dropped gallstones. *AJR Am J Roentgenol* 2013;200(6):1244–53.
- [6] Tsai HM, Lin XZ, Chen CY, Lin PW, Lin JC. MRI of gallstones with different compositions. *AJR Am J Roentgenol* 2004;182:1513–19.
- [7] Viera FT, Armellini E, Rosa L, Ravetta V, Alessiani M, Dionigi P, et al. Abdominal spilled stones: ultrasound findings. *Abdom Imaging* 2006;31:564–7.
- [8] Maatouk M, Bunni J, Schuijtvlot M. Perihepatic abscess secondary to retained appendicolith: a rare complication managed laparoscopically. *J Surg Case Rep* 2011.

- [9] Gayer G, Petrovitch I. CT diagnosis of a large peritoneal loose body: a case report and review of the literature. *Br J Radiol* 2011;84(1000):e83–5.
- [10] Ghahremani G, White E, Hoff F, Gore R, Miller J, Christ M. Appendices epiploicae of the colon: radiologic and pathologic features. *RadioGraphics* 1992;12(1):59–77.
- [11] Na-ChiangMai W, Pojchamarnwiputh S, Lertprasertsuke N, Chitapanarux T. CT findings of tuberculous peritonitis. *Singapore Med J* 2008;49(6):488.
- [12] Coumbaras M, Chopier J, Massiani M, Antoine M, Boudghène F, Bazot M. Diffuse Mesenteric and omental infiltration by amyloidosis with omental calcification mimicking abdominal carcinomatosis. *Clin Radiol* 2001;56(8):674–6.
- [13] Pedrosa I, Saíz A, Arrazola J, Ferreirós J, Pedrosa C. Hydatid disease: radiologic and pathologic features and complications. *RadioGraphics* 2000;20(3):795–817.
- [14] Stafford-Johnson D, Bree R, Francis I, Korobkin M. CT appearance of primary papillary serous carcinoma of the peritoneum. *Am J Roentgenol* 1998;171(3):687–9.
- [15] Grill V, Martin TJ. Hypercalcemia of malignancy. *Rev Endocr Metab Disord* 2000;1:253–63.
- [16] Wong LL, Peh WC. Clinics in diagnostic imaging (22): calcified peritoneal carcinomatosis. *Singapore Med J* 1997;38:88–91.
- [17] Kunieda K, Okuhira M, Nakano T, Nakatani S, Tateiwa J, Hiramatsu A, et al. Diffuse calcification in gastric cancer. *J Int Med Res* 1990;18:506–14.