

CMEARTICLE

# Clinics in diagnostic imaging (199)

Wei Ming Ian Tay<sup>1</sup>, FRCR, MMed, Manickam Subramanian<sup>1</sup>, MBBS, FRCR, Dinesh Chinchure<sup>2</sup>, MBBS, FRCR, Shi Xian Shawn Kok<sup>1</sup>, FRCR, MMed

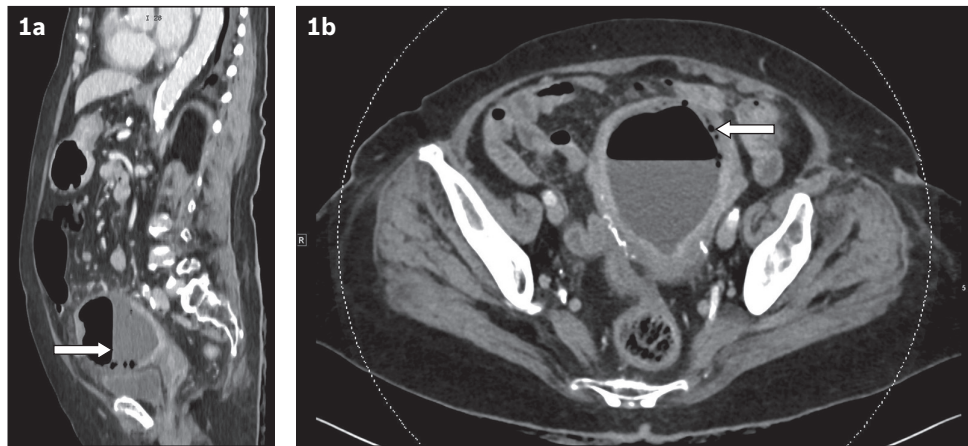


Fig. 1 (a) Sagittal and (b) axial contrast-enhanced CT images of the abdomen and pelvis.

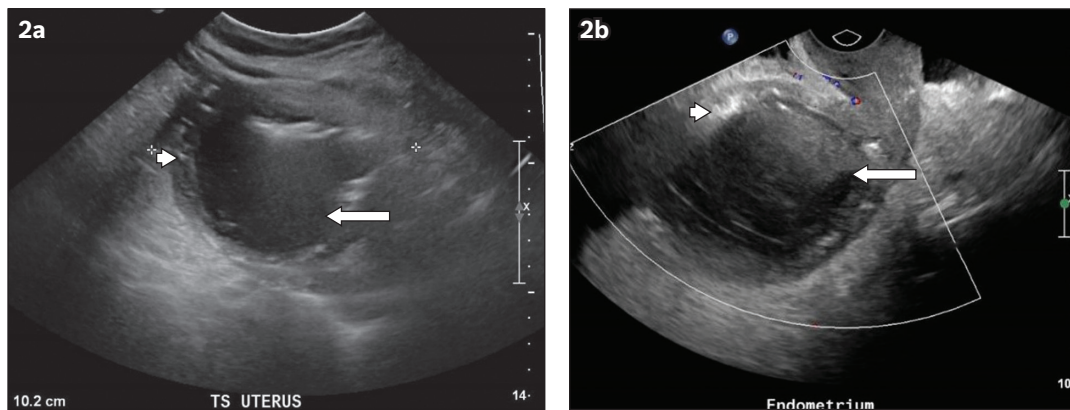


Fig. 2 (a) Transverse and (b) sagittal transvaginal US images.

## CASE PRESENTATION

A 92-year-old Chinese woman with a history of hypertension, diabetes mellitus and ischaemic heart disease presented to the emergency department with constipation, urinary incontinence and reduced oral intake of five days' duration. On examination, she was febrile (38.2°C) with suprapubic tenderness. Renal punch was negative. Initial laboratory markers revealed leucocytosis of  $27.2 \times 10^9/L$  (normal  $4.0\text{--}9.6 \times 10^9/L$ ), C-reactive protein

of 252.3 mg/L (normal 0.0–5.0 mg/L), serum glucose level of 15.0 mmol/L (normal 0.0–11.1 mmol/L) and glycated haemoglobin of 8.7% (normal < 6.0%). Her urine and blood cultures were negative for bacteria, but urine phase-contrast microscopy revealed leucocytes in her urine. Computed tomography (CT) of her abdomen and pelvis was performed two days into her admission (Fig. 1), and a transvaginal ultrasonography (US) was performed a day later (Fig. 2). What do the images show? What is the diagnosis?

<sup>1</sup>Department of Diagnostic Radiology, Tan Tock Seng Hospital, <sup>2</sup>Department of Diagnostic Radiology, Khoo Teck Puat Hospital, Singapore

**Correspondence:** Dr Ian Tay Wei Ming, Senior Resident, Department of Diagnostic Radiology, Tan Tock Seng Hospital, 11 Jalan Tan Tock Seng, Singapore 308433. [ian.tay@mohh.com.sg](mailto:ian.tay@mohh.com.sg)

### IMAGE INTERPRETATION

Sagittal contrast-enhanced CT image in the portovenous phase shows distension of the endometrial cavity with high-attenuation fluid and an air-fluid level (arrow, Fig. 1a). There is also focal wall thinning and decreased mural enhancement. Small gas locules are seen in the left anterior uterine wall (arrow, Fig. 1b), which appears thinned and shows non-enhancement of the endometrial lining. Transverse and sagittal transvaginal US images show that the endometrium has fluid-containing internal echoes (arrows, Fig. 2), while echogenic foci at the anterior uterine walls with dirty posterior shadowing represent mural gas locules (arrowheads, Fig. 2).

### DIAGNOSIS

Pyometra.

### CLINICAL COURSE

The patient was initially treated for urosepsis with a combination of intravenous amoxicillin/clavulanate and gentamicin. Upon the imaging diagnosis of pyometra, she was reviewed by the gynaecology department and her antibiotic regimen was altered to ceftriaxone and metronidazole. An endometrial pipelle was used to drain the pus from the endometrial cavity, with no cervical dilation performed. A Pap smear of her cervix showed no malignant cells. Culture of the pus grew *Peptostreptococcus* (Gram-positive anaerobe, sensitive to metronidazole) and *Escherichia coli* (Gram-negative, sensitive to ceftriaxone and gentamicin). Her suprapubic pain and urinary symptoms continued to improve, while her inflammatory markers were on a downward trend for the remainder of her stay. She was discharged well on Day 7 of her admission.

### DISCUSSION

Pyometra refers to the accumulation of pus in the endometrial cavity as a result of infection, and is thought to represent a chronic form of endometritis. It is a rare condition with a reported incidence of between 0.1% and 0.3% of all gynaecological attendances.<sup>(1,2)</sup> It mainly occurs in the postmenopausal age group and has a reported incidence of up to 13.6% among such patients.<sup>(3)</sup> Patients typically present with suprapubic pain, fever, chills, postmenopausal bleed and, on occasion, purulent vaginal discharge.<sup>(4)</sup>

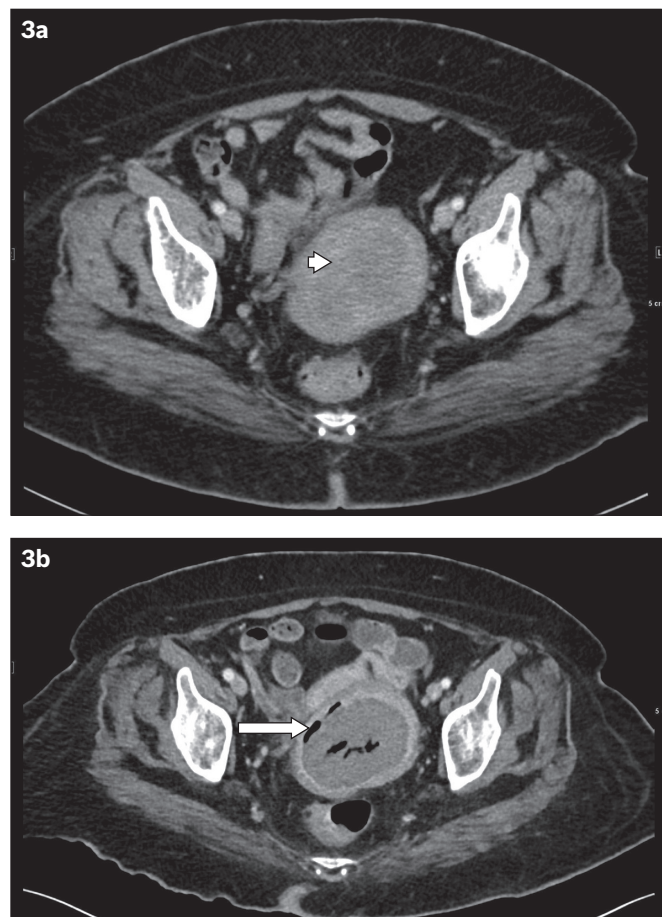
For pyometra to occur, there must be interference with the natural drainage of the uterine cavity by causes such as uterine malignancy, pelvic inflammatory disease, prior irradiation, cervical stenosis or imperforate hymen in younger patients. Its occurrence in the elderly age group should always raise suspicion for malignancy,<sup>(3-7)</sup> such as vaginal squamous cell carcinoma or cervical carcinoma. Our patient's Pap smear result showed no malignant cells. However, she had poorly controlled diabetes mellitus. While its association with pyometra was not well established in our literature review, we noted with interest the presence of poorly controlled diabetes mellitus in several prior reports of pyometra.<sup>(3,8)</sup> A possible association may well be explored in a larger case series.

CT and US are useful for image characterisation in pyometra. On CT, there is typically distension of the endometrial cavity with

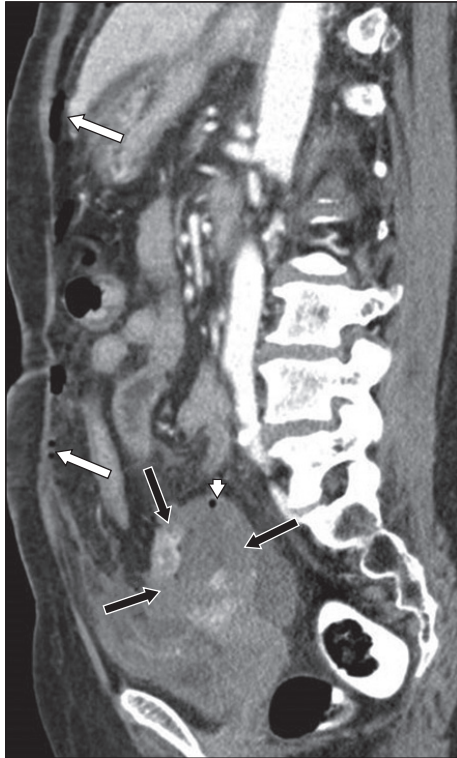
complex fluid, inflammatory fat stranding in the parametrium and free fluid in the pouch of Douglas. Gas bubbles or an air-fluid level may also be seen, as in the case of our patient. On US, there is complex fluid with internal echoes and debris, increased vascularity on colour Doppler imaging reflecting hyperaemia, and echogenic foci representing gas. Typically, there is also exquisite tenderness to any slight uterine movement during the sonographic or physical examination.<sup>(9-11)</sup> On magnetic resonance imaging, the fluid within the endometrial cavity is hyperintense on T2-weighted imaging and shows restricted diffusion; discontinuity of the uterine wall may also be evident.<sup>(12)</sup>

Although the diagnosis is typically straightforward given the characteristic imaging appearances, particularly on CT, one radiological mimic to be aware of is necrosis of a uterine fibroid. With causes such as torsion of a pedunculated fibroid or rapid overgrowth of the fibroid's vascular supply, necrosis of uterine fibroids used to be uncommon. However, it has become more common recently due to the proliferation of uterine artery embolisation techniques, and careful history-taking with the patient is required.<sup>(13)</sup>

We herein report the case of a patient with a known intramural fibroid that subsequently underwent necrosis, mimicking pyometra on CT (Fig. 3). Although the patient had



**Fig. 3** Necrosis of a uterine fibroid in a 53-year-old woman. Transverse contrast-enhanced CT image shows (a) a hypodense, circumscribed fibroid at the left uterine wall (arrowhead); and (b) gas locules that appeared three months later in the centre of the fibroid and at its circumference (arrow), which is consistent with necrosis. No perilesional fat stranding is noted.



**Fig. 4** Spontaneous perforation of pyometra in a 63-year-old woman. Sagittal contrast-enhanced CT image shows free intraperitoneal gas (white arrows), discontinuity of the uterine walls (black arrows) and an intramural gas locule in the uterine wall (arrowhead).

no history of uterine artery embolisation, this example highlights the value of reviewing previous images. In cases where evidence for fibroid necrosis and pyometra is equivocal, sonographic examination may prove useful to establish the presence of a normal-appearing endometrial cavity, which would identify the former.

The mainstay of treatment for pyometra is antibiotics and drainage. Although the purulent material can typically be drained conventionally under anaesthesia via cervical dilatation and drainage, in our case, the pus was drained with only the use of an endometrial pipelle, as no obstructing cervical mass was present. In instances where these methods are not possible, US-guided percutaneous drainage has been described in the literature.<sup>(14)</sup>

Although rare and mostly described in case reports, spontaneous perforation of pyometra is a feared complication that may result in diffuse peritonitis and pneumoperitoneum (Fig. 4) possibly progressing to septic shock. The clinical presentation usually resembles hollow viscus perforation.<sup>(15)</sup> CT findings described in the literature include focal discontinuity of the uterine wall, fluid collection in the pelvis tracking from the endometrial cavity, and pneumoperitoneum. Urgent surgical

intervention, usually a laparotomy, is often required in cases of perforated pyometra.

In summary, this case illustrates the characteristic imaging findings in a case of pyometra. The imaging diagnosis of this condition should be made in tandem with corroborative clinical and laboratory findings as well as sonographic examination, as the CT imaging features potentially overlap with those of uterine fibroid necrosis. Perforated pyometra is a dreaded complication that can be excluded with CT imaging.

**ABSTRACT** A 92-year-old woman presented to the emergency department with urinary symptoms, fever and suprapubic tenderness. Her inflammatory markers were raised. Urine and blood cultures were negative. Computed tomography performed to look for a source of sepsis showed distension of the uterine cavity with high-attenuation fluid, an air-fluid level and gas locules along the uterine wall. The causes, clinical presentation and imaging features of pyometra are discussed.

*Keywords:* endometritis, infection, postmenopausal bleeding, pyometra

## REFERENCES

- Chan LY, Lau TK, Wong SF, Yuen PM. Pyometra. What is its clinical significance? *J Reprod Med* 2001; 46:952-6.
- Whiteley PF, Hamlett JD. Pyometra—a reappraisal. *Am J Obstet Gynecol* 1971; 109:108-12.
- Sawabe M, Takubo K, Esaki Y, et al. Spontaneous uterine perforation as a serious complication of pyometra in elderly females. *Aust N Z J Obstet Gynaecol* 1995; 35:87-91.
- Kerimoglu OS, Pekin A, Yilmaz SA, Bakbak BB, Celik C. Pyometra in elderly post-menopausal women: a sign of malignancy. *Eur J Gynaecol Oncol* 2015; 36:59-61.
- Karpathios S, Prevedourakis C, Papadias C, Lolis D. Pyometra. *Int J Gynaecol Obstet* 1976; 14:477-9.
- Shierholz JD, Buchsbaum HJ, Lifshitz S, Latourette B. Pyometra complicating radiation therapy of uterine malignancy. *J Reprod Med* 1977; 19:100-2.
- Muram D, Drouin P, Thompson FE, Oxorn H. Pyometra. *Can Med Assoc J* 1981; 125:589-92.
- Uno K, Tano S, Yoshihara M, et al. A case report and literature review of spontaneous perforation of pyometra. *J Emerg Med* 2016; 50:e231-6.
- Yin WB, Wei YH, Liu GW, et al. Spontaneous perforation of pyometra presenting as acute abdomen: a rare condition with considerable mortality. *Am J Emerg Med* 2016; 34:761.e3-5.
- Revzin MV, Mathur M, Dave HB, Macer ML, Spektor M. Pelvic inflammatory disease: multimodality imaging approach with clinical-pathologic correlation. *Radiographics* 2016; 36:1579-96.
- Williams PL, Laifer-Narin SL, Ragavendra N. US of abnormal uterine bleeding. *Radiographics* 2003; 23:703-18.
- Kim J, Cho DH, Kim YK, Lee JH, Jeong YJ. Sealed-off spontaneous perforation of a pyometra diagnosed preoperatively by magnetic resonance imaging: a case report. *J Magn Reson Imaging* 2010; 32:697-9.
- Verma SK, Gonsalves CF, Baltarowich OH, et al. Spectrum of imaging findings on MRI and CT after uterine artery embolization. *Abdom Imaging* 2010; 35:118-28.
- Ekweani JC, Oguntayo AO, Kolawole AOD, Zayyan MS. Ultrasound-guided percutaneous drainage of pyometra in cervical cancer patients on radiotherapy. *Arch Int Surg* 2016; 6(3):165-9.
- Izumi JI, Hirano H, Yoshioka H, Takisawa J. Computed tomography findings of spontaneous perforation of pyometra. *Jpn J Radiol* 2010; 28:247-9.



## SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME (Code SMJ 201909B)

**Question 1.** Pertaining to the diagnosis of pyometra:

- (a) Clinical symptoms usually consist of suprapubic pain, fever and chills.
- (b) The clinical finding of purulent vaginal discharge is sensitive for pyometra.
- (c) Most patients will complain of purulent vaginal discharge.
- (d) Computed tomography (CT) is helpful in establishing the diagnosis and looking for complications of pyometra.

True	False
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**Question 2.** The following are known clinical complications of pyometra:

- (a) Ovarian torsion.
- (b) Peritonitis.
- (c) Septic shock.
- (d) Vaginal squamous cell carcinoma.

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**Question 3.** Regarding the radiological evaluation of pyometra:

- (a) Ultrasonography may demonstrate uterine intramural gas as dirty acoustic shadowing.
- (b) CT usually shows low-attenuation fluid in the endometrial cavity.
- (c) Air-fluid levels may be seen in the endometrial cavity on CT.
- (d) Fibroid necrosis may mimic the radiological findings of pyometra on CT.

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**Question 4.** Regarding uterine perforation from pyometra:

- (a) The patient will present with signs of peritonitis.
- (b) CT is useful to assess for free intraperitoneal gas.
- (c) The site of discontinuity of the uterine wall cannot be seen on CT.
- (d) Urgent surgical intervention is usually required.

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**Question 5.** Regarding the epidemiology of pyometra:

- (a) It is a common cause of intermenstrual vaginal discharge.
- (b) It is more common in postmenopausal women.
- (c) Cervical os obstruction due to carcinoma is an important cause to consider in middle-aged and elderly patients.
- (d) Spontaneous uterine perforation is a common complication of pyometra.

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### Doctor's particulars:

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(1) Answers will be published online in the SMJ November 2019 issue. (2) The MCR numbers of successful candidates will be posted online at the SMJ website by 8 November 2019. (3) Passing mark is 60%. No mark will be deducted for incorrect answers. (4) The SMJ editorial office will submit the list of successful candidates to the Singapore Medical Council. (5) One CME point is awarded for successful candidates. (6) SMC credits CME points according to the month of publication of the CME article (i.e. points awarded for a quiz published in the December 2017 issue will be credited for the month of December 2017, even if the deadline is in January 2018).

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