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## Case Report

# De novo vesico-acetabular fistula presenting with septic arthritis: Case report and literature review <sup>☆</sup>

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## ABSTRACT

Vesico-acetabular fistula formation is a rare condition typically associated with total hip arthroplasty. Clinical features can include pain of the hip and flank, haematuria, and dysuria. We report the case of a 67-year-old female with a past medical history of bilateral pelvic fractures and calcium hydroxyapatite deposition disease of the hip joint, who developed vesico-acetabular fistula in the absence of surgery. This was then complicated by septic arthritis. We highlight the ultrasound, computed tomography (CT) and magnetic resonance imaging (MRI) findings of the case and review the previous case reports describing the vesico-acetabular fistula.

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## Introduction

Fistulas refer to abnormal tracts connecting 2 or more epithelial-lined structures [1]. Fistulas of the bladder most commonly connect to the gastrointestinal tract (enterovesical fistulas) or the female urogenital system, such as the vesicovaginal fistula [2]. Fistulisation can be iatrogenic, caused by surgery or radiotherapy. Other aetiologies include

inflammatory conditions such as Crohn's disease, infection, trauma, and cancer [1–3].

The vesico-acetabular fistula is an abnormal tract between the bladder and the hip joint. It is rare and predominantly reported in the literature as a complication of total hip arthroplasty [2–4]. We present a unique case of vesico-acetabular fistula which arose without a history of surgery in the affected hip and presented as septic arthritis.

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging; HASTE, half-Fourier acquisition single shot turbo spin-echo; STIR, Short tau inversion recovery; T1FS, T1 fat-saturated.

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## Case

We present the case of a 67-year-old female who presented to our institution in May 2022 with a 10-day history of right hip pain. Mrs. F had a past medical history of giant cell arteritis, for which she had been on long-term corticosteroids since 2014 and osteoporosis, diagnosed with a bone mineral density scan revealing a T-score of -2.6 in 2015.

In September 2019, she presented following a week of bilateral hip pain and was found to have bilateral comminuted acetabular fractures on x-ray (Fig. 1). These were atraumatic, and magnetic resonance imaging (MRI) and computed tomography (CT) performed at the time did not reveal metastatic malignancy to suggest pathological fracture. On CT, there was faint punctate high-density material within the right hip joint consistent with hydroxyapatite crystal deposition disease (Fig. 2), which can cause rapidly destructive arthropathy [5]. Her case was discussed extensively with the orthopedics and trauma team, and she was deemed too high risk for a total hip arthroplasty, or for bilateral procedures, and was instead planned only for a left hip Girdlestone procedure; the left hip being more symptomatic at the time. Rehabilitation following this was successful, with her being able to mobilize with a walking frame.

She next presented in May 2022, 3 years later, to our Emergency Department with 10 days of sudden-onset right hip pain and inability to weight bear. Initial examination revealed marked tenderness on all active and passive hip movements and initial blood tests revealed an elevated C-reactive protein of 340 mg/dL.

The acute clinical features and elevated CRP raised suspicion of septic arthritis. An ultrasound of the right hip was conducted and showed thickening of the synovial lining of the hip with an unusual contour of the femoral neck, but no joint effusion (Fig. 3).

Computed tomography (CT) of the right hip was performed and revealed a fragmented acetabulum and proximal femur and gas around the right hip joint (Fig. 4a and 4b). Gas in the bladder lumen with perivesical stranding was also noted



**Fig. 1 – Pelvic x-ray performed in September 2019 revealed bilateral comminuted acetabular fractures.**

(Fig. 4c), suggesting cystitis. Hyperdense material was also seen in the right thigh (Fig. 4d).

MRI revealed a clear defect in the right bladder wall (Fig. 5a), with fluid signal communicating with the right hip. A moderately sized (66.7 × 38.8 mm) fluid collection was seen in the vicinity of the right hip (Fig. 5b) articulating with the fragmented acetabulum and communicating with fluid signal in the right anterior thigh (Fig. 5c). There was phlegmonous change and peripheral enhancement along the track and fluid collection, which continued to the anterior thigh compartment (Fig. 5d). The imaging findings were consistent with a vesico-acetabular fistula complicated by septic arthritis of the hip.

After orthopedic review, her hip collection was initially managed with aspiration and drain insertion. However, on drain removal, her hip began oozing pus, and she underwent a joint washout on the 2/6/23, where *Escherichia coli* and *Enterococcus faecalis* were cultured, and a second washout 5 days later which appeared clean.

The urology team were also involved in her management, and she underwent construction of an ileal conduit without cystectomy in June with a plan for a long-term urostomy.

She received a number of antibiotics throughout her admission in close consultation with the infectious diseases department, including vancomycin, ceftriaxone, ceftazidime, metronidazole, and piperacillin-tazobactam. After medical and surgical stabilization, she underwent a long inpatient rehabilitation process, and made significant recovery, including regaining the ability to mobilize with 4-wheel walker and being pain-free. She was discharged home in mid-August.

## Discussion

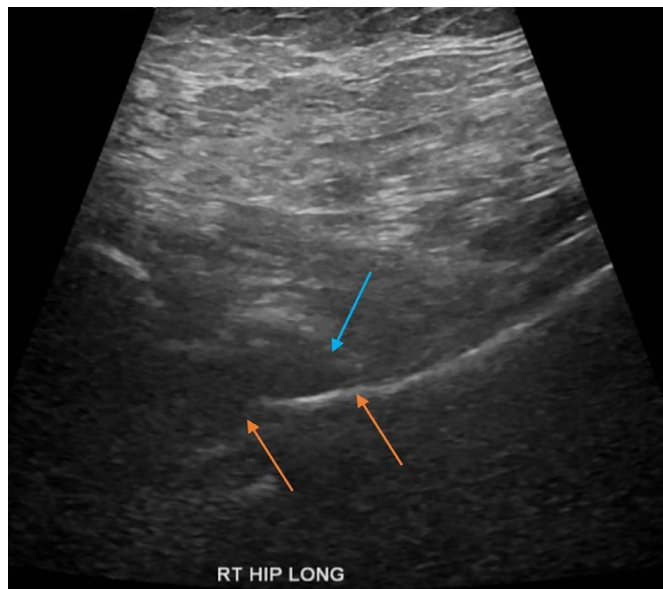
The vesico-acetabular fistula is recognized as a rare condition most often associated with a history of total hip arthroplasty. Our literature search only found 16 full-text case reports of vesico-acetabular fistula, the oldest dating back to 1976, as shown in Table 1 [1–4,6–17]. The vast majority of cases occurred in the context of prior hip arthroplasty, with other causes including hip fracture and repeated hip infections. To our knowledge, there is no prior published case of de novo vesico-acetabular fistula from calcium hydroxyapatite deposition disease and insufficiency fracture.

Postoperative vesico-acetabular fistulisation can be caused by mechanical injury during surgery, displaced cement producing an inflammatory reaction, or as a complication of chronic prosthetic infection [2]. This case report is used to illustrate the notion that suspicion of the condition should be maintained even without prior surgery on the affected hip. Other risk factors for fistula communication include calcium hydroxyapatite deposition disease, as in this case, and trauma.

Calcium hydroxyapatite deposition disease is common – evidence of the disease has been noted in up to 20% of adult shoulders [18]. The pathogenesis of intraarticular crystal deposition has not been fully elucidated, but metabolic alterations of calcium and phosphate, as well as local trauma, have been implicated [5]. In addition, there is a female predominance and risk factors include diabetes and thyroid disease.



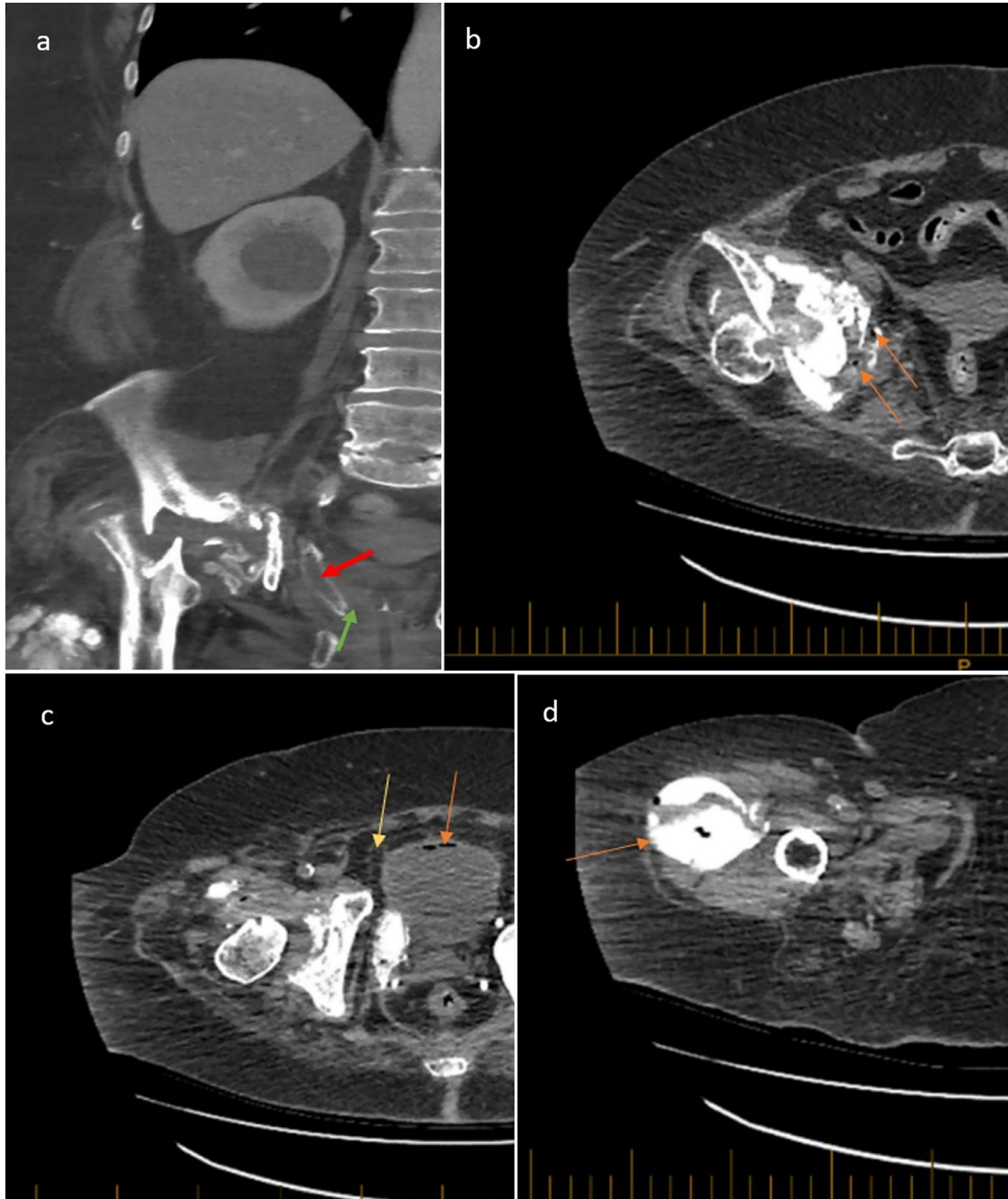
**Fig. 2 – Sagittal pelvic CT performed in September 2019 showed subchondral indentation of the femoral head (yellow arrow) and the faint punctate high-density material within the hip joint (red arrow). This is consistent with calcium hydroxyapatite crystal deposition.**



**Fig. 3 – Right hip ultrasound performed in 2022 revealed synovial thickening of the joint capsule (blue arrow). Note that the continuation to the normal rounded femoral head could not be readily identified. The orange arrows outline the anterior femoral neck, and the left side of the image is more cephalad, or at the hip joint.**

The clinical presentation is variable, but most cases of calcium hydroxyapatite deposition are asymptomatic. In its most severe form, the disease causes rapidly destructive arthropathy, which is most common in the glenohumeral joint, known as Milwaukee shoulder. However, similar severe arthropathy has also been described in the elbow, knee, and hip joints [5,18].

Radiologically, the disease is characterized by crystals which appear hyperdense on radiography and CT, hypointense on all MRI sequences, and hyperechoic on ultrasound [18]. Various management options have been described for symptomatic calcium hydroxyapatite deposition disease, including non-steroidal anti-inflammatory medication and physiotherapy in



**Fig. 4 – CT findings of Mrs F's presentation in 2022 are demonstrated.**

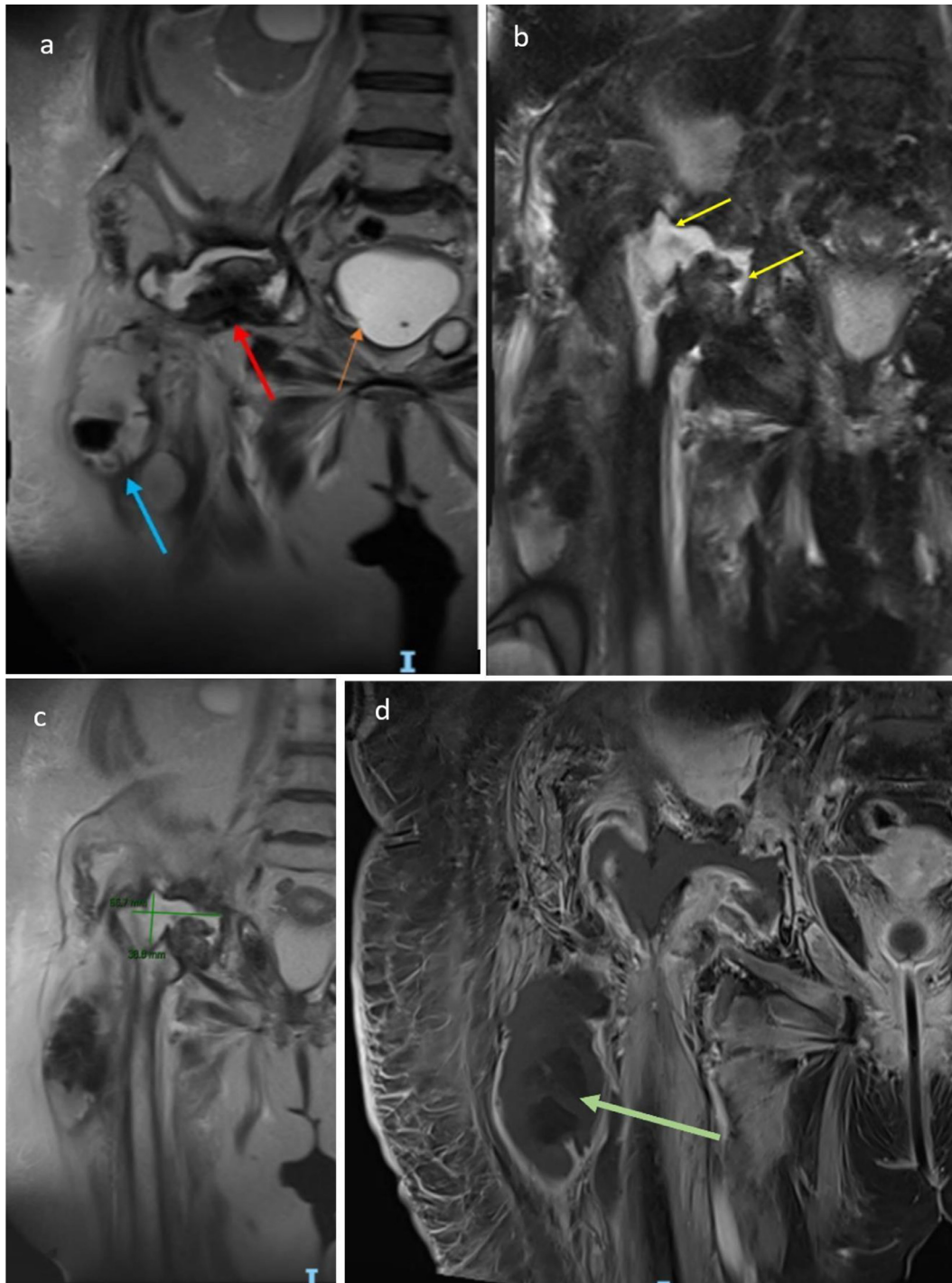
Coronal CT (a) revealed that the right hip was rapidly destroyed, with loss of the femoral head. Calcific densities within the hip capsule were caused by an erosive process, either from calcium hydroxyapatite deposition disease, or from the current presentation. The red arrow points at a linear ossific density, presumed to be post-traumatic heterotopic ossification or new bone formation as a result of prior fracture. This was in close vicinity to and extended into the bladder wall (green arrow).

(b) Axial CT revealed gas locules in the hip (orange arrows).

(c) Axial CT revealed perivesical stranding (yellow arrow) and gas in the bladder wall (orange arrow), suggestive of cystitis. The patient had not been catheterised at the time this study was performed.

(d) Axial CT revealed a collection of hyperdense material in the right thigh.





**Fig. 5 – MRI findings of Mrs. F's presentation in 2022 are shown. Sagittal T2 HASTE (a) showed a defect in the bladder (orange arrow) communicating with the fluid tract. The red arrow denotes the periacetabular collection and the blue arrow points to the inferior extent of the third pocket of collection, situated in the proximal anterior thigh with internal calcific material. Coronal STIR (b) and T2 HASTE (c) sequences showed the fluid collection in the vicinity of the right hip measuring 66.7mm by 38.8mm, which was continuous with the defect at the right lateral wall of the bladder.**

the first instance, and more invasive options such as percutaneous needle aspiration or arthroscopic removal of calcific deposits in more severe cases [18].

Clinical features of the vesico-acetabular fistula include hip or flank pain, haematuria, and dysuria [4]. It may present

as septic arthritis, as in this case [16]. Cutaneous fistulae may be noted on examination. In the event of introduced infections, investigations can show raised serum inflammatory markers and urinalysis with raised nitrites, leukocytes and/or blood. Imaging findings on CT and MRI are supportive. As

**Table 1 – Overview of available full-text case reports on vesico-acetabular fistula on literature search**

Reference	Year	Age (years)	Sex	Underlying cause	Management
de la Peña Zarzuelo [11]	2000	80	F	Hip arthroplasty	Prosthesis removal, bilateral ureterostomy
Gallmetzer [4]	1999	50	M	Hip arthroplasty, Hip infection	Fistula closure; reimplantation arthroplasty was planned but not performed due to the patient not attending follow-up
Gousse [10]	2001	84	F	Hip arthroplasty	Fistula excision, bladder repair
Hamano [12]	1996	85	F	Hip arthroplasty	Observation
Jones [7]	2010	70	F	Hip arthroplasty	Observation
Lamb [17]	2009	85	M	Hip arthroplasty	Observation
Morganstern [16]	1976	22	M	Gunshot wounds causing hip fracture and vesical perforation	Fistula excision
Roberts [15]	1987	19	F	Hip arthroplasty	Excision arthroplasty, catheter drainage
Russell [3]	2010	44	F	Hip arthroplasty, repeated hip infections	Bilateral ureteral stents, followed in 3 months by reimplantation arthroplasty.
Schneider [14]	1993	84	M	Hip arthroplasty	Catheter drainage
Tolkach [8]	2011	42	M	Hip fracture	Fistula excision, bladder repair, reimplantation arthroplasty
Tripp [13]	1995	32	F	Hip fracture, hip arthroplasty	Fistula excision, revision arthroplasty
Vopni [6]	2021	54	F	Hip arthroplasty	Cystectomy, fistula excision, reimplantation arthroplasty
Wadhwa [2]	2022	40s	M	Pelvic fracture and bladder injury, hip arthroplasty	Bladder repair, fistula excision
Wang [1]	2013	37	F	Repeated hip infections	Bladder repair, fistula excision
Wilhelm [9]	2007	70	F	Hip arthroplasty	Fistula excision, bladder repair, Girdlestone procedure

via PubMed. Keyword vesico-acetabular OR vesico-articular AND fistula.

shown in this case, findings of the condition on CT include fluid collection in association with the hip and evidence of destructive arthropathy of the hip.

Findings of complications of the fistula, such as cystitis and septic arthritis, should also be sought, e.g. gas in the bladder, bladder wall thickening, and perivesical stranding. In our case, given the gas-forming organisms, gas could be seen in the bladder and the hip joint. CT urography or cystography may be used to look for contrast extravasation from the bladder towards the hip [4].

Particular imaging findings on MRI for the vesico-acetabular fistula are tracks with fluid signal intensity (characterized by hyperintensity on T2-weighted fat-saturated sequences) communicating between the bladder and hip joint. Bladder wall defects are often more easily delineated on MRI. Typical MR findings for infection include hypointensity on T1 sequences, hyperintensity on T2-weighted sequences and contrast enhancement. Additional features of joint infection include lamellated synovial thickening, marrow oedema signal on both sides of the articular surface, joint effusion and synovial enhancement [19].

Management, as in this case, is typically multidisciplinary, with orthopedic and urological input. As shown in Table 1, the most common management approach is to excise the fistula

and repair the bladder. Omental flap interposition has been described as a surgical technique to repair the fistula [10]. In our case, cystectomy and ileal conduit was performed. In addition, input from the infectious diseases team was vital to optimize antibiotic management of associated cystitis and septic arthritis.

## Teaching points

- The vesico-acetabular fistula is a rare condition predominantly, but not exclusively, occurring as a complication of hip arthroplasty.
- It can present with hip or flank pain, dysuria or haematuria, and may be complicated by septic arthritis.
- The radiologist plays a key role in the diagnosis of the condition. Imaging features to look for include hip prostheses, evidence of hip degeneration or crystal deposition, and bladder wall defects. Typical imaging appearances include direct findings, e.g. fluid hyperintense signal communicating between the bladder and hip on MRI, and indirect findings of complications, such as perivesical stranding associated with cystitis. Superimposed infection should be actively sought.

- Management is multidisciplinary, with orthopedics and urology input for consideration of fistula repair, and infectious diseases team input for antibiotic optimization.

## Conclusion

We describe the first case of *de novo* vesico-acetabular fistula complicated by septic arthritis, in the context of osteoporosis and calcium hydroxyapatite deposition disease resulting in rapidly destructive arthropathy of the hip and acetabular fractures. The clinical features and imaging features of the condition are discussed, as well as an overview of the multidisciplinary approach to management.

## Patient consent

Written consent was obtained from the patient. No identifying features are disclosed in this case report.

## Data availability

No underlying data was collected or produced in this study.

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