



# Delayed presentation of urinoma mimicking spondylodiscitis secondary to ureteric injury following carrot stick fracture in ankylosing spondylitis

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## Abstract

**Introduction** Ureteric injuries are rarely associated with spinal trauma with an incidence of less than 1%. Missed injuries can lead to urinoma collection, urosepsis and even death.

**Materials and methods** A 75-year-old man presented 1 month following fall with high-grade fever and severe back pain mimicking spondylodiscitis clinically. Plain radiograph showed features of ankylosing spondylitis with a suspicious trans-discal injury at L3–L4. Hyper-intense fluid within L3/L4 disk space communicating to a large psoas collection measuring 13×6 cms mimicking spondylodiscitis with abscess formation was observed in magnetic resonance imaging (MRI). MRI with contrast enhancement demonstrated a leak through left ureter into the psoas muscle raising suspicion of a ureteric injury. Plain computerized tomography revealed a three-column fracture at L4, and a ureteric leak into the psoas collection with proximal hydronephrosis was seen after contrast administration, establishing the presence of a ureteric fistula resulting in urinoma.

**Results** Following initial symptomatic improvement after ureteric stenting, the patient succumbed to urosepsis at 3 months.

**Conclusion** We report for the first time a post-traumatic urinoma secondary to ureteric injury clinically mimicking spondylodiscitis. Clinicians need to be aware of the possibility of ureteric injury in hyperextension lumbar fractures occurring in ankylosing spondylitis and treat them early to avoid urological complications.

**Keywords** Urinoma · Ankylosing spondylitis · Carrot stick fracture · Urosepsis

## Introduction

Ureteric injuries account for less than 1% of urogenital trauma and are usually associated with pelvic fractures [1]. Their deep location in retroperitoneal space and the protection offered by thick psoas muscles make them unlikely to get injured in spinal trauma [2]. Missed ureteric injuries can lead to urinoma collection, and to our knowledge, this is the first report of post-traumatic urinoma due to hyperextension lumbar injury in a case of ankylosing spondylitis leading to chronic urosepsis and eventually death.

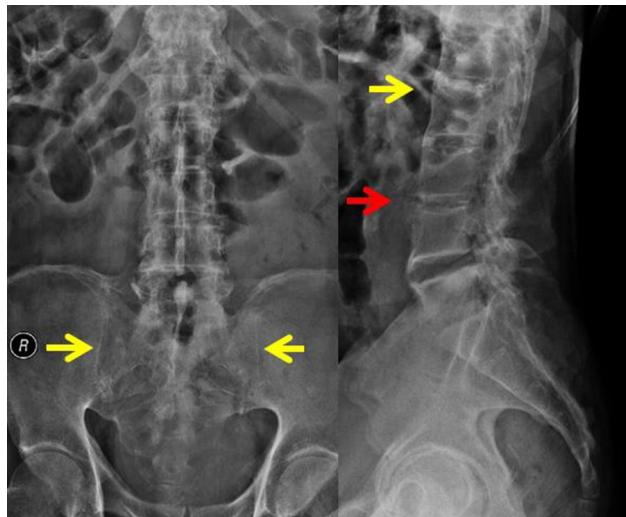
## Case report

A 75-year-old man presented to the emergency department with high-grade fever (102°F) and severe low back pain since 2 days. Previous history revealed an acute episode of low back pain following a trivial fall 1 month earlier. A local orthopedic surgeon had managed it conservatively with lumbosacral orthosis and pain medications, presuming the absence of abnormalities in plain radiography. The patient had improved symptomatically and was ambulant without support. On clinical examination, tenderness over lower lumbar spine with severe para-spinal spasm and high-grade fever was suggestive of spondylodiscitis. Neurological examination was normal. A review of the plain radiographic image (Fig. 1) taken at the time of initial fall revealed a completely ankylosed spine with the classical “bamboo spine appearance,” fused sacroiliac joints, osteoporosis and a suspicious trans-discal break at L3–L4 disk. However, the patient was not aware of his clinical condition

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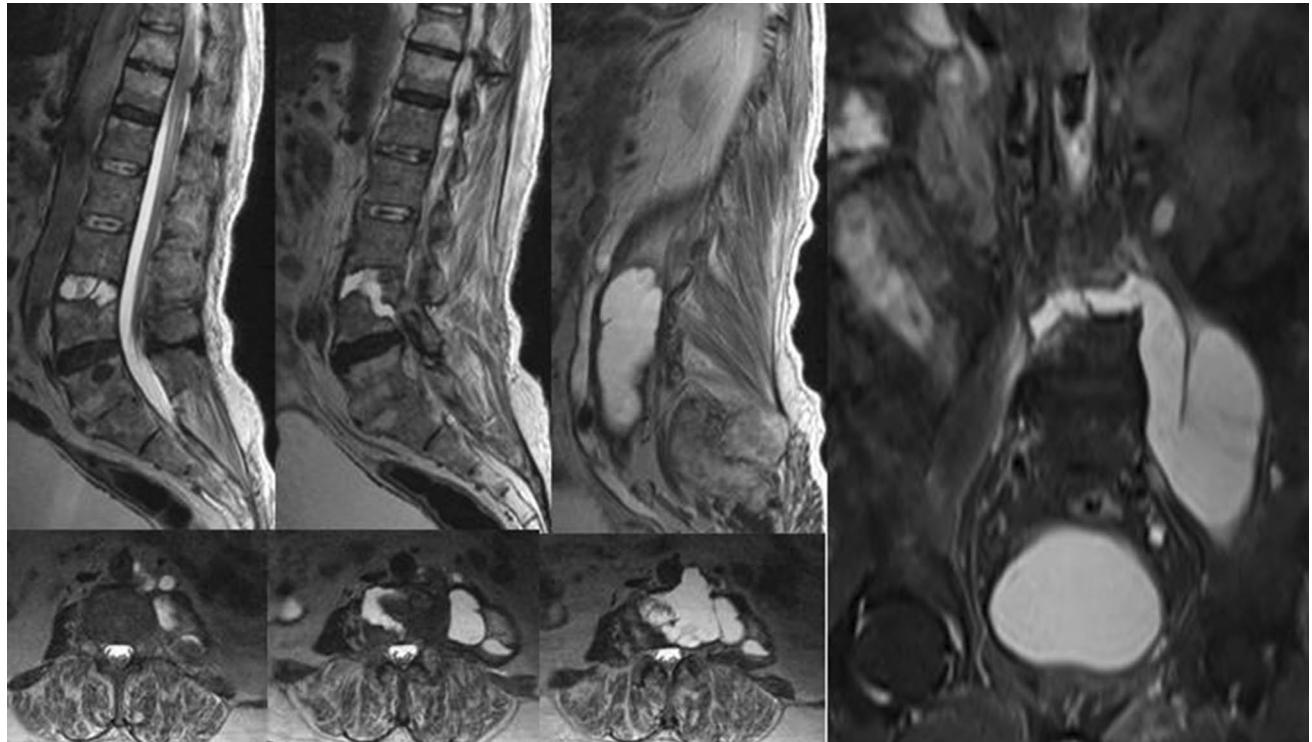
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**Fig. 1** Plain radiograph of lumbar spine with yellow arrows showing fused sacroiliac joints bilaterally and classical “bamboo spine appearance” and red arrow showing doubtful trans-discal break at L3–L4 disk space

of ankylosing spondylitis and was not on any chronic immunosuppressive therapies. With clinical suspicion of infective spondylodiscitis, magnetic resonance imaging (MRI) was performed which (Fig. 2) showed a carrot stick fracture at

L3/L4 disk, extending into the posterior L4 vertebral body and left L4 pedicle. Fluid noted within L3/L4 disk space mimicking spondylodiscitis was seen communicating to a large psoas collection measuring  $13 \times 6$  cms. Middle third of left ureter was medially displaced and showed adhesion to the psoas collection anteriorly. Computerized topography (CT) (Fig. 3) showed a classical three-column fracture disrupting the disk space anteriorly, vertebra in the middle column and facet joint complex posteriorly. On contrast administration, a leak of the contrast into the psoas collection suggested the presence of a ureteric fistula. There was moderate proximal hydronephrosis due to narrowing at the level of fistula/adhesion, and sagittal images demonstrated the impingement of the ureter between fracture fragments (Fig. 4). The radiological picture was diagnostic of a psoas urinoma communicating to the disk space secondary to ureteric injury following hyperextension injury of L3 vertebra. He was transferred to the urology department, where uretero-ureterostomy with stenting along with an omental flap around the ureteric injury was performed. Spine surgery was advised for the unstable fracture; however, it was refused by the patient and their relatives, when the due surgical risks were explained. In the postoperative period, after initial symptomatic improvement, he was discharged with antibiotics after 1 week of parenteral antibiotic therapy. Diagnosed with basal atelectasis at 1 month of follow-up at the

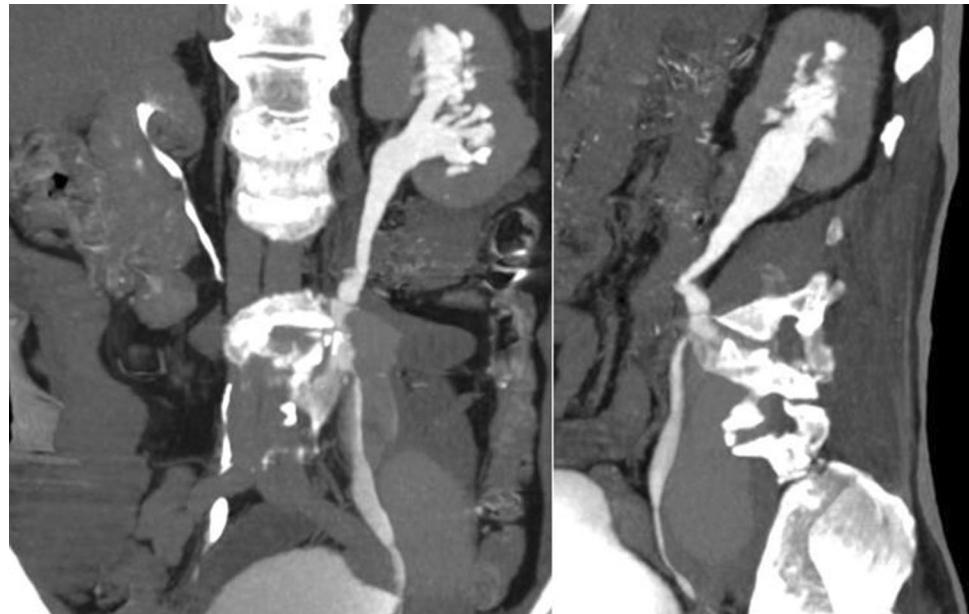


**Fig. 2** MRI sequences showing a carrot stick fracture at L3/L4 disc, extending into the posterior L4 vertebral body and left L4 pedicle with fluid within L3/L4 disk space communicating to left psoas collection of  $13 \times 6$  cm mimicking spondylodiscitis



**Fig. 3** CT showing classical unstable three-column fracture disrupting disk space anteriorly, vertebra in the middle column and facet joint complex posteriorly

**Fig. 4** CT pyelography showing proximal hydronephrosis due to narrowing at the level of fistula/adhesion, and sagittal images demonstrated the impingement of the ureter between fracture fragments on the left side establishing ureteric injury resulting in formation of ureteric fistula and urinoma



urology department, the patient was advised spine stabilization for avoiding additional complications associated with recumbency but having refused surgery, he was managed conservatively with chest physiotherapy and rehabilitation. This was followed by two visits to a local clinic for high-grade fever and respiratory distress in a span of 40 days, where he had refused a referral to tertiary center and was under supportive management. At 3 months following index surgery, he was taken back to the emergency department for high-grade fever, delirium, respiratory distress and reduced urinary output and could not be resuscitated. The probable cause of death was sepsis and repeated episodes of pneumonia following the first episode of infected urinoma. With the clinical symptomatology, possibilities of other causes of death were highly unlikely. An autopsy could have provided confirmation on the same, which unfortunately was refused by the patient's blood relatives. The authors declare that

currently, there is no compulsory autopsy protocol for natural or unsuspecting medical deaths in their country.

## Discussion

Ureteric injuries are rare as they are located deep in the retroperitoneum and are well protected by the pelvis structures, psoas muscles and vertebrae. They can be missed easily and can have a high mortality rate of up to 17% [3]. Urinary leaks in ureteric injuries can lead to a collection of extravasated urine, forming a retroperitoneal mass surrounded by a thick fibrous capsule known as urinoma [4]. Urinoma has been reported as a rare complication following iatrogenic injury to ureters in retroperitoneal procedures and also following posterior spinal procedures such as lumbar spinal fusion and discectomy [5, 6].

Post-traumatic urinoma following hyperextension injury in ankylosing spondylitis has not been reported.

Diagnosis of a urinoma is usually arrived through CT scans where the fluid collection opacifies following administration of contrast [7]. The ureter lies adjacent to aorta on the left and to inferior vena cava on the right side and its proximity to the L4–L5 disk space, and this anatomical relationship needs emphasis to understand the possibility of ureteric entrapment and injury in a case of ankylosing spondylitis due to hyperextension mechanism. This can be easily missed as in our case, where both the fracture and ureteric injury were not diagnosed initially leading to the accumulation of urinoma, chronic urosepsis and death.

Patients with rigid spine such as ankylosing spondylitis (AS) and diffuse idiopathic skeletal hyperostosis (DISH) are susceptible to unstable three-column fractures following trivial injuries [8]. However, up to 60% of these fractures can be missed in plain radiography [9]. Further, elastic tissue dysfunction of the nearby visceral structures in these conditions predisposes them to adhesions and injuries following fracture displacements [10]. Soft tissue injuries such as tracheal rupture, aortic injury and diaphragmatic hernias have been reported following thoracolumbar fractures in AS necessitating the use of advanced imaging such as CT and/or MRI to detect fractures and efficiently diagnose associated injuries [11].

Ureteral injuries have a subtle initial clinical presentation and can present later with complications such as urinoma formation, hydronephrosis, renal failure, urosepsis and even death [12]. Oh et al. reported a case of ureteric impingement in the fracture gap of a hyperextension lumbar fracture, which was treated by ureteroureterostomy and stenting [13]. Pillai et al. managed a rare case of iatrogenic ureteric injury following posterior lumbar spinal fusion by stenting and flap cover [14]. Urinomas can be classified according to their anatomical location and etiology. Among the known etiologies such as congenital, iatrogenic, spontaneous rupture of ureteral wall and obstructive uropathy, traumatic urinomas are very uncommon. Eltorai et al. reported two cases of giant urinomas in spinal cord injury patients due to erosion of ureteral wall secondary to nephrolithiasis and obstructive uropathy eventually leading to urosepsis and death [15]. While small urinomas respond to standard surgical measures such as stenting and end-to-end repair of ureters with flap covers, infected urinomas lead to sepsis, renal failure and early systemic failure due to multi-organ dysfunction and can also be fatal [14, 15]. More recently, Kawasaki et al. reported acute sepsis in a case of diffuse idiopathic skeletal hyperostosis following a fall due to a similar ureteric injury, which required an extended hospital stay, and the spine was stabilized at 55 days. Unlike this case, our patient presented with delayed onset urinoma and chronic urosepsis [16].

Appropriate and early diagnosis will provide the clinician a possibility for early drainage and ureteral repair. Due to vague symptoms and lack of the literature on this clinical entity, urinomas are generally missed and can get infected, especially in elderly patients as in our case of ankylosing spondylitis. This led to chronic urosepsis and pneumonia, and finally, the patient succumbed to the illness. This could have been avoided, had the patient been diagnosed earlier. There is a remote possibility of the patient having deteriorated due to secondary insufficiency of ureter following repair due to the unattended fracture. However, we believe that ureteric injury in ankylosing spondylitis occurs at the moment of hyperextension when soft tissues such as ureters get impinged between the sharp fracture fragments and are unlikely to re-occur following a repair secured with omental flap as in this case where the patient was not ambulant most of the time following index procedure. Though the ideal treatment in such a situation would be to fix the spine along with ureteric repair, whether the deferred spine surgery at the time of ureteric repair would have altered the fatal outcome of the patient is debatable.

## Conclusion

Spinal fractures and associated visceral injuries in ankylosing spondylitis can be missed in plain radiographs. Ureteric injury associated with a spine fracture is rare and if undiagnosed can lead to urosepsis and even death. A high index of suspicion is essential to avoid missing of associated visceral injuries in ankylosing spondylitis. Advanced imaging such as CT and/or MRI is essential to diagnose urinoma and rule out other associated visceral injuries.

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## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

## References

- Engelsgjerd JS, LaGrange CA (2019) Ureteral injury. In: StatPearls [Internet]. StatPearls Publishing, Treasure Island. [cited 2019 Nov 2]. <http://www.ncbi.nlm.nih.gov/books/NBK507817/>
- Titton RL, Gervais DA, Hahn PF, Harisinghani MG, Arellano RS, Mueller PR (2003) Urine leaks and urinomas: diagnosis and imaging-guided intervention. Radio Gr 23(5):1133–1147

3. Pereira BM, Ogilvie MP, Gomez-Rodriguez JC, Ryan ML, Peña D, Marttos AC et al (2010) A review of ureteral injuries after external trauma. *Scand J Trauma Resusc Emerg Med* 3(18):6
4. Goldwasser J, Wahdat R, Espinosa J, Lucerna A (2018) Urinoma: prompt diagnosis and treatment can prevent abscess formation, hydronephrosis, and a progressive loss of renal function [internet]. case reports in emergency medicine. [cited 2019 Nov 2]. <https://www.hindawi.com/journals/crjem/2018/5456738/>
5. Hajiha M, Sowerby RJ, Pace KT (2017) A rare ureteral injury following posterior approach lumbar discectomy. *J Endourol Case Rep* 3(1):158–161
6. Flynn DE, Caroline DF, Gembala RB, Ball DS, Radecki PD, Cohen GS (1993) Urinoma secondary to surgical spinal fusion: radiologic diagnosis and treatment. *Abdom Imaging* 18(3):292–294
7. Gayer G, Caspi I, Garniek A, Hertz M, Apté S (2002) Perirectal urinoma from ureteral injury incurred during spinal surgery mimicking rectal perforation on computed tomography scan. *Spine* 27(20):E451–E453
8. Chaudhary SB, Hullinger H, Vives MJ (2011) Management of acute spinal fractures in ankylosing spondylitis. *ISRN Rheumatol* [Internet]. [cited 2019 May 29]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3263739/>
9. Anwar F, Al-Khayer A, Joseph G, Fraser MH, Jigajinni MV, Allan DB (2011) Delayed presentation and diagnosis of cervical spine injuries in long-standing ankylosing spondylitis. *Eur Spine J* 20(3):403–407
10. Westerveld LA, Verlaan JJ, Oner FC (2009) Spinal fractures in patients with ankylosing spinal disorders: a systematic review of the literature on treatment, neurological status and complications. *Eur Spine J* 18(2):145–156
11. Kelley's Textbook of Rheumatology, 9th edn [Internet]. [cited 2019 May 29]. <https://www.elsevier.com/books/kelleys-textbook-of-rheumatology/9781437717389>
12. Slobogean GP, Tredwell SJ, Masterson JST (2007) Ureteropelvic junction disruption and distal ureter injury associated with a Chance fracture following a traffic accident: a case report. *J Orthop Surg Hong Kong* 15(2):248–250
13. Oh I-S, Chang D-G, Kim Y-H, Ha K-Y (2013) Pure hyperextension injury of the lower lumbar spine with an ureteral impingement. *Eur Spine J Off Publ Eur Spine Soc Eur Spinal Deform Soc Eur Sect Cerv Spine Res Soc* 22(Suppl 3):S353–S356
14. Pillai SB, Hegde P, Venkatesh G, Iyyan B (2013) Ureteral injury after posterior lumbar discectomy with interbody screw fixation. *BMJ Case Rep* [Internet]. [cited 2019 Nov 3]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3822177/>
15. Eltorai IM, Hovey RM, Ronningen LD, Montroy RE, Gutierrez PA, Aesquivel L (2003) Giant urinoma in spinal cord injury: report of two cases. *J Spinal Cord Med* 26(4):404–408
16. Kawasaki S, Shigematsu H, Matsumori H, Maegawa N, Tanaka Y (2018) Ureteral injury as a possible complication of vertebral fracture in a patient with ankylosing spinal hyperostosis. *J Orthopaedic Sci* 23(1):194–196

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