Tophaceous gout causing lumbar stenosis
A case report
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Abstract
Rationale: Gout in the spine is very rare. The clinical symptoms of the spinal gout are various and lack of specificity. The authors report a case of spinal gout causing lumbar stenosis. We never find such wide-invasive spinal gouty lesion in the published studies.

Patient concerns: A 68-year-old male had low back pain radiating to bilateral lower limbs, accompanying with intermittent claudication that lasted for 3 months and aggravated 5 days ago.

Diagnoses: Spinal gout, lumbar stenosis.

Interventions: The patient underwent L2-L4 laminectomy, L2/3 L3/4 and L4/5 discectomy and transforminal lumbar interbody fusion with pedicle screw fixation.

Outcomes: Dual-energy computed tomography detected extensive tophaceous deposits in L1/2 L2/3 L3/4 and L4/5 lumbar discs as well as the posterior column, especially L2-L3 and L4-L5 facet joints. During the surgery, we found a mass of chalky white material at the posterior column of L3 to L5 vertebral bodies, which also involved the intervertebral discs. Pathological examination confirmed the diagnosis of spinal gout.

Lessons: Although spinal gout is thought to be rare, the diagnosis should be considered if the patient had severe back pain and a history of gout. Dual-energy computed tomography is highly recommended for these patients.

Abbreviations: DECT = dual-energy computed tomography, MRI = magnetic resonance imaging.

Keywords: back pain, dual-energy computed tomography, lumbar stenosis, spinal gout

1. Introduction
Gout, which is characterized by the deposition of monosodium urate crystals, usually involves the peripheral joints like interphalangeal joints, ankles, and wrists. Gout in the spine is very rare, with the first case of spinal gout being reported by Kersley et al[11] in 1950. Several cases of spinal gout have been reported since then.[2–8] The patients were between 44 and 74 years of age in the majority of reported cases.[9] The clinical symptoms of the spinal gout are various and lack of specificity, ranging from back pain to various neurological deficit. Therefore, there are some difficulties in diagnosis of spinal gout. In the review by Massato, 91.2% of the patients were diagnosed by pathological examination. When examination of a biopsy specimen was not available in some patients (6.2%), a diagnosis was made only based on clinical or arthrocentesis of others joints. In 2 cases,[10,11] diagnosis was made by autopsy for other causes of death. Clear diagnosis was often delayed, especially to the asymptomatic patients. Recently, a new imaging technique called dual-energy computed tomography (DECT) was developed. As a noninvasive examination, it had advantages in early diagnosis of spinal gout. In this paper, we reported a case of spinal gout, which was diagnosed by a combination of symptoms, laboratory values, magnetic resonance imaging (MRI), DECT, and pathological examination finally.

1.1. Ethical statement
Informed consent was obtained.

2. Case report
A 68-year-old male had low back pain radiating to bilateral lower limbs, accompanying with intermittent claudication that lasted for 3 months and aggravated 5 days ago. Without drug analgesia, he could not complete lumbar MRI because of severe low back pain. He had a background history of gout for 10 years and hypertension for 16 years. Physical examination showed hypoesthesia on his right big toe and weakness of right knee extension (muscle strength, grade 4). The knee jerk reflex was absent on the right knee (−) and decreased on the left knee (+). The ankle jerk reflex was decreased on both sides (+). Pathologic reflex was not detected. There were nodular whitish deposits in several finger and foot joints.

Results of laboratory data were shown below: white blood cell count 6230/mm³ (normal range 3500–9500/mm³); neutrophils 73% (normal range 40%–75%); erythrocyte sedimentation rate 21 mm/h (normal range lower than 20 mm/h); C-reactive protein 1.59 mg/L (normal range lower than 8 mg/L), and the serum uric acid level was 544.9 µmol/L (normal range 89.0–357.0 µmol/L). Plain radiographs of the lumbar spine demonstrated degenerative lumbar
scoliosis with hyperostosis, narrowing of intervertebral disc spaces, and endplate sclerosis (L2/3 and L3/4) (Fig. 1). Axial T2-weighted MRI displayed an isointense mass lesion on the right L4-L5 facet joint with intervertebral foraminal narrowing and nerve root invasion (Fig. 2A). CT revealed a lesion on the right L4-L5 facet joint, which eroded the upper segment of the right L5 pedicle, leading to lumbar stenosis (Fig. 2B). DECT confirmed uric acid deposition (in green) on the right L4-L5 facet joint and L4/5 disc (Fig. 2C). Sagittal DECT and 3-dimensional DECT reconstruction further detected extensive tophaceous deposits in L1/2, L2/3, L3/4, and L4/5 lumbar discs, and also the posterior column, especially L2-L3 and L4-L5 facet joints (Fig. 3).

The patient underwent L2-L4 laminectomy, L2/3, L3/4, and L4/5 discectomy, and transforaminal lumbar interbody fusion with pedicle screw fixation. During the surgery, we found a mass of chalky white material at the posterior column of L3 to L5 vertebral bodies, which also involved the intervertebral discs. The right L2-L3 and L4-L5 facet joints (Fig. 4A), together with the upper segment of the right L5 pedicle, were eroded by the lesion of chalky white material. In addition, the right L5 nerve root was surrounded by the chalky white material. Pathological examination of the specimen from the right L4-L5 facet joint revealed the typical picture of a gouty tophus: amorphous material with a multinucleated giant cell reaction (Fig. 4B). According to symptoms, laboratory values, DECT results, and pathological examination, a diagnosis of spinal gout was established.

3. Discussion
It has been reported that the incidence of gout in American adults was about 4%. Spinal gout was thought to be rare. However, its incidence may be much higher since it can hardly be diagnosed without biopsy. Toprover et al reported that 75.4% spinal gout patients had a history of gout or hyperuricemia.
Therefore, we believe that more attention should be paid to the patients of low back pain who had a long history of gout. The differential diagnosis of spinal gout should be carried out. However, a confirmed diagnosis of spinal gout can hardly be made without histological examination. The abnormalities presented in the plain x-ray were not specific for gout. Gout on MRI was sometimes confused with other types of lesion, such as infections or neoplasms. Barrett et al reported a case of a patient with spinal gout who was initially diagnosed with and treated for an epidural infection. The mass lesion was enhanced on T2 images after intravenous administration of gadolinium. Another case report showed tophaceous gout of the lumbar spine mimicked a spinal meningioma. The mass lesion was isointense on T1 images, whereas it was hypointense on T2 images. After gadolinium administration, the mass demonstrated heterogeneous peripheral enhancement. In our study, an isointense mass lesion on the right L4-L5 facet joint was founded on T2 images. This proved that gout did not present a characteristic image on MRI. Micheal et al reported that the detection rate of gout by MRI was only 21%. We suggested DECT was recommended for these patients as a preoperative noninvasive examination if conditions permit. In this case, the imaging of DECT prompted the location of tophaceous deposits, which was confirmed during the surgery. This provided great value in formulating operation plan before surgery.

4. Conclusions
This is a typical spinal gout case. We never find such wide-invasive spinal gouty lesion in the published studies. Although spinal gout is thought to be rare, the diagnosis should be considered if the patient had severe back pain and a history of gout. DECT is highly recommended for these patients.

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