Typical synovial cyst arising from degenerative facet joint usually appears isointense to slightly hyperintense to cerebrospinal fluid on T1-weighted and hyperintense on T2-weighted conventional magnetic resonance (MR) imaging. We present a case of intraspinal synovial cyst with thecal sac compression that manifesting low signal intensity on both T1-weighted and T2-weighted MR imaging due to the gas-containing nature. It may be difficult to be differentiated from crystal deposition or giant osteophyte formation if no other modality such as computed tomography is available for correlation. The entity of synovial cyst with vacuum should be included in the differential diagnoses when evaluating a patient with posterolateral epidural lesion that is hypointense at all MR pulse sequences.

Key words: Spine, facet joints; Synovial membrane, cysts

Synovial cysts of the lumbar facet joints have been increasingly reported in recent years since the magnetic resonance technique was available [1-4]. The synovial cysts are usually associated with osteoarthritis of the facet joint, or post-traumatic changes, either in the presence or absence of spondylolisthesis. Surgical resection is usually necessary if patients suffer from radiculopathy or neurologic symptoms. Synovial cysts with vacuum have been mentioned in the literature [9] but only few reports regarding to its imaging features were available. Here we present a case of synovial cyst with vacuum of the facet joint, which may be challenging to the diagnosis if only conventional magnetic resonance (MR) imaging was performed.

CASE REPORT

A 72-year-old male visited our orthopedic department because of chronic low back pain with radiation to the lower legs and recent onset of bilateral lower legs weakness. Physical examination was not unusual except mildly decreased muscle power of the left lower leg. The patient was otherwise healthy and without history of systemic disease, alcoholism, or malignancy. The family history was also noncontributory. The routine blood tests were within normal ranges.

The radiographs of lumbar spine disclosed mild rotatory scoliosis and degenerative change of lumbar spine with hypertrophic change of the facet joint. The MR imaging was performed (1.5-T system; Signa; General Electric Medical Systems, Milwaukee, WI) and revealed an intraspinal lesion adjacent to the left L4-L5 facet joint with narrowing of the lateral recess and compression of the thecal sac. The lesion was hypointense on axial spin echo (SE) T1-weighted (repetition time/echo time = 666/18), axial fat-suppressed fast spin echo (FSE) T2-weighted (4000/80), and sagittal T2-weighted (4137/80) sequences (Fig. 1). Crystal deposition of ligamentum flavum and facet capsule, or giant osteophyte from facet joint were considered initially based on its location and signal char-
acteristics. Due to the non-conclusive findings based on MR images, non-contrast computed tomography (CT) scan (Somatom HQ; Siemens, Erlangen, Germany) was then undertaken. It disclosed the gas-containing nature of the lesion (Fig. 2) and was straightforward to the final diagnosis of intraspinal juxta-articular synovial cyst with vacuum. The wall of the cyst showed high attenuation on CT study, suggesting possibility of calcification of the cyst wall.

The patient was under conservative medical treatment with gradually subsided symptoms. The patient kept followed-up at the out-patient department and was doing well for years.

**DISCUSSION**

The actual etiology of intraspinal synovial cysts is still not well-understood, but has been considered to associate with the degenerative osteoarthritis of the facet joints [2,6] and the spondylolisthesis [4,6]. It is

**Figure 1.** Axial SE T1-weighted (TR/TE 666/18) image **a,** axial fat-suppressed FSE T2-weighted (4000/80) image **b,** at the level of L4-5 and the sagittal T2-weighted (4137/80) image **c,** showed a hypointense intraspinal juxta-articular lesion (arrow), closely attached to the left facet joint, with compression of the lateral recess and the thecal sac.

**Figure 2.** Axial CT image at the same location as figure 1a and 1b disclosed the gas-containing nature of the synovial cyst (arrow) of left facet joint. A calcified rim was also noted.
generally accepted that the synovial cysts probably originate from synovium herniating through a weakened facet joint capsule. Other pathogenesis have also been proposed, including myxoid degeneration of periarticular fibrous tissue, increased secretion by fibroblasts following trauma, growth of developmental synovial rests, and proliferation of pluripotential mesenchymal cells [7, 8].

On the MR images, a synovial cyst typically presents as an intraspinal extradural well-circumscribed cystic mass arising from the adjacent facet joint. It usually appear isointense to slightly hyperintense to cerebrospinal fluid on short TR/TE images and hyperintense on long TR/TE sequences, due to the high content of the proteinacious fluid. A thickened hypointense rim on long TR/TE images has been observed in some of the lesions, probably reflects fine calcification or hemorrhage in the margins of the cysts [2, 8].

Gas-filled synovial cysts have been reported and be postulated the possibility of an adjacent diseased facet joint with a vacuum cleft, which consequently dissected into the cyst [9]. The “vacuum” phenomenon was first reported in 1937 by Magnusson who described as accumulation of gas, principally nitrogen, in the intervertebral disc of the spine [11]. Knutsson theorized that the pathophysiology of a vacuum disc was related to advanced arthrosis of the intervertebral disc. The vacuum phenomenon of the facet joint may also be related to advanced osteoarthrosis. Lumbar facet joint degeneration had been divided into five stages of degeneration process: synovitis, joint capsule laxity, articular cartilage thinning, subarticular bone change, and hyperostosis. Vacuum phenomenon with gas formation may occur secondary to the laxity of joint capsule [10], and may be extruded into the adjacent synovial cyst if it is present. It explains the atypical MR appearance of gas-filled synovial cyst.

The differential diagnosis of intraspinal extradural lesions manifesting low signal characteristics on both T1-weighted and T2-weighted MR images include protruded osteophyte, gas-forming infection of the facet joint, crystal deposition of the ligamentum flavum, and, less likely, posteriorly sequestered disk fragment. The presence of swollen soft tissue edema and gadolinium-enhanced MRI may be helpful to distinguish gas-forming infection from the gas-filled synovial cyst. The locations of the sequestered disk fragments are usually ventral to the ligamentum flavum, while the synovial cysts are often at dorsal aspect of ligamentum flavum or inseparable from it [1]. Without other image modality such as CT, gas-filled synovial cyst may be indistinguishable from osteophyte or crystal deposition based on conventional MRI.

Treatments of symptomatic synovial cysts usually consist of surgical resection, percutaneous aspiration or steroid injection, or immobilization using a brace [8]. Surgery is usually treatment of choice for such lesions due to its efficiency. However, spontaneous remission of the solitary intraspinal synovial cyst of the lumbar spine has also been reported [8]. Familiarity with the MR appearance of this unusual gas-containing synovial cyst can avoid the possibility of misinterpretation as intraspinal crystal deposition or giant osteophyte formation.

In this report, we present a case of synovial cyst with vacuum and calcified rim of the lumbar facet joint, manifesting low signal intensity on both T1-weighted (666/18) and T2-weighted (4000/80) MR images. It may be misinterpreted as calcified nature such as crystal deposition or giant osteophyte if only MR images was used. The synovial cyst with vacuum of the facet joint should be included in the list of differential diagnoses when evaluating hypointense intraspinal extradural lesion adjacent to the facet joint on both T1-weighted and T2 weighted MR images.

**REFERENCES**


脊柱內含氣性滑膜囊腫：病例報告

周美君1  葉力仁12  陳坤煌12  潘慈本12

高雄榮民總醫院 放射線部1
國立陽明大學 醫學院2

退化性脊椎間關節炎常合併發生脊柱內滑膜囊腫，其在傳統磁振造影典型表現為：T1加權影像時的訊號強度相等或略高於脊髓液，T2加權影像時的訊號強度亦屬偏高。本篇報告一例脊柱內滑膜囊腫，它在磁振造影T1及T2加權影像的訊號強度皆低於脊髓液，造成原因為其囊腫內容物主要為氣體，這樣的影像學表現在沒有其他影像學檢查（例如電腦斷層攝影）輔助下容易被誤認為退化性骨質或是其他代謝異常造成之晶體沈澱。瞭解滑膜囊腫有內含氣體之可能性，有助於分析及鑑別磁振造影下為低訊號強度之脊柱內病灶。

關鍵詞：脊椎間關節，滑膜囊腫