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Case Report

Intraosseous pneumatocyst of the cervical vertebra

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ARTICLE INFO

Article history:

Received 29 May 2013

Accepted 1 October 2013

Available online 20 November 2013

Keywords:

Computerized tomography

Intraosseous pneumatocyst

Magnetic resonance imaging

Introduction

Intraosseous pneumatocyst is a rare, asymptomatic, benign, air-containing entity that is usually discovered incidentally on imaging. These lesions are most often seen in the ilium and sacrum in the vicinity of the sacro-iliac joint. Despite its benign nature, awareness of this entity and its imaging characteristics is important to distinguish it from other ominous focal osseous lesions. This article presents an unusual case of cervical vertebral intraosseous pneumatocyst and discusses the likely pathogenesis and natural history, and the imaging characteristics of this unusual entity.

Case report

A 31-year-old male patient presented with chronic intermittent nuchal pain of about one year duration. The pain was insidious in onset and mild to moderate in intensity and was brought on by prolonged desk-work. There was no history suggestive of radicular pain or upper limb muscle weakness. There was no history of any comorbid condition, medication or spinal trauma (accidental or surgical). Examination of the patient revealed normal vital parameters. Paraspinal muscle spasm was noted; however, there was no point tenderness or swelling. Haematological and other relevant laboratory investigations were normal. Radiograph of the cervical spine revealed osteophytes at multiple vertebrae with reduced intervertebral disc height at C4-5, C5-6 and C6-7 levels. A subtle rounded transradiant area was noted in the anterior part of C5 vertebral body (Fig. 1); the vertebral endplates were normal. Subsequently, magnetic resonance imaging (MRI) of the spine was performed which revealed disc degenerative changes at multiple levels without any canal compromise or nerve root compression. A well-circumscribed rounded lesion of abnormal signal intensity (markedly hypointense on both T1- and T2-weighted images), measuring 8.0 mm × 9.0 mm, was noted in the anterior part of the body of C5 vertebra (Fig. 2). The adjoining marrow signal intensity was normal. No evidence of discitis was noted. The vertebral endplates were

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<http://dx.doi.org/10.1016/j.mjafi.2013.10.003>

0377-1237/© 2013 Published by Elsevier B.V. on behalf of Director General, Armed Forces Medical Services.

Fig. 1 – Radiograph of the cervical spine reveals an ovoid transradiant lesion in the anterior part of the body of C5 vertebra (arrow). Degenerative changes are also noted in the spine.

preserved and the pre/paravertebral soft tissues were normal. Corroborative computerized tomography (CT) revealed a sharply delineated lesion with an attenuation of (–) 1022 Hounsfield Units (HU) consistent with gas (Fig. 3). On the basis of these findings, a diagnosis of cervical intraosseous pneumatocyst was made.

Discussion

Osseous pneumatization, a common avian feature is normally present only in the craniofacial bones in human beings. Intraosseous air at other locations is infrequently noted in conditions like osteomyelitis, irradiated neoplasms, intraosseous ganglia, osteonecrosis, methyl methacrylate prosthesis, and postoperative and post-traumatic states.¹

Another intraosseous air-containing entity of uncertain aetiology is a pneumatocyst, first described by Ramirez et al in 1984.² This benign cyst-like lesion consists predominantly of nitrogen gas and is most frequently encountered in the vicinity of the sacro-iliac joint.³ Only a few intraosseous pneumatocysts have been reported in the vertebrae, humeral head, clavicle, cervical rib, scapula, acetabulum and pubis.⁴ Most of these lesions are incidental discoveries in patients being evaluated for unrelated ailments. Though initially considered a very rare entity, it may not be very uncommon especially in the sacro-iliac region.^{4,5} Due to the limited literature available

on the subject and lack of awareness of this entity, it often presents a diagnostic dilemma.

Less than 30 cases of cervical pneumatocyst have been reported till 2009,⁶ mostly in the lower cervical vertebrae. Cervical vertebral pneumatocysts may occur in the vertebral body, the spinous process or the lateral mass.⁴ The posterolateral corner of the vertebral body is the most preferred site.² They are usually small and subcentimetric in size; however, larger lesions are known.⁷ Multiple vertebral pneumatocysts have also been reported.^{8,9} They have been described with and without communication with the adjacent discs and joints and the spinal canal.^{3,4,7}

It has been proposed that intraosseous pneumatocysts either develop spontaneously or from vacuum degeneration of pre-existing intraosseous ganglia or synovial cysts. The extension of gas from degenerating cervical discs through the adjoining endplates or other joints is also likely.³

The natural course of cervical pneumatocysts is varied and unclear. While most pneumatocysts retain their size and appearance over years on imaging, gradual enlargement has also been reported.^{8,9} Some have been reported to progress spontaneously to fluid-filled cysts and subsequent replacement by granulation tissue.³ In others, the contents have progressed from fluid and gas to only gas.⁹ It has been speculated that gas and fluid accumulation occurs in the cyst due to a significant pressure gradient vis-à-vis the adjoining bone marrow. Kitagawa et al⁸ proposed that pneumatocysts in younger patients are smaller and are likely to be spontaneous in origin, whereas in older patients they are larger and associated with degenerative disc disease.

On plain radiographs, intraosseous pneumatocysts appear as juxta-articular transradiant lesions with a thin sclerotic rim. On MRI, due to absence of protons within the lesion they are markedly hypointense on both T1- and T2-weighted images. Lesions containing fluid or granulation tissue appear hyperintense on T2-weighted images and hypointense on T1-weighted images. Contrast-enhancement has been described in the lesions replaced by fluid/granulation tissue.³ In such cases, follow-up scans or comparison with previous imaging is essential. CT is the confirmatory imaging modality as it demonstrates intralesional gas.

Conclusion

Intraosseous pneumatocyst is a rare, asymptomatic, under-reported, benign, air-containing entity. It is usually discovered incidentally on imaging. Vertebral pneumatocysts though extremely uncommon are noted in the cervical spine, often with co-existing degenerative disc disease. They may appear as ominous lytic metastases on plain radiographs or blastic metastases on MRI, especially in known patients of cancer. By demonstrating intralesional gas, CT is confirmatory for this entity.

Conflicts of interest

All authors have none to declare.

Fig. 2 – T2- (a) and T1-weighted (b) sagittal MRI images of the cervical spine reveal a rounded markedly hypointense lesion in the body of C5 vertebra (arrows).

Fig. 3 – Panel of coronal and sagittal CT images shows a well-defined air-containing lesion (–1022 HU) in the body of C5 vertebra (arrows).

REFERENCES

1. Reeder MM, Bradley Jr WG, Merritt CR. *Reeder and Felson's Gamuts in Radiology*. 4th ed. New York: Springer-Verlag; 2003 .
2. Ramirez H, Blatt ES, Cable HF, McComb BL, Zornoza J, Hibri NS. Intraosseous pneumatocyst of the ilium. *Radiology*. 1984;150:503–505.
3. Yamamoto T, Yoshiya S, Kurosaka M, et al. Natural course of an intraosseous pneumatocyst of the cervical spine. *AJR*. 2002;179:667–669.
4. Oehler E, Valour F, Pascart T. Intraosseous pneumatocysts: a case based review. *Clin Rheumatol*. 2013;32:129–134.
5. Haithcock JA, Layton KF, Opatowsky MJ. Vertebral pneumatocysts: uncommon lesions with pathognomonic imaging characteristics. *Proc (Bayl Univ Med Cent)*. 2006;19: 423–424.
6. Zarei F, Iranpour P. Pneumatocyst mimicking a sclerotic bony lesion on MRI. *Spine J*. 2010;10:e17–e19.
7. Cosar M, Eser O, Aslan A, et al. Vertebral body pneumatocyst in the cervical spine and review of the literature. *Turk Neurosurg*. 2008;18:197–199.
8. Kitagawa T, Fujiwara A, Tamai K, et al. Enlarging vertebral body pneumatocysts in the cervical spine. *Am J Neuroradiol*. 2003;24:1707–1710.
9. Wilkinson VH, Carroll T, Hoggard N. Contrasting natural histories of thoracic spine pneumatocysts: resolution versus rapid enlargement. *Br J Radiol*. 2011;84:e79–e82.