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Clinical Study

Giant thoracic osteophyte: A distinct clinical entity

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ABSTRACT

Calcified lesions described within the neural axis are classified as either an ossification of the posterior longitudinal ligament, diffuse idiopathic skeletal hyperostosis, or ossification of the ligamentum flavum. We aim to describe a unique pathologic entity: the giant thoracic osteophyte. We identified four patients who were surgically treated at the Massachusetts General Hospital from 2006 to 2012 with unusual calcified lesions in the ventral aspect of the spinal canal. In order to differentiate giant thoracic osteophytes from calcified extruded disc material, disc volumetrics were performed on actual and simulated disc spaces. All patients underwent operative resection of the calcific lesion as they had signs and/or symptoms of spinal cord compression. The lesions were found to be isolated, large calcific masses that originated from the posterior aspect of adjacent thoracic vertebral bodies. Pathological examination was negative for tumor. Adjacent disc volumes were not significantly different from the index disc ($p = 0.91$). A simulated calculation hypothesizing that the calcific mass was extruded disc material demonstrated a significant difference ($p = 0.01$), making this scenario unlikely. In conclusion, giant thoracic osteophyte is a unique and rare entity that can be found in the thoracic spine. The central tenant of surgical treatment is resection to relieve spinal cord compression.

1. Introduction

Calcified lesions have been reported along the neural axis [1–4], as well as elsewhere [5–8]. They can be referred to as pseudotumor, calcifying pseudoneoplasm, or tumoral calcification, and likely represent a heterogeneous group of lesions. Abnormal ossification of ligaments and entheses also occur along the spinal column and follow distinct patterns. Based on the affected structure and pattern of involvement, they have been grouped under the rubric of ossification of the posterior longitudinal ligament (OPLL), diffuse idiopathic skeletal hyperostosis (DISH), and ossification of the ligamentum flavum (OLF) [9].

In this paper, we describe a distinct entity of a giant calcific lesion of the thoracic spine that does not fit in the current scheme of dystrophic calcification. It differs from standard osteophytes in that it is (1) isolated, (2) occurs in the absence of other structural abnormalities such as ventral osteophytes or instability, (3) penetrates the dura, and (4) is larger than typical osteophytes. We refer to this entity as a "giant thoracic osteophyte."

2. Materials and methods

The study protocol was approved by the Institutional Review Board (IRB) of the Massachusetts General Hospital (protocol # 2012P001826). From 2006–2012, four patients were referred to our institution for surgical management of large thoracic calcific lesions resulting in spinal cord compression. Their medical and surgical histories were reviewed and summarized. Consent was not necessary for this IRB approved, retrospective study, which included approval for academic publication. The IRB waived the need for written informed consent from the participants.

2.1. Imaging

Pre-operative MRI and CT scan data were loaded in DICOM format into OsiriX open-source image analysis software (Geneva, Switzerland). (This open-source version does not have Food and Drug Administration 510(k) clearance for clinical use in the United States for primary medical imaging). MRI was used to analyze the intervertebral discs, whereas CT scan was used to quantify the volume of the osteophyte. Analysis of the osteophyte, the index intervertebral disc, and the adjacent intervertebral discs was carried out using manual outlining of the region of interest in a sagittal plane.

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The software then generated a three-dimensional rendering of the region of interest, along with the volume. Statistical analysis was performed with Graphpad Prism version 6 (Graphpad Software Inc., La Jolla, CA, USA). Paired *t*-tests were performed to compare the volume of the adjacent discs to the index disc level. To test the hypothesis that the calcified material originated from the index disc level itself, we also performed a paired *t*-test where the volume of the adjacent disc was compared to the sum of the index disc level and osteophyte volume. *p* values were calculated with a pre-defined significance level of <0.05, two-tailed.

3. Results

3.1. Patient 1

A 46-year-old woman presented with pain and sensory complaints concerning the left lower extremity. She had developed mild back pain over a period of several months. In addition, the patient complained of frequent falls, urinary frequency, and back spasms. She was found to have a giant thoracic osteophyte at the T10–11 level that resulted in severe compression of her thoracic spinal cord (Fig. 1a). Of note, the patient was also diagnosed with a retroperitoneal mass (angiomyolipoma). Surgical management was undertaken in multiple stages from both anterior and posterior approaches, resulting in resection of the giant thoracic osteophyte (Fig. 1b). She remained neurologically stable at the time of writing.

3.2. Patient 2

A 41-year-old woman presented with severe back pain and lower extremity motor dysfunction that had progressed over approximately 3 years. She required a cane for ambulation. The patient also reported bladder dysfunction. She was found to have a giant thoracic osteophyte at the T6–7 level and subsequently underwent a laminectomy as the first stage in her treatment. An anterior approach surgery to resect the giant thoracic osteophyte was planned at the time of writing, and she was neurologically stable.

3.3. Patient 3

A 51-year-old woman presented with back pain and signs of myelopathy for more than 10 years. On presentation, she required a cane for ambulation. She was found to have a giant thoracic osteophyte at the T7–8 level. She successfully underwent posterior

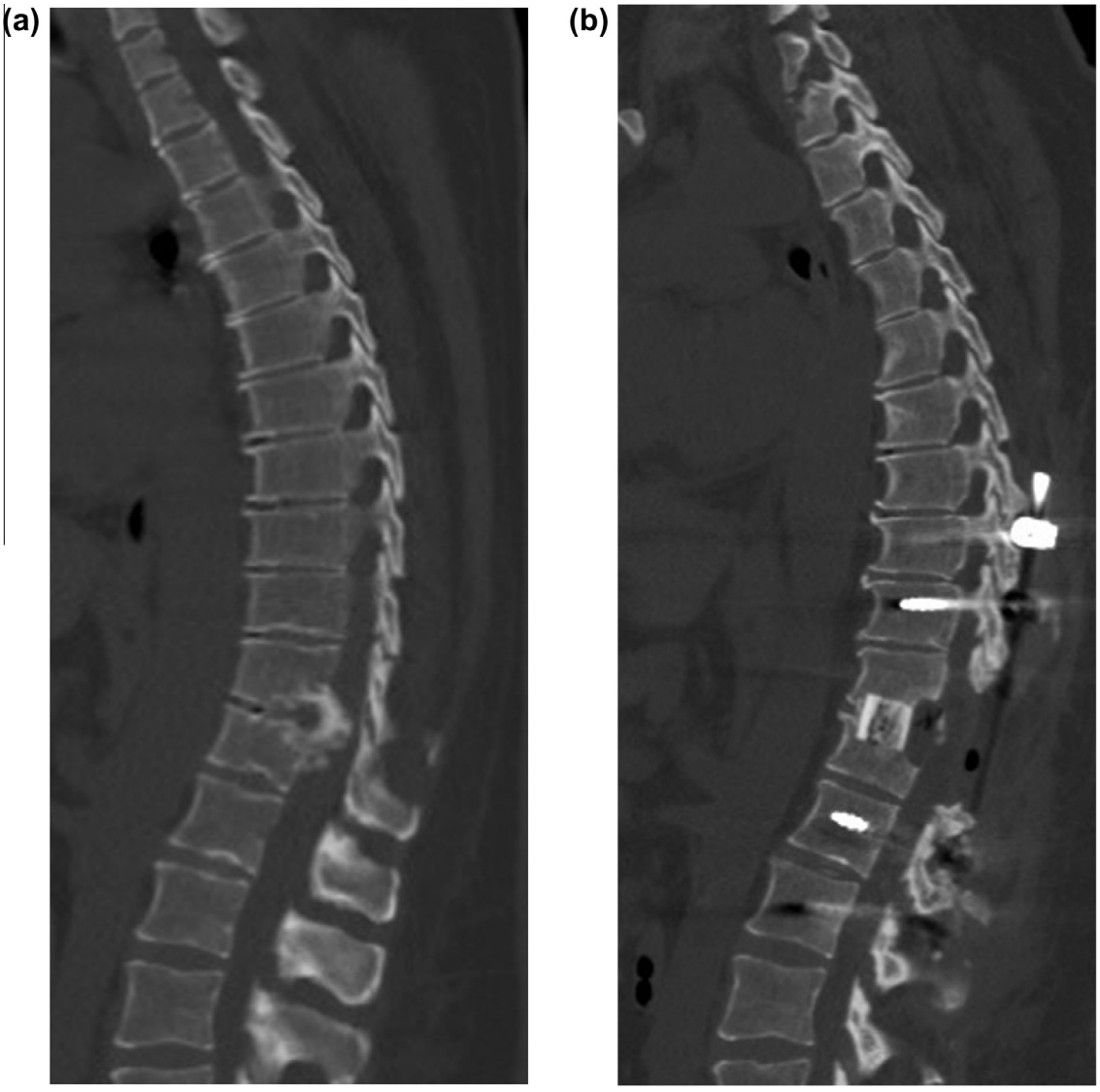

Fig. 1. Patient 1. Pre-operative (a) and post-operative (b) sagittal CT scan demonstrating resection of the giant thoracic osteophyte.