Benign notochordal cell tumor of the sacrum
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Section: Musculoskeletal system
Area of Interest: Bones Musculoskeletal spine
Imaging Technique: CT
Imaging Technique: MR
Case Type: Clinical Cases
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Patient: 48 years, female

Clinical History:
A 48-year-old woman with back pain was referred for an MRI (Magnetic Resonance Imaging) of the spine. She had no clinical records of oncological or hematological disease.

Imaging Findings:
MRI of the lumbar spine showed a rounded focal lesion in the sacrum, 20 mm in diameter, centred in S1, without perilesional oedema. Its signal intensity was heterogeneous, intermediate/low on T1WI (T1 Weighted Imaging) and high on T2WI sequences. L5-S1 degenerative changes were also noted, with disc bulging. No other bone lesions were identified in the lumbar spine.

Given the finding of a bone lesion, the patient had a complementary Computed Tomography (CT) done, on which the lesion showed subtle sclerosis of imprecise margins, without signs of radiological aggressiveness.

On a follow-up MRI of the sacrum performed 3 months after the first MRI scan, the lesion remained stable and showed no post-contrast enhancement or soft tissue component.

Discussion:
Benign Notochordal Cell Tumors (BNCT) are lesions of notochord cell origin. Histologically, they are differentiated from chordomas and notochord remnants and have recently been recognised as separate entities. They are frequent lesions on autopsies reported in about 20% of cadaveric specimens in the clivus and spine and are increasingly described in imaging studies.

Although most are asymptomatic and an incidental finding, cases associated with back pain have been reported.

On MRI, they are frequently found as rounded intraosseous lesions, characteristically well-defined and with low signal on T1WI and predominantly high signal on T2WI, although some hyperintense foci of intralesional fat may be found on T1WI. They do not show soft tissue mass or postcontrast enhancement. On X-rays, they are often unnoticed and even imperceptible, and on CT, when visible, they frequently show subtle hyperdensity, without osteolysis. They show little or no activity on bone scintigrams.
Although BNCT are considered benign lesions that do not require surgical resection, sporadic cases associated with chordoma have been described, and it is controversial whether they are concomitant lesions, or whether TBCN may occasionally act as a precursor to malignant chordoma-like lesions. Therefore, even when sacral lesions show typical features of BNCT, imaging follow-up is recommended to confirm their radiological stability.

In conclusion, BNCT are lesions increasingly described in imaging studies, usually as incidental findings. Knowledge of their characteristic imaging features is crucial for radiologists in order to differentiate them from malignant bone lesions that require more aggressive treatments. Searching for extraosseous extension, enhancement or soft tissue components are key findings to indicate biopsies and to rule out chordomas or other malignant tumours.

Written informed patient consent for publication has been obtained.

**Differential Diagnosis List:** Sacral benign notochordal cell tumour, Chordoma, Metastases, Plasmocytoma, Atypical hemangioma

**Final Diagnosis:** Sacral benign notochordal cell tumour

**References:**


Description: MRI of the lumbar spine. Sagittal Turbo Spin Echo (TSE) T1WI (A) and T2WI (B) showed a rounded lesion on S1 (white arrow), with heterogeneous signal intensity (predominantly high on T2WI) with no perilesional oedema. No soft tissue component was observed. Axial TSE T2WI sequence (C) confirmed that the lesion was confined to the S1 vertebral body, and exclusively intraosseous, close to the midline (white arrow).

Origin: Department of MRI and TC, Hospital Nuestra Señora del Rosario, Madrid, Spain, 2021
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**Figure 2**

**a**

Description: Axial CT without intravenous contrast. Reformatted images with soft tissue algorithm in axial (A) and sagittal (B) planes. S1 lesion was subtly hyperdense and had imprecise margins. No calcified matrix, osteolysis, or periosteal reaction was noted. **Origin:** Department of MRI and TC, Hospital Nuestra Señora del Rosario, Madrid, Spain, 2021

**b**

Description: Axial CT without intravenous contrast. Reformatted images with soft tissue algorithm in axial (A) and sagittal (B) planes. S1 lesion was subtly hyperdense and had imprecise margins. No calcified matrix, osteolysis, or periosteal reaction was noted. **Origin:** Department of MRI and TC, Hospital Nuestra Señora del Rosario, Madrid, Spain, 2021
**Description:** MRI of the sacrum performed 3 months after the first MRI study. Axial TSE T1 WI (A) and STIR WI (B) images confirmed the stability in size and signal of the sacral lesion (white arrows). There was still no evidence of perilesional edema or soft tissue component. On TSE T1 WI sequence with fat saturation after intravenous contrast (C), the lesion showed no enhancement.

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