Calcifying pseudoneoplasm of the neuraxis (CPN) is also known by several other names including the catch-all “fibro-osseous lesion,” as well as “calcifying pseudotumor of the neural axis”. Grossly, it is usually well-circumscribed, gritty or hard in consistency and up to several centimeters in size. Histologically, it consists largely of relatively amorphous material surrounded in part by a layer of mesenchymal-appearing cells variably immunoreactive for vimentin and EMA (epithelial membrane antigen). Calcification within the amorphous material is a frequent finding giving the material a chondrocalcific appearance. Metaplastic bone formation often occurs, even in lesions remote from bone. On occasion, multinucleated giant cells and even adipose tissue may be seen. Overall, CPN is considered to be a benign, reactive process with morbidities related to its local effects.

CASE REPORT

The patient, a 26-year-old female, presented with left-sided and lower back pain. She had no known previous injury to her back. A magnetic resonance imaging (MRI) scan was performed which demonstrated a small 0.5 x 0.4 x 0.3-cm, T-2 hypointense, intradural nodule in the left lateral thecal sac at level L1-2 that involved the left nerve roots. The radiologic impression was that of a small schwannoma. A repeat MRI scan 3.5 months later demonstrated relative stability of the now 0.8 x 0.5 x 0.5-cm lesion (Figure 1). One month thereafter, the patient underwent a gross total resection. At surgery, the mass was noted to be firm, red-tan and involved a single spinal rootlet. The lesion was removed en bloc. Grossly, it measured 0.8 x 0.5 x 0.5 cm, was well circumscribed, white and gritty on cut surface and featured a small nerve entering one end and exiting the other. The frozen section interpretation favored a low-grade tumor with dystrophic calcification.

Figure 1: A. Sagittal T1 MRI with contrast demonstrating an L1 contrast enhancing mass. B. Axial T1 MRI with contrast demonstrating a contrast enhancing lesion just anterior to the ligamentum flavum and the left facet joint.
On microscopic review, the lesion was noted to be intimately associated with a segment of spinal nerve root. Its heterogenous histologic appearance comprised three distinct patterns including: a) hypocellular amorphous matrix, b) encircling cellular zones, and c) metaplastic bone. The hypocellular element, basophilic and chondrocalcific in appearance, had a delicate, somewhat fibrillary or brushed appearance. This was particularly the case in its peripheral zones where cytologically benign, epithelioid to spindle-shaped cells were arrayed around the hypocellular areas to form a rind. The bone present appeared entirely benign and metaplastic in nature, being generally separated from the hypocellular amorphous matrix. The intervening cellular areas contained foci of meningotheial cells, blood vessels, plump spindled cells and rare giant cells. A single mitotic figure was noted within one of these intervening cellular regions (Figure 2).

Immunohistochemical stains were performed for EMA (Dako; Carpinteria, CA; clone E29, 1:50 BRD), S-100 (Dako, polyclonal, 1:1600), neurofilament (NF) (Dako, clone 2F11, 1:800 BRD), and smooth muscle actin (SMA) (Dako, clone 14A, 1:250). The rind of cells that surround the hypocellular regions stained positively for EMA which appears distinct in this case from the stromal cells which lack significant EMA reactivity (Figure 3). S-100 and NF highlighted not only the portion of

Figure 2: A. H&E 1.25X. View of entire lesion demonstrating the heterogeneous nature of the mass, the nerve rootlet is circled. B. H&E 10X. View of the nerve rootlet. C. H&E 10X. Demonstrating the heterogeneity of the lesion with basophilic amorphous areas, regions with increased cellularity, and bone. D. H&E 10X. Clear delineation is demonstrated between the relatively amorphous regions and the areas of increased cellularity, a rind of cells is noted surrounding the amorphous areas. E and F. H&E 40X. A multinucleated giant cell and mitotic figure, respectively.

Figure 3: H&E and EMA 10x. The arrows highlight a rind of cells surrounding the amorphous areas, these cells stain positively for EMA.
neuraxis has not been previously described as involving a single nerve root in such an intimate, discriminating fashion with radiographic and gross features suggestive of a neoplasm. This being said, a similar reactive lesion with calcification and fibroblastic proliferation has been recently described in an intradural extramedullary location. However, this did not have the described chondrocalcinic appearance of a CPN nor bone formation. Despite the lack of bone formation these authors thought it was a reactive condition and compared it to neuritis ossificans, which is a disease of peripheral nerve caused by ossification of the nerve sheath. If additional cases of CPN involving nerve roots are brought to light, perhaps a separate name should be entertained for this CPN subtype, such as “radiculitis calcificans”, which describes both the clinical condition of radicular pain and its pathology. Though rare, CPN may enter into the differential diagnosis of spinal nerve root lesions, including tumors.

REFERENCES

Figure 4: S100, 20X. An axon bundle within the substance of the pseudoneoplasm is highlighted.