Case report

Epithelioid sarcoma of the spine: Case report and literature review

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ABSTRACT
Epithelioid sarcomas are rare mesenchymal neoplasms mainly arising in the limbs of young adults. We report the case of a 24-year-old male presenting low back pain radiating to both lower limbs, constipation and urinary retention. The MRI scan showed an intraspinal lesion extending from L4 to S2. Surgery resulted in gross total removal of the extradural lesion and partial removal of the intradural component. The immunohistological study of the lesion was consistent with an epithelioid sarcoma. The patient was submitted to radiotherapy and chemotherapy, but a local recurrence of the lesion and dissemination along the neuraxis were observed 3 months after surgery. Despite treatment, the patient died 4 months after the surgical procedure due to multiorgan failure.

Despite there being isolated reports of epithelioid sarcomas appearing in the spine, this is, to our knowledge, the first case with intradural extension.

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Sarcoma epitelióide de la columna vertebral: caso clínico y revisión de la literatura

RESUMEN
Los sarcomas epitelioides son neoplasias mesenquimatosas raras que afectan sobre todo a extremidades de adultos jóvenes. Presentamos el caso de un adulto de 24 años de edad y sexo masculino que consultó por lumbalgia irradiada a miembros inferiores, estreñimiento y retención urinaria. La RM mostró una lesión espinal que se extendía de L4 a S2. La cirugía consistió en una resección casi total de la lesión extradural y parcial del componente intradural.

El estudio inmunohistológico de la lesión fue compatible con un sarcoma epitelióide. El paciente fue sometido a radioterapia y quimioterapia, pero 3 meses después de la cirugía se...
Introduction

Epithelioid sarcomas are rare, mesenchymal tumors of unknown histogenesis, displaying multidirectional differentiation.\textsuperscript{1} The condition was first described in 1961 by Laskowski\textsuperscript{2} and Enzinger reported 62 cases in 1970.\textsuperscript{3} Epithelioid sarcomas affect principally the extremities of young adults: fingers, hand, forearm, lower leg and knee, and less often the shoulder, arm, ankle, foot and toes.\textsuperscript{4,5} Rarely the trunk has been involved. To our knowledge there are only four cases reporting spinal involvement (lumbosacral junction, sacrum, lumbar and thoracic spine).\textsuperscript{6–11}

In none of these cases, intradural extension was present. Kurtkaya-Yapicier et al. published in 2002 the first case report of primary epithelioid sarcoma of the cerebral dura mater.\textsuperscript{6} Despite their slow growth, local recurrence and metastasis are relatively frequent.\textsuperscript{12} The most generally recommended treatment for epithelioid sarcoma is a wide excision. Chemotherapy and irradiation appear to be beneficial, but long-term follow-up is necessary.\textsuperscript{4,6}

Case report

A 24-year-old Caucasian male reported progressive unremitting lumbosacral pain after a motor vehicle accident. Radiographs were unremarkable. During the next four months the pain worsened, radiating to the lower limbs, with distal muscle weakness, episodes of urinary retention, constipation and sexual dysfunction. When he was first examined at our hospital he showed decreased strength in plantar flexion and dorsiflexion of the left foot, decreased sensation across the S1 left dermatome, absent sensation from S2 to S4 dermatomes on the left and absent Achilles reflexes. Lumbosacral MRI showed an intraspinal lesion, extending from L4 to the S2 level, filling the right foramina of S2 and S3 and showing homogeneous enhancement with gadolinium. Schwannoma or ependymoma was considered the most likely diagnoses (Fig. 1a).

The patient underwent surgery, with L4 and L5 laminectomies and removal of the posterior wall of the sacrum as far as the S2 level. An extradural mass was identified and removed almost completely. After midline durotomy a grayish, friable and richly vascularized mass was identified, firmly attached to arachnoid and nerve roots. The tumor was partially resected because it could not be dissected away from the nerve roots, hindering a wider surgical resection. After surgery no new motor or sensory deficits were noted, and an improvement in pain was reported by the patient. Pathology studies were consistent with epithelioid sarcoma. A careful workup revealed no evidence of a primary extraspinal neoplasm.

Two weeks later radiotherapy was started with a total dose of 40 Gy. Chemotherapy with Cisplatin (190 mg) and Adriamycin (114 mg) was administered. Clinical deterioration became evident 2 months after surgery with motor deficits involving the L4 and S1 territory bilaterally. A new MRI showed a larger mass, extending up to L3 (Fig. 1b, c). One month later the patient started to have headaches and disorientation. A neuroaxis MRI showed a diffuse contrast enhancement along spinal cord, a cervical syringomyelic cavity (Fig. 1d) and dilatation of the cerebral ventricles (Fig. 1e). The patient died 4 months after surgery because of a multiorgan dysfunction.

Pathological findings

The hematoxylin–eosin stained paraffin section displayed a highly cellular tumor, without any specific architecture. The tumor cells had rather large roundish to oval, vesicular nuclei, often with prominent nucleoli (Fig. 2a). Focally, eosinophilic nuclear inclusions were detectable. The eosinophilic cytoplasm was scant. Mitotic figures were frequent (Fig. 2b). Tumor cells were strongly positive for vimentin (Fig. 2c) and focally for CAM5.2 (Fig. 2d), cytokeratins (clones LU-5 and AE1/3) and epithelial membrane antigen (EMA). S-100 revealed exclusively residual nerve fibers, tumor cells being negative. Strong expression was found with antibodies to the VS38C epitope. There was no immunoreactivity for markers of neuronal or neuroendocrine differentiation, such as synaptophysin and chromogranin-A. No reactivity was found for HMB-45 and panMelA (antibody cocktail to detect melanoma cells), and for CD31, CD34, CD 117, PLAP, CD99, HHV8, ALK1, MyIiD1m TDT, TTF-1 or CD23. Extensive immunohistochemical stainings for lympho-plasmocyte markers revealed the presence only of reactive, non-neoplastic inflammatory cells, predominantly in close vicinity to vessels (positive either/or CD3, CD4, CD5, CD10, CD20, CD30, CD38, CD43, CD45, CD79A, CD138). In situ hybridization for kappa and lambda light chains revealed no monoclonal rearrangement. In situ hybridization for EBV was negative. The proliferation ratio focally reached at least 60%. These findings were consistent with the diagnosis of epithelioid sarcoma.

Discussion

Although primary central nervous system sarcomas are very rare lesions, an ever-expanding list of histological variants has been reported arising from cranial and spinal meninges. These tumors include malignant fibrous histiocytoma,\textsuperscript{13} chondrosarcoma, rhabdomyosarcoma,\textsuperscript{13} liposarcoma, fibrosarcoma, angiosarcoma and leiomyosarcoma. Epithelioid sarcoma occurs most commonly in adolescents and young adults between 15 and 35 years of age (median, 26 years), with a male:
Fig. 1 – (a) T1-weighted magnetic resonance image (MRI) showing an intracanalar lesion with homogeneous enhancement with gadolinium. T1-weighted magnetic resonance images with (b) and without gadolinium (c) showing a larger mass and contrast enhancement of the dura mater extending several levels above the lesion. (d) Cervical syringomyelic cavity. (e) Dilatation of the cerebral ventricles.

Fig. 2 – (a) The tumor is composed of sheets of large cells with ample cytoplasm. (b) Nucleoli (arrow) are evident in many nuclei. Mitotic figures (arrow head) are numerous. (c) An antibody to vimentin marks part of the cytoplasm in most of the tumor cells (arrows). (d) The tumor is focally positive for CAM5.2 (arrows).
female ratio of 2:1. A history of trauma was recorded by Prat et al. in six of 22 cases and by Dabska and Koszarowski in 16 of 22 cases.

Epithelioid sarcoma is prone to local recurrence and metastasis. Favorited sites of distant spread include the lungs, lymph nodes, and skin. In the skin epithelioid sarcomas may involve the scalp. Wide local resection is the recommended treatment of epithelioid sarcoma. The 5-year survival rate varies from 65 to 100%. Factors affecting the survival rate are as follows: 1. Size of the tumor, 2. Infiltration of the tumor into muscular, neural or vascular structures, 3. Primary location in the trunk, 4. Pulmonary metastasis, 5. Male gender, 6. Necrosis, 7. Rhabdoid cytomorphology.

Our case embodied many factors that favor recurrence of this neoplasm: large size, localization in the trunk, infiltration of neural structures and male gender.

Histologically, epithelioid sarcomas consist of nodules of polygonal epithelioid and spindle cells, or cells appearing as a mixture of the two. The cells are lightly eosinophilic, often with intercellular collagen, sometimes with hyalinized. The most common growth pattern is a pseudogranulomatous proliferation with broad, undulating collars around central, relatively acellular or necrotic zones. The tumor nodules are frequently surrounded and infiltrated by chronic inflammatory cells. Immunohistochemical studies show that vimentin, cytokeratin and epithelial membrane antigen are usually positive. CD34 and desmin are also positive in some specimens. S100 and CD31 are negative in the majority of cases. These immunohistochemical findings are helpful for the differential diagnosis from other malignant tumors of epithelioid appearance such as synovial sarcoma, extra-areolar malignant rhabdoid tumor, epithelioid malignant peripheral nerve sheath tumor, melanoma, rhabdomyosarcoma, and undifferentiated carcinoma. On the basis of immunohistochemical findings we can also exclude any tumor originating from CNS cells. Results of the immunohistochemical analysis of our case were consistent with a diagnosis of classical epithelioid sarcoma.

Wide local resection is the recommended treatment of epithelioid sarcoma, followed by adjuvant chemotherapy and irradiation. In the spine, total eradication of the sarcoma by an en-bloc excision is compromised by the presence of neural structures. Nerve sheaths may serve as a pathway for the spread of the sarcoma. Considering that imaging findings are not characteristic the authors advocate a surgical exploration in similar appearing tumors. Intraoperatively the surgeon must decide if a total resection is feasible and adjuvant therapy should be attempted in all cases. The definitive diagnosis is only possible after pathological examination.

**Conclusion**

The authors report the clinical, histological, immunohistochemical and ultrastructural features of, what is to the best of our knowledge, the first case of a spinal epithelioid sarcoma with intradural extension. Recognition of this extremely rare tumor and its distinction from more common malignant tumors depends in large part on judicious application of immunohistochemistry. The case presented herein expands the topography of epithelioid sarcomas.

**References**