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Sinonasal desmoplastic small round cell tumor

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ABSTRACT

Desmoplastic small round cell tumor (DSRCT) is a rare malignancy with poor prognosis that generally involves the peritoneum. Only rare cases occur outside the abdomen. Its diagnosis can be achieved only by immunohistochemistry and cytogenetic studies. We describe a case of a 61-year-old man referred to our department with a primary sinonasal tumor. The DSRCT diagnosis was confirmed by the presence of a polyphenotypic immunoprofile (positive for cytokeratin, desmin, and neuronspecific enolase) and the characteristic EWS–WT1 gene fusion resulting from the t(11;22)(p13;q12) reciprocal translocation. This reported case of DSRCT draws attention to the importance of including DSRCT in the differential diagnosis of sinonasal tumors.

1. Introduction

Desmoplastic small round cell tumor (DSRCT) is a rare neoplasm, of a possible mesothelial origin and described as a separate entity by Gerald and Rosai in 1989 [1]. It typically affects adolescents and young adults with male predilection and it has a propensity to serosal surfaces, especially the peritoneal cavity. Less than 200 cases are reported in the world literature. Extraabdominal DSRCT is infrequent with cases reported in the brain, lung, pleura, salivary glands and soft tissue and bone [2]. DSRCT has a highly aggressive clinical course, and despite multimodal treatment, multiple series have shown that it has a dismal 5-year survival rate [2]. From an immunohistochemical point of view, DSRCT shows multidirectional differentiation, with co-expression of epithelial, mesenchymal, and neural markers. DSRCT possesses a unique translocation, t(11;22)(p13;q12) which may explain the multidirectional differentiation of DSRCT [3].

We present a recent case of sinonasal DSRCT which was referred to as esthesioneuroblastoma. This is followed by a discussion of key clinical and investigational findings that aided in diagnosis as well as an approach to unusual causes of nasal tumor.

2. Case report

A previously healthy 61-year-old man diagnosed through biopsy with esthesioneuroblastoma (Kadish stage B) was referred from another hospital to our institution for surgical treatment in October 2009. He referred that he had right nasal respiratory insufficiency, and occasional nose bleeds 10 months ago. The nasal endoscopy showed a glistening, mucosa-covered, soft, polypoid, highly vascularized mass filling the right nasal cavity. A magnetic resonance imaging (MRI) and computed tomography (CT) scans showed a mass arising from the roof of the right ethmoid sinus that extended into the anterior cranial fossa through the cribriform plate as well the right orbit. A cranioendoscopic resection was performed and the tumor was resected in monobloc with negative margins for residual tumor (Fig. 1). Fragments of soft to firm gray and tan tissue were submitted for pathologic examination. After surgery, the patient received 66 Gy of radiotherapy and he was still disease-free for 2 years and 5 months after the diagnosis.

2.1. Histopathology

Macroscopically, the tumor was circumscribed, solid, firm homogeneous, multilobulated with a gray-tan cut surface and measured 8 cm × 5 cm. On histologic examination the tumor consisted of well-defined islands of malignant cells separated by a desmoplastic stroma, focally infiltrative. The amount of tumor cells versus stroma varied from field to field. The tumoral cells ranged from small to medium-sized, hyperchromatic round nuclei, clumped chromatin, inconspicuous nucleoli and from scant to

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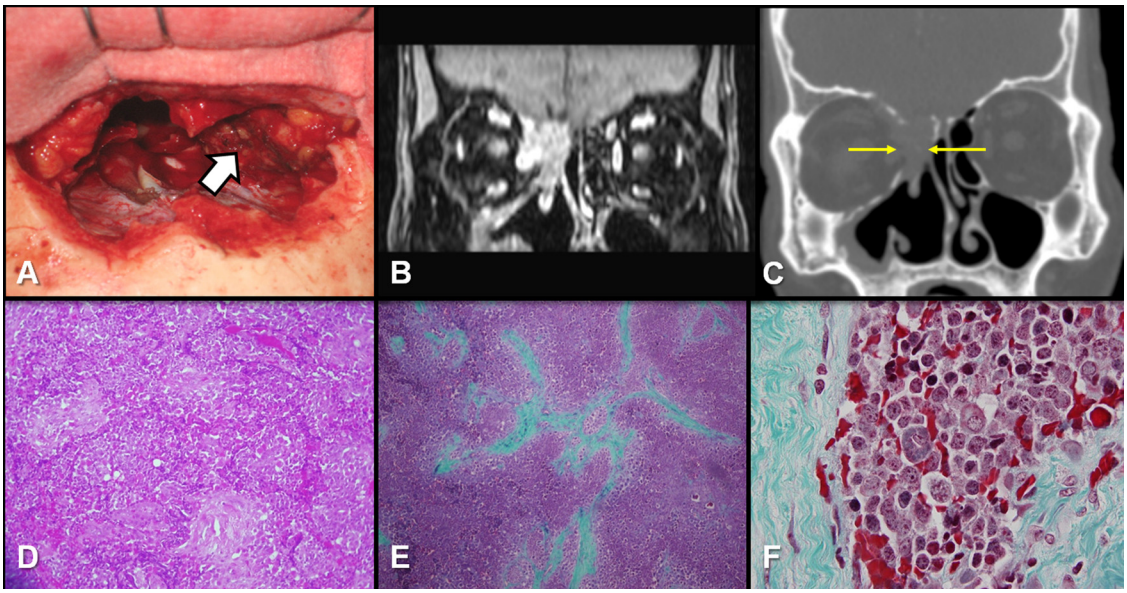

Fig. 1. (A) Surgical view of the craniotomy showing the dura of the anterior fossa, the frontal sinus and the upper part of the tumor (arrow). (B) View of the sinonasal DSRCT involving the right periorbit and the anterior cranaial fossa on Gadolinium-enhanced, T1-weighted MR images and on CT scan (C). (D) Photomicrograph of a hematoxylin–eosin stained paraffin section showing how the tumor comprises sharply demarcated, well defined and variable-sized nests in a desmoplastic stroma (original magnification 50×). (E) Small round blue tumor cells separated by abundant desmoplastic stroma (hematoxylin–eosin, original magnification 100×). (F) The tumor cells are medium sized, with hyperchromatic nuclei, a moderate amount of eosinophilic cytoplasm and demonstrate high nuclear cytoplasmic ratio (hematoxylin–eosin, original magnification 400×).

moderate amounts of eosinophilic cytoplasm. Mitotic figures, marked pleomorphism and apoptotic bodies were readily seen. There were large tumor nests with central coagulative necrosis, separated by scanty stroma. There was no evidence of rosette formation or glandular differentiation (Fig. 1).

2.2. Immunohistochemical findings

Paraffin sections were incubated with primary monoclonal antibodies for immunohistochemical studies purposes. Immunohistochemical staining was performed using an automatic staining workstation (DakoCytomation) with the Envision system with diaminobenzidine chromogen used as the substrate. The antibodies are shown in Table 1. KI67 showed an irregular rate of proliferation in the range of 50–60%. The tumor cells showed a strong cytoplasmic reactivity to keratins (AE1/AE3 and CK8/CK18) (Fig. 2A) and the epithelial membrane antigen (EMA). A distinctive dot-like perinuclear pattern was seen with staining for desmin (Fig. 2B) and vimentin (Fig. 2C), sometimes focally limited to a few cells. The tumor cells were positively diffused for neuron-specific enolase (NSE) (Fig. 2D). The tumor cells displaying weak and focal nuclear staining for WT1 with fairly constant paranuclear and cytoplasmic staining. The staining with other antibodies was negative (Table 1).

2.3. Molecular analysis

Dual-coloured fluorescence in situ hybridization (FISH) was performed on paraffin section using the EWS break-apart probe (Vysis; Abbott Molecular, Des Plaines, IL, USA), where the splitting of normally fused red and green signals into separate red and green signals indicates the presence of EWS gene translocation. On FISH analysis each tumor cell nucleus showed one combined red-green signal and one green and one separate red signal, indicating the presence of a translocation involving EWS gene (Fig. 3). Images were analyzed and captured using the Olympus BX-61 fluorescence microscope (Olympus, Tokyo, Japan).

Table 1
Immunohistochemical staining.

Antibody	Clone	Source	Dilution	Results
Neuron-specific enolase (NSE)	NSE-P1	Neomarkers, Fremont, CA, USA	1:1500	+
Cytokeratin (CK8/CK18)	CAM5.2	Becton-Dickinson, San Jose, CA, USA	1:50	+
Cytokeratin (AE1/AE3)	AE1 and AE3	Zymed Laboratories Incorporated, South San Francisco, CA	1:200	+
Epithelial membrane antigen (EMA)	E29	Dako, Glostrup, Denmark	1:1600	+
Desmin	D33	Dako, Glostrup, Denmark	1:500	+
Ki-67	SP6	Neomarkers, Fremont, CA, USA	1:200	50–60%
Vimentin	SP20	ScyTek Laboratories, UT, USA	1:100	+
WT1	6F-H2	Dako Glostrup, Denmark	1:1000	+
S-100	Antiserum	Dako Glostrup, Denmark	1:4000	–
CD99	O13	Sigent, Dedham, MA, USA	1:1000	–
Myogenin	F5D	DAko Glostrup, Denmark	1:800	–
Smooth muscle actin	1A4	Zymed, San Francisco, CA, USA	1:100	–
Synaptophysin	SP11	Neomarkers, Fremont, CA, USA	1:200	–
Muscle specific actin	HHF-35	Neomarkers, Fremont, CA, USA	1:100	–
Vimentin	SP20	ScyTek Laboratories, UT, USA	1:100	+
Cromogranin	Polyclonal, rabbit anti-human	Dako, Glostrup, Denmark	1:1500	–