Case Report

Sinus rhabdomyosarcoma invading the orbit in an adult


Abstract

Rhabdomyosarcoma (RMS) is the most common primary malignant orbital tumor in children. However, it is rare in adults. We present a case report of a 22-year-old man who initially presented with nasal obstruction, as the only clinical symptom, but subsequently was diagnosed as having RMS of the ethmoid sinus invading the orbit.

Key Words: Rhabdomyosarcoma, malignant, orbit, proptosis, nasal obstruction, ethmoid sinus

CASE REPORT

A 22-year-old male patient presented with a history of left nasal obstruction and headache of 2 months duration. He was diagnosed to have sinusitis and received treatment. Two months later, he re-presented with a history of worsening headache, recurrent nasal bleeding (epistaxis), and increasing double vision (diplopia). This time, the clinical examination showed a 3 mm proptosis of the left eye with mild ocular motility restriction. The patient was referred for further investigations. Orbital computed tomography (CT) scan revealed a homogeneous mass 20 x 15 x 15 mm in size occupying the left ethmoid, with bone destruction and invasion of part of the left orbit. Incisional biopsy of the mass through the nasal cavity was done. Histopathological examination of the specimen revealed the picture of alveolar RMS (Fig. 1). With a diagnosis of RMS, treatment was started with chemotherapy. It included cyclophosphamide, vincristine, and Adriamycin for 6 cycles. There was a partial regression of the size of the tumor after chemotherapy. However, chemotherapy was discontinued because the patient developed osteomyelitis of the sinus. Three months later, proptosis increased with displacement of the globe downward and outward, and limitation of ocular motility (Fig. 2). Orbital CT revealed expansion of the tumor with massive orbital invasion, invasion of the left ethmoid, maxillary, and sphenoid sinuses, and inva-
sion of the neck lymph nodes (Fig. 3). Radiotherapy of the orbit and sinus with 6000 rad delivered in divided doses over a 6-week period was performed. The patient developed a frozen, blind, painful eye, and the radiotherapy was complicated by orbital radiation necrosis. Exenteration was performed. However, the patient's general condition deteriorated and he died 2 months later with widespread systemic metastases.

DISCUSSION

Rhabdomyosarcoma is a highly malignant neoplasm that is composed of cells with histologic features of striated muscle in various stages of muscle embryogenesis. It can occur at any age from birth to adulthood, but most series report an average age at diagnosis of 7 to 8 years. It is the most common primary malignant orbital tumor in childhood. However, it is quite rare in adults.

RMS most commonly originates in the superior nasal orbit and causes a rapid (days to weeks) downward and outward displacement of the globe. It may originate from the ethmoid sinus or nasal cavity and extend into the orbit, causing initial symptoms of sinusitis, nasal congestion, and epistaxis, followed by onset of proptosis. Orbital presentation of paranasal tumors is uncommon. Shields et al reported that 8 of 625 biopsied orbital lesions were derived from the paranasal sinuses. Seven of these originated from the maxillary sinus, and the remaining one was an adenocarcinoma which originated from the ethmoid sinus. Similarly, Henderson only included 2 adenocarcinomas of the ethmoids in his series of 1376 consecutive orbital lesions. In another study of sino-nasal cancer in Denmark, 315 patients were seen in a 10-year period by Grau et al. They found that tumor sites were in nasal cavity (156 cases), maxillary sinus (139 cases), ethmoid sinus (14 cases), sphenoid sinus (5 cases), and frontal sinus (1 case). Histological pictures included squamous cell carcinoma (126 cases), adenocarcinoma (41 cases), malignant melanoma (38 cases), and malignant lymphoma (34 cases).

Approximately 10% of patients with RMS complain of pain or headache, often poorly localized in the forehead over the affected eye, and only occasionally is a patient found to have loss of central vision. The physician should not wait for the patient to experience visual impairment before initiating therapy. Symptoms are usually present for at least 6 weeks before the patient seeks medical attention. The occasional presentation of nasal stuffiness, and frequent nosebleeds is often misinterpreted by the patient and physician as an intranasal problem and is not recognized as a manifestation of orbital RMS with intranasal extension or sinus RMS.

The tumor most commonly presents as a rapidly evolving exophthalmos, but it may also present as a palpable subconjunctival or lid mass with redness of the eye, and oedema of the lids and conjunctiva. Jones et al noted that in about one third of their patients, drooping of the upper lid of the affected eye occurred early in the clinical course.

Specific studies that may be helpful in the diagnosis of RMS include orbital CT, magnetic resonance imaging (MRI), and ultrasonography. Chest and bone roentgenograms, liver enzymes, and other metastatic work up should be performed to exclude the possibility of systemic metastasis.

Histologically, RMS is classified into 4 main types: embryonal, alveolar, pleomorphic, and botryoid. Embryonal rhabdomyosarcoma is the most common variant in the orbit. The alveolar is the second most common histologic form, and has a predilection for the infe-
rior orbit. The observation that different histologic patterns are reasonably specific for different age groups and locations, implies different histogenetic derivations. It has been suggested that both embryonal and botryoid rhabdomyosarcomas arise from undifferentiated mesenchymal elements possessing the capacity to differentiate into striated muscle. Accordingly, rhabdomyosarcoma could arise in any organ possessing such primitive pluripotential mesenchymal tissue, even if the organ does not normally possess adult differentiated striated muscle. It would appear that the pleomorphic rhabdomyosarcoma arises de novo in adult skeletal muscle, i.e., an origin distinct from that of the embryonal type of the head, neck, and orbit in children. Whether or not this classification has prognostic significance is still uncertain. Nonetheless, it is generally accepted that the more differentiated tumors (pleomorphic types) have a better prognosis, and that the alveolar type has the worst prognosis.

A diagnostic histopathologic feature of rhabdomyosarcoma is the presence of cross striations within the cytoplasm of the tumor cells. Such cross striations may be difficult to discern with routine hematoxylin and eosin stains but are more easily recognized with the Masson trichrome stain or the phosphotungstic acid-hematoxylin (PTAH) stain. Cross striations are definitely more difficult to demonstrate in the embryonal variety than in the pleomorphic type. Porterfield and Zimmerman demonstrated cross striations in only 60% of their embryonal rhabdomyosarcomas. The formation of cross striations apparently represents a higher level of differentiation than is usually present in embryonal rhabdomyosarcoma. Demonstration of cross striations is not necessary to make the diagnosis of rhabdomyosarcoma, but any rapidly evolving spindle cell sarcoma of the orbit in a child should be considered to be rhabdomyosarcoma until proven otherwise. Immunohistochemical studies are useful in the histopathologic diagnosis of orbital rhabdomyosarcoma. Positive stains for myoglobin and desmin are helpful in this regard.

The approach to biopsy should depend on the location of the tumor. If the mass can be readily palpated through the eyelid, a horizontal skin incision through the eyelid is appropriate. If the lesion is found adjacent to the equator of the globe, a conjunctival surgical approach may yield adequate tissue. If it is located more posteriorly in the orbit, a superior orbitotomy may be best. When the tumor involves the nasal cavity or sinuses, a transnasal biopsy may be easier than an orbitotomy. In general, a lateral orbitotomy with removal of the zygoma (Kronlein approach) is not necessary unless the tumor is located far posteriorly in the orbit. Even when the mass is apparently excised completely, the patient should usually be treated with postoperative radiotherapy and chemotherapy because of the highly malignant nature of the tumor. Although there is some controversy about the extent of the surgery necessary, the surgery should be directed toward removing as much of the tumor as possible as long as vital anatomic structures are not sacrificed or damaged. The excised tissue should be submitted immediately for routine histopathologic examination, and once the diagnosis of rhabdomyosarcoma is confirmed histologically, the patient should...
treated promptly with irradiation and chemotherapy.\textsuperscript{36}

Orbital radiotherapy should consist of 5000 to 6000 cGy delivered in divided doses over a 5 to 6-week period. In general, the patient is treated with 200 cGy 5 days each week. About 5000 cGy are given anteriorly through a 5-cm-round portal, and 1000 cGy are delivered laterally through a 4-cm-round portal. Appropriate shielding is necessary to prevent damage to normal structures, particularly in the opposite eye. In most instances, there is a dramatic regression of the tumor during the 6-week course of radiotherapy.\textsuperscript{24}

The program of adjuvant chemotherapy may necessarily be modified from case to case depending on the patient's tolerance and the extent of the disease. The goal of chemotherapy should be to achieve maximum drug response within the acceptable limits of toxicity. Triple therapy using vincristine sulfate, actinomycin D, and cyclophosphamide have been advocated. While on chemotherapy the patient must be monitored closely for evidence of bone marrow suppression or other complications, and it may be necessary to decrease or discontinue the therapy depending on the type and severity of complications.\textsuperscript{37} Chemotherapy was discontinued in our case because the patient developed osteomyelitis of the sinus.

The prognosis for life in patients with RMS has improved dramatically in recent years. In the earlier series the overall survival rate was only about 30%.\textsuperscript{20-22,33} Many of these patients were managed by orbital exenteration alone. With the recent use of limited surgery for diagnostic purposes followed by irradiation and chemotherapy, the survival rate has continued to improve. However, published series have reported definitively worse results, and a relatively poor long-term outcome for adult RMS compared to pediatric RMS.\textsuperscript{16,17} The nasopharyngeal region RMS belongs to a group of rare malignant diseases representing a major diagnostic and therapeutic problem.\textsuperscript{38} Ethmoid sinus cancer is often associated with an adverse prognosis. Dilhuydy et al\textsuperscript{39} reported a 5 year survival rate of 44% in cases with ethmoid cancer. Invasion of the dura, brain, nasopharynx, or sphenoid sinus carries a worse prognosis.\textsuperscript{40} The final outcome in our patient parallels other published series, and confirms the relatively poor long-term outcome for adult patients with RMS, especially those originating in the nasal sinuses.

In conclusion, this case report confirms previously published data that RMS in adults has a worse prognosis. It brings the attention of both otorhinolaryngologists and ophthalmologists to the entity of sinus RMS despite its rarity. A rapidly growing tumor usually involving the orbit, it should be aggressively and promptly treated.

**REFERENCES**

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