A 22-month-old Filipino boy presented to our office with a 2-day history of right eye swelling and nonspecific eye pain. One month before presentation, the child was diagnosed with left-sided otitis media and streptococcal pharyngitis for which the patient was placed on amoxicillin. Although the patient showed clinical improvement with the amoxicillin, the mother stated that the patient never returned to his baseline level of energy and activity. In the month before presentation, the child had a 5-pound weight loss. The patient’s mother denied rash, conjunctivitis, ocular discharge, right ear discharge, coryza, and rhinorrhea. There was no history of sinusitis, trauma, surgery, bacteremia, bee stings, or fever.

Upon physical examination, the temperature was 37.8°C, pulse 108, respirations 28, and blood pressure 124/71. His weight was 12.14 kg (50th percentile) with a height of 78 cm (< 3rd percentile). The patient appeared sick but non-toxic. The right eyelid was soft, nonfluctuant, edematous, erythematous and could not be completely lifted. There was mild proptosis and conjunctival injection. Pupils were round and reactive to light. Extraocular movements were intact in the left eye but mildly restricted in the right eye. The remainder of the exam was unremarkable.

For diagnosis, see page 339.

Editor’s note: Each month, Case Challenges features a discussion of an unusual diagnosis in genetics, radiology, or dermatology. A description and images are presented, with the diagnosis and an explanation of how the diagnosis was determined following. As always, your comments are welcome.
computerized tomography (CT) scan of the orbit was ordered (see Figure 1, page 336), and the patient was admitted to the hospital to be consulted by ophthalmology for suspected orbital cellulitis. A magnetic resonance image (MRI) with and without contrast was later suggested to better delineate this soft tissue mass (see Figure 2). A biopsy was performed, and the diagnosis was confirmed through histological staining.

Figure 2A. Coronal MRI of the Head. Note a heterogeneously enhancing right infratemporal fossa mass eroding the floor of the middle cranial fossa. Figure 2B. Axial MRI of the orbit. Note the mass extending into the orbit to create two separate yet connected masses. The intracranial component measured 4.0 x 4.0 x 2.5 cm, and the intraorbital component along the lateral wall measures 1.8 x 0.6 x 1.5 cm, with associated mass effect and globe protrusion.
DIAGNOSIS

The diagnosis of rhabdomyosarcoma needs a high index of suspicion. In this case, the diagnosis was considered because of the peculiar findings on the CT scan of the orbit. Before viewing the CT scan, the presumptive diagnosis was orbital cellulitis. However, the scan showed more than just the soft tissue swelling and orbital edema, which led us to believe that a malignant mass may be the culprit. An MRI was done to delineate the extent of the soft tissue growth. It depicted a mass that eroded the bony structures of the orbit and middle cranial fossa, as well as causing a midline shift. A biopsy was performed the next day, and histology revealed a small blue cell tumor. Histological stains desmin and myogenin, specific for embryonal rhabdomyosarcoma, were positive in the specimen, therefore, a diagnosis was established. No metastatic lesions were demonstrated on contrast CT of the abdomen, pelvis, and chest.

Results from lumbar puncture, bone marrow aspirates, and biopsy revealed normal cellularity, with no evidence of malignancy. The patient had a Perm-a-cath placed shortly after diagnosis and was started on chemotherapy with vincristine and irinotecan. The patient continued to tolerate chemotherapy treatment with the addition of decadron, resulting in a decrease in right eye edema and erythema. The pediatric oncologist and otolaryngologist concluded the patient’s tumor to be nonamenable to surgical resection. The bulk of the patient’s care was then handled by the pediatric oncologists, who continued with systemic chemotherapy and radiation. The patient was seen at regular intervals for check up and imaging. Twelve months after the diagnosis, the patient was found to have multiple small metastatic lesions to the brain while remaining asymptomatic.

DISCUSSION

Whenever a pediatric patient presents with symptoms of an orbital cellulitis, a CT scan of the orbit is considered to rule out childhood cancers, such as rhabdomyosarcoma (RMS), malignant lymphoma, and lacrimal gland tumors. These have all been known to present as acute orbital cellulitis.1 Orbital cellulitis is a clinical diagnosis, and, at some centers, a child presenting with eyelid swelling, erythema, proptosis, and decreased extraocular movements might be placed on empiric intravenous antibiotics without obtaining any imaging studies. In one case series, four of six rhabdomyosarcomas involving the orbit presented with an acute onset of proptosis associated with signs of inflammation, mimicking orbital cellulitis.2

RMS is a malignant tumor of striated muscle origin and is the most common childhood soft tissue sarcoma.3 Approximately 90% of RMS cases are diagnosed in individuals younger than 25 years, and within this group, 60% to 70% are younger than 10 years.4 RMS represents 3.5% of all malignancies in children 0 to 14 years.5 Despite being the most common childhood soft tissue sarcoma, the annual incidence of RMS is 4.3 cases per 1 million children.5,6

The head and neck are the most frequent (35% to 40%) sites of origin, followed by the genitourinary tract, extremities, trunk, retroperitoneum, and uncommon regions, such as intrathoracic, GI tract, and perianal regions. In the head and neck, the most common sites are parameningeal and orbital locations, accounting for 14% and 9% of all RMS cases, respectively.4,5 Over several decades, much progress has been made in the treatment of RMS. As a result, 5-year survival rates increased from 25% in 1970 to 73% in 2001, as shown in the Intergroup Rhabdomyosarcoma Study [(IRS)-IV].8 In the United States, an estimated 350 new cases of RMS are diagnosed each year. Fifty of these are parameningeal RMS.9

People of Asian descent have a slightly lower prevalence than that of blacks or whites. The male-to-female ratio is approximately 1.5:1.4 Rhabdomyosarcoma is divided into five major histologic categories: embryonal, alveolar, botryoid embryonal, spindle cell embryonal, and anaplastic.4 In this report, the patient’s final diagnosis was an embryonal type of RMS, which is the most common form.

Various anatomic constraints of the head and neck make most lesions in this region obvious.
upon physical examination and, therefore, are easily detectable. A mass or area of localized swelling usually characterizes the initial presentation. Fewer than half of these patients present with pain. Other symptoms, depending on the location of the tumor, include nasal discharge, airway obstruction, otorrhea, hearing loss, fetor (foul smell), and rapid proptosis.

The initial diagnostic workup must address two key issues. The first is to determine the nature and extent of the primary disease. To accomplish this, a surgical biopsy is performed early in the diagnostic process. In addition, either CT or MRI is performed to provide information that is used in planning the approach for surgical resection, as well as routes and doses for potential radiation therapy. Secondly, the clinician must evaluate the patient for regional or metastatic disease. This evaluation is accomplished by performing a battery of adjunctive studies, including bone marrow biopsy, chest CT, and technetium diphosphonate bone scanning. When the primary site is parameningeal, a lumbar puncture is also performed for CSF cytology.

Staging classifications based on a) anatomic site of tumor origin, b) tumor size, c) nodal involvement, d) histology, and e) cellular DNA content allow the clinician to determine an overall prognosis for each patient. For example, patients with head and neck RMS affecting the orbit and nonparameningeal area have a prognosis more favorable than that of patients with tumors in other sites of the body.

The treatment of RMS is a multimodal effort. Initial efforts are aimed at surgical resection of the tumor, followed by chemotherapy, and typically ending with a standard course of radiation. The principles of surgical and radiation therapy are based on the site of involvement and the extent of disease, whereas the chemotherapeutic options depend on risk factors.

The principles of surgical and radiation therapy are based on the site of involvement and the extent of disease, whereas the chemotherapeutic options depend on risk factors. Chemotherapy is typically administered for 2 to 3 months before the start of radiation therapy. Radiation treatment is then administered for approximately 6 weeks. The only exception to this rule involves patients with parameningeal disease, and evidence of meningeal spread, such as the case presented here. In this circumstance, radiation is started at the time of diagnosis.

CONCLUSIONS

We suggest that RMS be considered in the differential diagnosis in any patient with symptoms suggestive of cancer or a palpable mass. In situations of suspected orbital cellulitis, a keen history and physical exam should be performed, with careful attention to extraocular muscle movements and proptosis. In our patient, who presented with a recent history of otitis media and strep pharyngitis, it would have been imprudent to assume, without a thorough physical exam and imaging studies, that this presentation was also infectious in nature. CT scan imaging is warranted in order to rule out tumors and allow for timely intervention and care by specialists. Our patient was asymptomatic and metastasis free for more than 1 year because of early diagnosis and treatment of a parameningeal RMS, which normally carries a grave prognosis when diagnosed late.

REFERENCES