A Neck Mass in a 9-Year-Old Child

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child, neck mass, arteriovenous malformations, AVM

A 9-year-old male presented with a 1-year history of an enlarging mass in the right neck after a blow to that area with a football. He was born full-term with no previous hospitalizations. Prior surgeries included bilateral ear tubes and subsequent myringoplasty. Physical examination revealed a right-sided mass in the vicinity of the parotid gland with a palpable thrill. The mass was soft and compressible without fluctuance, drainage, or changes in the overlying skin. The rest of the ear, nose, and throat examination was normal. The differential diagnosis included a vascular malformation (arteriovenous malformation [AVM] with possible aneurysm or pseudoaneurysm), congenital cyst, or dermoid. Computed tomography angiography (CTA; Figure 1) demonstrated a 3.3 × 4.1 × 4.6 cm³ right maxillofacial high-flow AVM with a prominent feeding vessel arising from the external carotid artery and with early draining to the external jugular vein (Schrödinger stage II). The child underwent a transcatheter extracranial embolization of the malformation. Arteriograms during the procedure revealed no abnormalities in the right vertebral, common carotid, or internal carotid arteries. A right external carotid arteriogram demonstrated a large caliber posterior auricular artery with significant tortuosity and with multiple intranidal aneurysms. This artery was the main feeding vessel of a large retromandibular nidus with a plexiform appearance that extended to the ear canal. Small branches of the external carotid artery trunk and occipital artery were found to supply the AVM as well. The AVM was embolized (partially) with particles and hydrocoils with no complications.

Two months later, a control angiography demonstrated partial recanalization of the AVM (Figure 2). A second embolization and sclerotherapy procedure was performed using particles and alcohol. A control angiography post-procedure showed a marked decrease in the size of the AVM with no evidence of intimal injury or thromboembolic sequelae (Figure 3). The child will be followed closely and may need more treatments later.

Discussion

The differential diagnosis of a pulsatile cervicofacial mass in a child includes vascular anomalies such as hemangiomas, capillary malformations, venous malformations, and AVM.¹ An AVM is often congenital and diagnosed early in life but can...

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arteries of the AVM.\textsuperscript{2,4,5} Computed tomography angiography can also be used to classify AVMs as either focal or diffuse malformations depending on their size and anatomical involvement.\textsuperscript{2}

In this case, the diagnosis of AVM was based on a recent local trauma, a painful growing mass that was pulsatile, and CTA findings. It is unclear, although unlikely, that the trauma was the cause for the AVM. The Schrödinger classification system categorizes the natural course of AVM progression into 4 stages (I-IV) and is used to describe an AVM based on its clinical characteristics.\textsuperscript{2} Schrödinger stage I is characterized by a cutaneous blush or warmth, stage II by expansion, active enlargement, pulsations, tortuous veins, and/or bruit, stage III by pain, ulceration, bleeding, and/or infection, and stage IV by cardiac failure.\textsuperscript{2,3} The malformation in this report was classified as Schrödinger stage II.

There is currently no medical therapy to treat an AVM or prevent its recurrence.\textsuperscript{6} As AVMs can present with highly variable features and progression, an individualized and multidisciplinary approach is recommended.\textsuperscript{2,6} Large or diffuse AVMs are more difficult to treat and often have a higher recurrence rate than small or focal AVMs. It is therefore important to treat an AVM early before it progresses in size or severity. Intravascular embolization is the preferred first-line treatment. It can result in temporary AVM control, especially for small lesions or large ones where surgical excision is associated with high morbidity.\textsuperscript{6} Multiple embolization treatments are often required due to the high incidence of recurrence.\textsuperscript{7} Serial embolizations (every 3 months) are effective in controlling even deep lesions in children and minimize morbidity.\textsuperscript{6} Sclerotherapy is often done in conjunction with embolization to decrease the size of the AVM aided by physiological inflammation and scarring.\textsuperscript{2} Complications of embolization and sclerotherapy include skin necrosis, bleeding, ulceration, or nerve injury.\textsuperscript{2} Total surgical excision may completely cure small focal AVMs, but recurrence rates are very high for diffuse ones.\textsuperscript{2,8,9} Adequate resection of a diffuse or large AVMs is limited due to poor anatomical boundaries between diseased and normal tissue.\textsuperscript{2}

The management of neck AVMs in children is challenging, as exemplified by this report. This child has already undergone 2 embolization procedures. Partial recanalization of the AVM occurred after the first treatment. The case emphasizes the need for a multidisciplinary approach to care. Depending on AVM progression, surgical excision or serial embolizations may be necessary.

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