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The Vidian Artery in Childhood Tonsillar Hypertrophy

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Cerebral arteriography performed in two children for cerebral pathology incidentally revealed prominent arterial supply to pharyngeal tonsillar tissue arising directly from the internal carotid arteries bilaterally. Embryologic considerations seem to indicate developmental origins of this vessel from early emanations of the first fetal aortic arch. Clinical implications revolve around the possible relation of the vidian artery to serious hemorrhage during or after otherwise uncomplicated tonsillectomy.

The anomalous anatomic vascular patterns of the cervical carotid system involve variations of both the internal and external carotid arteries [1–10]. This paper deals with instances of symmetric vessels originating from the petrous internal carotid arteries, which supplied the posterosuperior pharyngeal soft tissues in two children with hypertrophied but uninflamed tonsils.

Subjects and Methods

Two children, ages 4 and 10 years old, were studied with arterial digital subtraction angiography (ADSA) as part of their preoperative evaluation for cerebral mass lesions. One of these patients also had an IV dynamic CT (IVDCT) as part of the work-up. Subsequent clinical investigation revealed no evidence of inflamed or abnormally enlarged tonsillar tissue considering the age of the patients. The two children have continued to be treated and followed for their primary cerebral disease for 1 year without change in status of the initial nasopharyngeal observations as judged by direct examination and static CT.

Results

The first patient, a 10-year-old girl, had a small arterial branch originating from the distal internal carotid artery bilaterally, coursing anteromedially. A rounded blush was seen extending into the venous phase. No abnormal venous drainage was present. A subsequent lateral radiograph of the nasopharynx revealed prominence of the nasopharyngeal soft tissues compatible with hypertrophied tonsils, a finding that was not considered abnormal for the patient's age (Fig. 1). The second patient, a 4-year-old boy, had identical findings to the first subject on ADSA and static CT. A supplemental IVDCT to further characterize the nasopharyngeal tissue showed the nonspecific rapid enhancement of the hypertrophied tonsils corresponding to the blush observed on the angiogram (Fig. 2).

Discussion

The normal anatomy of the cervical carotid vascular system, including variants, makes allowance for the vascular structures observed in these two subjects. The fact that these aberrant arteries are bilateral suggests their symmetric developmental nature. The absence of regional clinical disease, which might parasitize an

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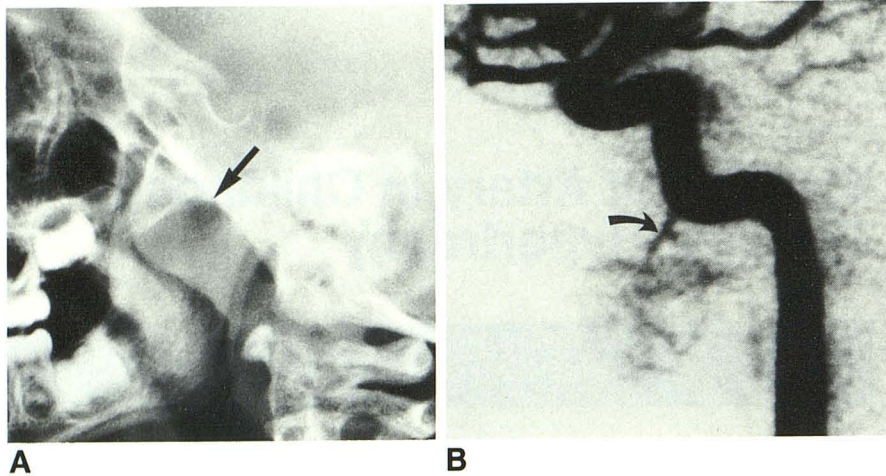


Fig. 1.—10-year-old girl with left hemispheric glioblastoma.
A, Lateral view of nasopharynx shows hypertrophied adenoid tissue (*arrow*).
B, Lateral view of arterial digital subtraction angiogram during left internal carotid injection demonstrates single artery supplying the capillary blush, which corresponds to nasopharyngeal tissue seen in **A** (*arrow*).

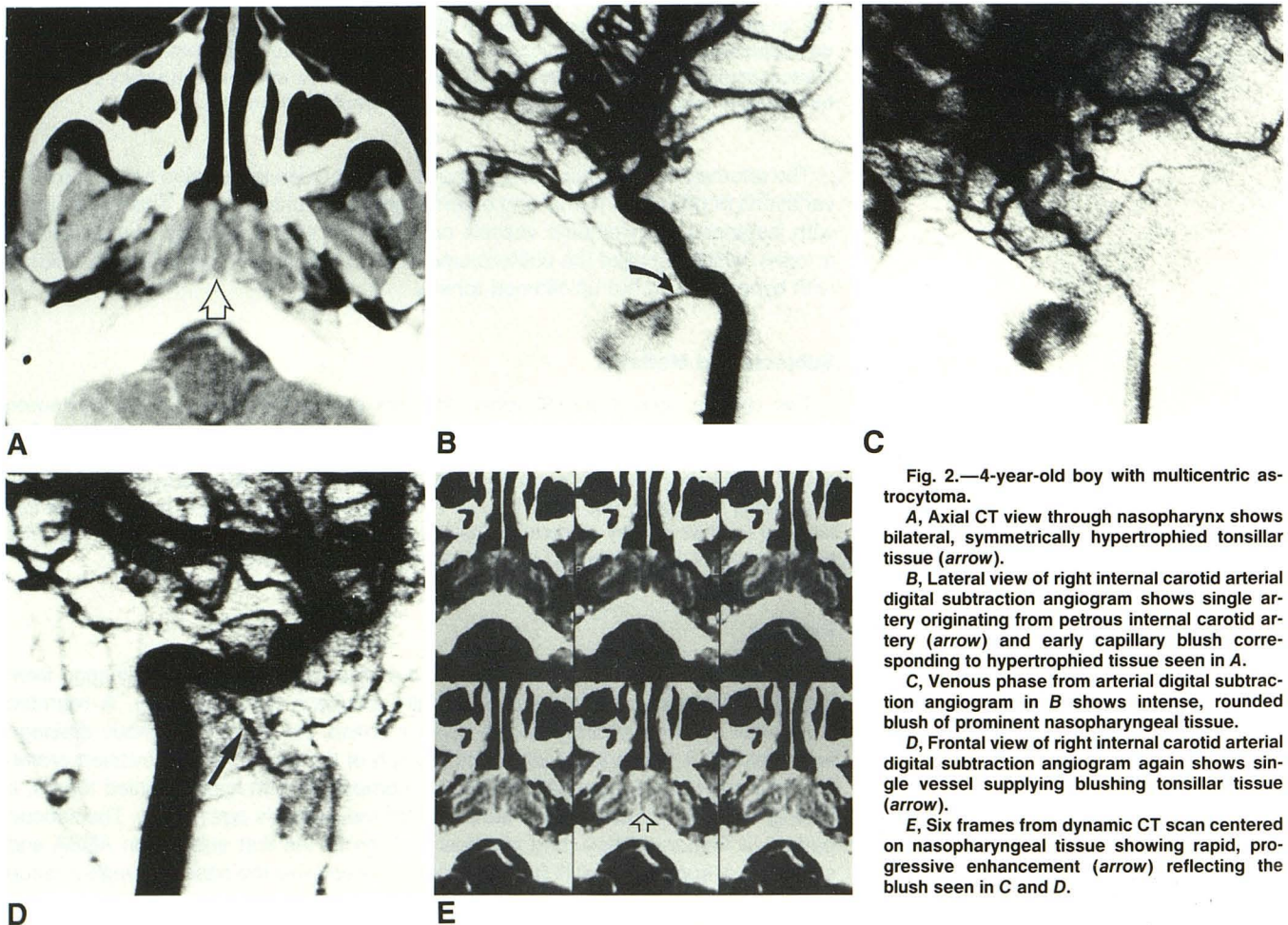


Fig. 2.—4-year-old boy with multicentric astrocytoma.
A, Axial CT view through nasopharynx shows bilateral, symmetrically hypertrophied tonsillar tissue (*arrow*).
B, Lateral view of right internal carotid arterial digital subtraction angiogram shows single artery originating from petrous internal carotid artery (*arrow*) and early capillary blush corresponding to hypertrophied tissue seen in **A**.
C, Venous phase from arterial digital subtraction angiogram in **B** shows intense, rounded blush of prominent nasopharyngeal tissue.
D, Frontal view of right internal carotid arterial digital subtraction angiogram again shows single vessel supplying blushing tonsillar tissue (*arrow*).
E, Six frames from dynamic CT scan centered on nasopharyngeal tissue showing rapid, progressive enhancement (*arrow*) reflecting the blush seen in **C** and **D**.

otherwise insignificant blood supply, supports a developmental premise of fetal persistence.
 The embryologic development of this area is complex, and begins with the emergence of the fetal aortic arches. At the

4-mm-length fetal stage, the first arch gives rise to the mandibular artery. With partial involution of the mandibular artery by the 5–9-mm stage, the ventral pharyngeal artery assimilates that vessel's distal branch supply. The vestige of the

embryonic mandibular artery gives rise to the small inconstant branches supplying the upper posterior nasopharynx directly from the petrous internal carotid artery, including the adult mandibular artery and the vidian artery. Through a complex series of outgrowths, involutions, and assimilations, first the stapedia artery and finally the external carotid artery take over the remaining major vascular supply of the region [7, 11–14]. Intimate anastomoses between the external carotid system and branches of the internal carotid artery thus exist between corresponding ramifications of the vidian artery with the internal maxillary artery, the ascending pharyngeal artery, and the adult mandibular artery. The observed prominence of the vidian arteries in the current subjects may represent a juvenile anatomic manifestation. Perhaps in certain subjects the hypertrophied tissue in the tonsillar region in childhood maintains varying degrees of fetal circulation. In adulthood, the vidian artery may simply involute with normal regression of the nasopharyngeal lymphoid tissue. This would functionally explain the angiographic absence of this artery in most adults. Furthermore, the radioanatomic observations of this artery in normal and abnormal circumstances in adults confirms its persistence into adulthood, albeit in a variably hypoplastic state [3, 7, 10].

However, the real importance of these observations is clinical. In recent years the indications for tonsillectomy have decreased and have been modified radically [15–18]. This is fortunate in view of the catastrophic and sometimes fatal hemorrhaging not infrequently associated intraoperatively and perioperatively in subjects undergoing simple tonsillectomy [19–25]. It is tempting to postulate that these sometimes fatal hemorrhages are related to prominent vidian arterial circulation. Certainly, large vessels on the order of those shown in the present cases, feeding otherwise innocent if inflamed tonsillar tissue, must be unsuspected by the surgeon. It is easy to understand why serious bleeding might occur if such an enlarged vessel were inadvertently lacerated. Because of its rich anastomotic patterns, bleeding from the vidian artery cannot be controlled by simple ligation of either the external or the internal carotid arteries selectively. After a detailed subtraction angiographic evaluation, endovascular occlusion or even angiographic trapping may be necessary in the treatment of uncontrollable hemorrhaging emanating from this region.

Clearly, further understanding of this anatomic vascular structure in children is indicated. With fewer tonsillectomies being performed, more stringent guidelines being observed, and with broader alternatives available, the possibility of the presence of the infantile vidian artery in surgical candidates warrants consideration. Perhaps in selected cases preoperative angiography should be considered for pediatric patients scheduled for surgery for benign or malignant mass lesions of any origin in the posterior nasopharynx.

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