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N M Borden, D Dungan, B L Dean and R A Flom

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Posttraumatic Epistaxis from Injury to the Pterygovaginal Artery

Neil M. Borden, David Dungan, Bruce L. Dean, and Richard A. Flom

Summary: Facial and skull base trauma can cause clinically significant epistaxis. Optimal evaluation and treatment require knowledge of the pertinent vascular and skull base anatomy. We describe a patient with extensive skull base injury and epistaxis in whom CT revealed a fracture through the roof of the nasopharynx and arteriography showed injury to the pterygovaginal (pharyngeal) artery. The fracture was successfully treated with transarterial particulate embolization.

Index terms: Arteries, carotid, external; Epistaxis; Head, injuries

Epistaxis can be idiopathic in origin or it can arise from a variety of causes, including mass lesions, coagulopathy, or trauma. Traumatic injury to the skull base and facial region, for example, can cause intractable epistaxis. This article describes a patient in whom significant epistaxis developed after an injury to the pterygovaginal (pharyngeal) branch of the distal internal maxillary artery.

Case Report

A 13-year-old boy suffered a facial crush injury after falling from a moving automobile. He was transported to our facility for emergency care. Cranial computed tomography (CT) revealed extensive fractures of the face and skull base (Fig 1A and B), including a fracture through the right petrous carotid canal. Emergency cerebral angiography performed to evaluate the status of the right internal carotid artery showed no abnormalities. However, at the time of angiography the patient was noted to have epistaxis. Arterial blood in the right nares coursed down the posterior pharynx, with nasogastric suction producing blood at a rate of more than 1 L/h.

Selective angiography of the right external carotid artery showed extravasation of contrast material into the nasopharynx. Because of the demonstrated arterial leak, emergent embolization therapy was begun. A Fast-tracker 18 microcatheter (Target Therapeutics, Fremont, Calif) was advanced coaxially through a 5.5F angiography catheter into the distal internal maxillary artery. Selective digital angiography confirmed an injury to the pterygovaginal artery, with extravasated pooling of contrast material in the nasopharynx (Fig 1C). This arterial branch might be confused with the vidian artery (artery of the pterygoid canal). The vidian artery courses posteriorly in a characteristic horizontal fashion to the foramen lacerum. In contrast, the pterygovaginal artery curves downward into the nasopharynx to anastomose in the eustachian tube region after coursing posteriorly in the roof of the nasopharynx. These distinctly different pathways of flow allow differentiation at angiography. The vidian artery was not definitely identified in this case at angiography. In addition, comparison with the coronal CT scan showed a fracture through the area of the pterygovaginal (palatovaginal) canal and an intact vidian canal. The distal internal maxillary artery was then embolized with 1.5 mL of polyvinyl alcohol particles (250 to 350 μm).

A postembolization angiogram showed resolution of the contrast leak (Fig 1D). The patient's epistaxis resolved, and 1 day after embolization the nares were clean and dry. Four units of blood were transfused, and the patient's hematocrit value stabilized at 23.6. No further episodes of epistaxis occurred.

Discussion

External carotid angiography with embolotherapy has become a vital component of the examination and treatment of patients with severe or intractable epistaxis (1–3). Optimal therapy depends on detailed knowledge of the pertinent arterial anatomy. Idiopathic epistaxis often arises from the distal branches of the internal maxillary artery or from branches of the facial or ophthalmic arteries (4–6). In posttraumatic epistaxis, the patient's pattern of injury may help predict possible bleeding sites. In this case, both CT and angiography showed that injury to the pterygovaginal (pharyngeal) artery was the cause of posttraumatic epistaxis.

The third, or pterygopalatine, segment of the internal maxillary artery gives rise to numerous branches within the pterygopalatine fossa. The medially directed sphenopalatine artery and inferiorly directed descending palatine artery are

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From the Department of Neuroradiology, Barrow Neurological Institute, Phoenix, Ariz.

Address reprint requests to Neil M. Borden, MD, Department of Neuroradiology, Barrow Neurological Institute, 350 W Thomas Rd, Phoenix, AZ 85013.

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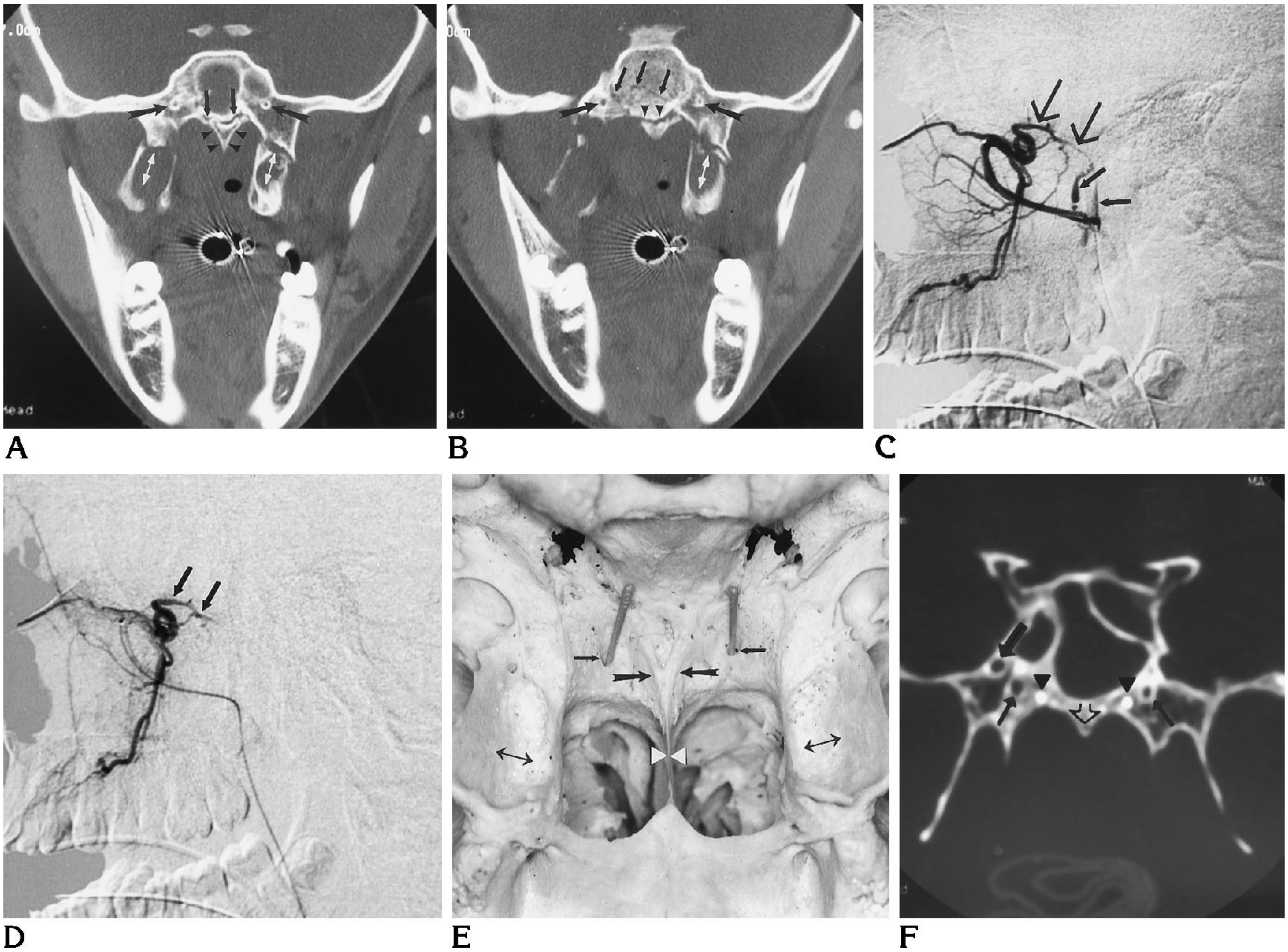

Fig 1. Thirteen-year-old boy with facial crush injury caused by an automobile accident.

A, Bone window from the patient's direct coronal CT scan shows horizontal fractures through the bases of the pterygoid plates (*double-headed arrows*). A horizontal fracture through the skull base (*small arrows*) with detachment of the vomer (*arrowheads*) extends into the expected location of the pterygovaginal canals. The *large arrows* indicate the pterygoid (vidian) canals.

B, Bone window from the direct coronal CT scan more posterior than in *A* again shows the fracture through the base of the left pterygoid plates (*double-headed arrow*). Horizontal and oblique fractures through the middle and right lateral clivus are seen (*small arrows*), as is the horizontal fracture through the skull base involving the region of the pterygovaginal canals (*arrowheads*) and detachment of the vomer from the skull base. Pterygoid (vidian) canals are clearly visible (*large arrows*).

C, Superselective internal maxillary artery angiogram before embolization shows frank extravasation of contrast material arising from the pterygovaginal artery (*large arrows*) with pooling in the nasopharynx (*small arrows*).

D, Late arterial phase from the superselective internal maxillary artery angiogram after embolization shows absence of contrast extravasation. The proximal portion of the pterygovaginal artery within the palatovaginal canal in the roof of the nasopharynx (*arrows*) is seen.

E, Magnified photograph of the skull base of a dry skull specimen as seen from below. Opaque markers have been placed through the pterygovaginal canals (*small arrows*). The vomer (*large arrows*), the pterygoid fossa between the pterygoid plates (*double-headed arrows*), and the nasal septum (*arrowheads*) are indicated.

F, Direct coronal CT scan of the dry skull specimen with opaque markers placed through both pterygovaginal canals (same specimen used in *E*). The right foramen rotundum (*large arrow*), the pterygoid (vidian) canals (*small arrows*), and the pterygovaginal canals containing the opaque markers (*arrowheads*) are identified. The vomer is indicated by the *open arrow*.

often implicated in cases of idiopathic epistaxis (7).

The three posterior branches of the distal internal maxillary artery are (from lateral to medial) the artery of the foramen rotundum, the vidian artery, and the pterygovaginal (pharyngeal) artery. The pterygovaginal artery courses posteriorly in a paramedian location to enter a small, short bony canal in the roof of the nasopharynx (8). The artery courses posteriorly and emerges from the canal in the nasopharynx to enter an area of rich anastomoses in the region of the eustachian tube orifice (Fig 1E). This artery is described in the literature as a possible source of epistaxis (9).

The pterygovaginal (palatovaginal) canal is poorly seen on coronal CT scans; however, its position can be inferred from a knowledge of normal arterial and skull base anatomy. The foramen rotundum and the vidian canal are seen routinely on coronal CT scans through the posterior nasopharynx. The pterygovaginal (pharyngeal) artery is the most medial of the three posterior branches of the distal internal maxillary artery, and its canal, the pterygovaginal (palatovaginal) canal, lies medial to the vidian canal along the roof of the nasopharynx. This relationship can be seen on a direct coronal image of a dry skull specimen (Fig 1F) and coincides with the location of fracture in this patient. Skull base trauma can lead to epistaxis after injury to the pterygovaginal artery within the narrow confines of the pterygovaginal (palatovaginal) canal, as this case illustrates.

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