Traumatic arteriovenous fistula of the scalp

Case report

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A case of an arteriovenous fistula resulting from an air-rifle pellet injury to the scalp is reported. Traumatic arteriovenous fistulas of the scalp are rare lesions. A suggested pathogenesis is a disruption of the arterial wall and its vasa vasorum with endothelial proliferation to adjacent veins. Classically, these fistulas are described as single channels, but more commonly they consist of multiple connections. Angiography is necessary to delineate the full extent of the lesions unless they are extremely small. Careful complete excision is the definitive management, as recurrences are common.

KEY WORDS • traumatic arteriovenous fistula • scalp

TRAUMATIC arteriovenous (AV) fistulas are rare. Numerous sites have been described, including the scalp,1,2 carotid cavernous sinus,9 vertebral artery,4 and ophthalmic artery;8 they have also been described in the chest and the hepatic artery-portal vein system.6 We are reporting a case of AV fistula of the scalp caused by a wound from an air-rifle pellet.

Case Report

This 15-year-old boy was referred to our tertiary-care hospital with a 2-year history of a progressive soft linear swelling over the right occipital region extending to the midline parietal region of the scalp. He had suffered no associated headache, seizures, visual problems, or ataxia. Three years previously he had been struck in the right occipital region of the scalp with an air-powered pellet which had been surgically excised.

Examination. There was a large soft linear swelling, approximately 2 cm in diameter, extending from the right occipital region toward the midline and then superiorly to the parietal region of the scalp. A 3-cm surgical scar was noted overlying the occipital swelling. There was a palpable thrill with an associated bruit in the region. No carotid, orbital, or subclavian bruits were present. The remainder of the neurological, neuro-ophthalmological, and general physical examinations was entirely normal.

Transfemoral selective carotid arteriograms (Fig. 1) demonstrated a tortuous hypertrophied right occipital artery feeding an extremely large AV fistula. This drained through large superficial temporal veins into the external jugular vein. Vertebral angiograms filled the AV fistula from normal-sized cervical branches. The intracranial circulation was normal.

Operation and Postoperative Course. The major feeding vessels were ligated and the AV fistula was excised. Pathologically, the fistula measured 1 cm in length with an average diameter of 0.3 cm. It was comprised of a collection of large and small blood vessels of both venous and arterial types. The surrounding loose vascular connective tissue contained a complex of small dilated vessels. Examination of the patient 14 months after surgery showed no evidence of recurrence.

Discussion

Scalp AV fistulas are rare despite the intense vascularity of the scalp and the relatively high frequency of trauma to this region. Marks, et al.,3 presented five cases of AV fistulas of the external carotid system treated over a 20-year period, and only one involved the scalp region. Our patient had a late presentation, and had not noticed any swelling for approximately 1 year following the injury. Clinical signs of fistulas in the external carotid artery system are more commonly seen within 2 to 3 weeks.6 Physical examination generally reveals a soft compressible swelling with an associated bruit and a palpable thrill. Manual compression of feeding channels may diminish the size of the fistula.

Therapeutic intervention was deemed necessary in this patient. The possibility of injury to the superficial vessels supplying and draining the fistula may result in exsanguination before medical help is obtained. This is particularly important in geographic areas where med-
ical attention is not readily available, which was the case with our patient. Early definitive management is important in children and adolescents, who are prone to trauma, as well as in the elderly population who often live alone. Another concern about this lesion is the possibility of diversion of blood flow from the internal carotid artery circulation to the hypertrophied external carotid system. This diversion may produce ischemic events in the ipsilateral cerebral hemisphere, as can be seen in intracranial AV malformations. Note the marked hypertrophy of the occipital artery in our patient (Fig. 1).

Surgical excision is the therapeutic modality of choice. Complete excision of the fistula with ligation of all feeding vessels is necessary as there is a high propensity for these lesions to recur. Preoperative evaluation of scalp AV fistulas should include both the external and internal circulation and, depending on the site, vertebral angiograms should be obtained to delineate the size of the fistula. The disappearance of the bruit and collapse of the enlarged draining veins confirm excision of the fistula. Routine postoperative angiography is not warranted unless there is clinical suspicion of incomplete excision.

Other therapeutic methods such as embolization and balloon occlusion have been used to treat AV fistulas. Scalp lesions, however, are readily accessible to surgery and are preferably treated by this means. Therapeutic embolization may be incomplete, resulting in later recurrence. Balloon occlusion has been used in intracranial lesions; this procedure is demanding, and may be incomplete, resulting in recurrence.

The classical pathological description of a traumatic AV fistula is a single well-formed vascular channel between an artery and a vein fashioned by canalization of a thrombus or through an aneurysmal sac. More commonly, as in our case, there are multiple endothelial-lined channels, which suggests that the pathogenesis consists of a vein and artery with disruption of its vasa vasorum, adjacent to a hematoma allowing endothelial bud formation and proliferation to create the numerous vascular channels.

References


Manuscript received November 15, 1985. Accepted in final form October 23, 1986. Address reprint requests to: Leke Badejo, M.D., Discipline of Surgery, Memorial University of Newfoundland, St. John’s, Newfoundland A1B 3V6, Canada.