Emergency balloon occlusion for massive epistaxis due to traumatic carotid-cavernous aneurysm

Case report

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A patient with a giant traumatic aneurysm of the right internal carotid artery presented with recurrent massive epistaxis 30 years after a head injury. During an episode of acute hemorrhage, this patient was effectively treated with occlusion of the internal carotid artery circulation by a detachable inflatable balloon.

KEY WORDS traumatic aneurysm • head injury • epistaxis • balloon occlusion

TRAUMATIC aneurysms of the cavernous portion of the carotid artery presenting with epistaxis are uncommon. In an extensive review of the literature in 1981, Chambers, et al., reported only 100 cases of this disorder. A triad of monocular blindness, history of head injury, and recurrent epistaxis is often found in these patients. The initial episode of epistaxis is usually brief and mild but can be fatal, and subsequent episodes of epistaxis are massive and life-threatening. The diagnosis of an aneurysmal origin for the hemorrhage is often elusive and delayed. An aneurysm is seldom suspected because of the time interval between head injury and epistaxis. Although 88% of these hemorrhages occur within 3 weeks of trauma, rare cases have been reported after delays of greater than 4 years. In our case, 30 years elapsed between head injury and blindness and the onset of massive epistaxis.

Surgical treatment for a traumatic aneurysm of the internal carotid artery (ICA) was first performed in 1928 by Birley and Trotter, who applied carotid artery ligation; this is currently the accepted treatment for this lesion. Carotid artery stenosis with a Selverstone or Salibi clamp is also commonly used. Recently, balloon occlusion of the ICA has been proposed as an effective method for treating unclippable aneurysms, and this technique has been used for the elective treatment of traumatic aneurysms. This therapy for cases of life-threatening hemorrhage has received little attention, however. The present report stresses the use of balloon occlusion of the ICA as a life-saving measure for acute massive epistaxis.

Case Report

This 64-year-old man was admitted to the Methodist Hospital for evaluation of right-sided epistaxis. Two weeks prior to admission he had two brief episodes of mild epistaxis that resolved spontaneously. His medical history was remarkable for a severe head injury with a skull fracture sustained at the age of 34 years. During the year following the accident, he gradually lost all vision in the right eye, but had no further health problems for the next 29 years.

Examination. Physical examination revealed no light perception in the right eye. A mild right sixth cranial nerve palsy was noted on lateral gaze. A bruit was audible in the right carotid artery. The remainder of the neurological and general physical examination was normal.

A computerized tomography (CT) scan of the head after intravenous administration of contrast medium revealed a large right parasellar mass projecting into the sphenoid sinus (Fig. 1 left). The mass had a densely enhancing region directly abutting a nonenhancing area, both within a single heavily calcified perimeter. An arteriogram demonstrated a giant lobulated aneurysm of the right ICA (cavernous portion) (Fig. 1 center and right). A traumatic aneurysm was suspected. Shortly after arteriography, the patient experienced two
episodes of severe pulsative epistaxis within 1 hour. He was taken back to the arteriography suite where he had a third episode of massive epistaxis. Binasal Foley catheters were placed into the nasopharynx and inflated for temporary control of the hemorrhage.

Operation. A nondetachable balloon catheter was placed into the right ICA and inflated at the entrance of the carotid canal resulting in complete temporary occlusion of the artery. The procedure was performed transfemorally under local anesthesia, using fluoroscopic guidance. Electroencephalographic monitoring and continuous neurological assessment of the patient over approximately 10 minutes showed no changes. The mean stump pressures were 39 mm Hg. The temporary balloon was then exchanged for a detachable balloon filled with contrast solution. The balloon was inflated and detached and two thrombogenic coils were placed proximal to the balloon. Cerebral arteriograms, obtained immediately after the procedure, revealed complete occlusion of the right ICA with no filling of the aneurysm. Adequate cross filling of the right hemisphere from the left carotid circulation was demonstrated.

Postoperative Course. The patient was taken to the neurosurgical intensive care unit where the nasal catheters were gradually removed. One week after balloon occlusion, cerebral arteriography revealed a completely occluded right ICA, continued collateral perfusion by the left carotid circulation, and no filling of the aneurysm. A dynamic CT study showed a nonenhancing homogeneous parasellar mass consistent with thrombus formation. Magnetic resonance imaging using blood flow-dependent pulse sequences demonstrated no flow through the mass and a signal pattern consistent with old and new thrombus formation (Fig. 2). The patient was discharged 2 weeks after balloon occlusion without recurrent epistaxis or new neurological deficits.

Discussion

Since the original description by Barth, traumatic aneurysms of the ICA have proved to be extremely hazardous when epistaxis is a presenting feature. Mild epistaxis that resolves spontaneously often heralds massive hemorrhage that can quickly lead to exsanguination and death. Such deaths are often the result of diagnostic and therapeutic delays because the origin of epistaxis is not appreciated. Nearly three-quarters of patients are not properly diagnosed until 4 months after their initial hemorrhage. Massive epistaxis usually
leads to emergency arteriography where an aneurysmal origin for the hemorrhage is eventually discovered.\(^{22}\) If the patient's condition stabilizes and the bleeding stops, carotid ligation (either intracranial or extracranial) is generally performed.\(^ {10,14,20,22}\) In an acutely deteriorating patient, however, the preparation required for adequate surgical control can result in the patient's death.\(^{1,13}\)

The mortality rate for surgical treatment of traumatic aneurysms of the ICA has been reported to be 18% to 24%.\(^ {16,22}\) Conservative care carries a 41% to 50% mortality rate.\(^ {16,22}\) Satisfactory results have been obtained by Drake\(^7\) and Gelber and Sundt\(^8\) using carotid artery stenosis; however, a 55% incidence of repeat hemorrhage has been reported using this technique.\(^23\) Balloon occlusion of the carotid circulation has been proposed as an alternative method for treating unclippable aneurysms. Recent series reported by Fox, et al.,\(^8\) Debrun, et al.,\(^3\) and Berenstein, et al.,\(^3\) had comparable or significantly better outcomes when patients were treated with balloon embolization. These series included patients with cavernous-carotid aneurysms who presented with epistaxis. Although these patients were initially stable, Serbinenko and Lazarev\(^ {16,19}\) have suggested that balloon catheters can be successfully employed as an effective emergency treatment for acute hemorrhage.

Risks and complications associated with surgical (intracranial or extracranial) or detachable intra-arterial balloon occlusion of the carotid artery are well documented.\(^ {3,6-9}\) Use of detachable balloons as a life-preserving technique, however, has several advantages over surgical intervention. The patient can be easily awakened for continuous neurological assessment throughout the procedure.\(^ {15}\) Although electroencephalography is helpful,\(^ {20}\) the inability to adequately monitor neurological function can result in unexpected postoperative deficits following surgical carotid occlusion.\(^7\) Arteriography can also be obtained more easily immediately before, during, and after occlusion of the artery, insuring both the lack of aneurysmal filling and preservation of adequate collateral perfusion.\(^ {15}\) Delays in postoperative arteriographic verification of aneurysmal thrombosis can be dangerous. Fatal recurrent hemorrhage has occurred after successful carotid ligation because of unsuspected flow to the aneurysm.\(^7\) The occurrence of monocular blindness and a history of head injury in the presence of epistaxis should suggest the possibility of a traumatic cavernous-carotid aneurysm. Emergency balloon occlusion of such aneurysms may be a lifesaving procedure.

References

12. Lee BCP, Deck MDF: Sellar and juxtasellar lesion detection with MR. Radiology 157:143-147, 1985

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