Overview

Carotid-cavernous fistulas (CCFs) are abnormal communications between the carotid arterial system and the venous cavernous sinus. Most often, CCFs are broadly classified as either direct or indirect, on the basis of anatomic features depicted on angiograms. (See the images below.)

Patient with a gunshot wound to the face in whom a left traumatic carotid-cavernous fistula developed. The case was further complicated with bilateral optic nerve injuries and a skull base fracture affecting the sphenoid bone and temporal bones bilaterally.

An almost complete carotid-cavernous fistula demonstrates only minimal runoff to the ipsilateral intracavernous carotid artery territory. Because runoff has occurred, carotid preservation remains the treatment of choice. In patients in whom absolutely no runoff is demonstrated, carotid sacrifice at the level of the carotid-cavernous fistula can be considered, if necessary, to close the fistula. Needless to say, this treatment also depends on the collateral vessels and the patient's ability to tolerate intracavernous carotid artery sacrifice.
Anteroposterior view of an almost complete carotid-cavernous fistula demonstrates only minimal runoff to the ipsilateral intracavernous carotid artery territory. Because runoff has occurred, carotid preservation remains the treatment of choice. In patients in whom absolutely no runoff is demonstrated, consideration can be given to carotid sacrifice at the level of the carotid-cavernous fistula if necessary to close the fistula. Needless to say, this treatment also depends on the collateral vessels and the patient's ability to tolerate intracavernous carotid artery sacrifice.

CT image of the head at the level of the cavernous sinuses demonstrating left cavernous sinus widening secondary to an underlying carotid-cavernous fistula.

Further classification is based on their etiologic and hemodynamic qualities. Clinical manifestations of CCFs frequently involve ophthalmologic abnormalities; many patients initially consult an ophthalmologist.[1]

Symptomatic direct CCFs (type A) spontaneously resolve only in rare cases. Therefore, they almost always require urgent treatment. The goal of treatment is to eliminate flow through the fistula but also to maintain internal carotid patency.[2, 3, 4]

Radiologic techniques are used in embolization of carotid-cavernous fistulas (CCFs). Angiography is invaluable for the guidance of catheter placement and delivery of the embolization materials. Angiography, computed tomography (CT) scanning, magnetic resonance imaging (MRI), and magnetic resonance angiography (MRA) are also useful in assessing the effectiveness of treatment. (See the image below.)

Preferred examination
CT and MRI are the preferred radiologic modalities. Compared with angiography, CT and MRI have a much lower incidence of complications. Furthermore, CT and MRI scans depict peripheral pathologies associated with CCFs (e.g., enlargement of cavernous sinus and the ophthalmic vein). Angiography is used to confirm CT or MRI findings prior to treatment.\[5, 6, 7\]

Limitations of techniques

CT findings may be sufficient for diagnosis in most patients; however, MRI and angiography are superior in evaluating venous distension, the aneurysm lumen, and the increased flow to cavernous sinus. Indirect signs associated with CCFs are not readily seen on angiographic images. MRIs and CT scans are limited because precise filling of the cavernous sinus and other signs of abnormal blood flow are not readily seen.

References


