
PERSISTENT FACIAL SWELLING AND TINNITUS COMPLICATING SEPTORHINOPLASTY

T. Van der Zijden1, J. Claes2,3, F.M. Vanhoenacker4,5, G. Claes6

Septorhinoplasty (SRP) is commonly performed for correcting nasal bony and cartilaginous deformities. Traumatic arteriovenous fistula (AVF) is often seen at specific anatomic locations and has rarely been associated to SRP. We report such an unusual case where an AVF developed from a terminal branch of the facial artery.

After septorhinoplasty a patient reported pulsatile tinnitus, starting one day after surgery. Swelling on the left side of the nasal pyramid was still present two weeks after the procedure. Clinically, a traumatic AVF was suspected which was confirmed by subsequent Doppler ultrasound examination and angiography. The lesion had developed an important venous pouch and arterial contribution was from the internal carotid as well as external carotid system bilaterally. Complete resection was done by external approach.

Key-words: Arteriovenous malformations – Nose.

Case report

A 47-year-old male underwent endonasal SRP for correction of an obstructing nasal pyramid and nasal septal deviation. The patient’s history included hiatus hernia, aspirin intolerance and bronchial hyperreactivity without evidence of sinonasal inflammatory disease. Oral omeprazole and salmeterol/fluticasone intake was used as chronic medications. No other systemic or vascular conditions were present.

The surgical procedure involved a septal correction with osteotomy of the maxillary crest, removal of a cartilaginous and bony hump, para- median and lateral osteotomies involving external stab incisions midway between medial canthus and nasal dorsum. Afterwards nasal splints and thermoplastic external nasal splint were placed.

The immediate postoperative course was uneventful and the patient was discharged the next day. At postoperative control one week later the splints were removed and symmetrical regressing facial swelling and hematoma was visible. However, the patient mentioned a discrete, pounding tinnitus that was present since day one after surgery. Since no clinical explanation could be found at that time, no specific action was undertaken until the next control visit one week later. At that time and after further regression of facial soft tissue swelling a localized swelling at the left medial canthus had become evident. The swelling was well-confined, painless, without signs of inflammation or hematoma (Fig. 1). In addition, the presence of a pulse synchronous pulsation of the swollen area was very striking. Rhinoscopy and nasal endoscopy were normal. Clinically, an arteriovenous fistula formation was suspected and the patient was referred for Doppler Ultrasound evaluation, confirming the vascular nature of the lesion with mixed arteriovenous flow (Fig. 2). The high diastolic flow in the arterial component of the lesion reflected a potential communication with the internal carotid artery (“low-resistance cerebral circulation”).

For optimal therapy planning the patient underwent conventional angiography. Selective angiography of both external and internal carotid arteries showed the vascular anatomy of the AVF with the arterial feeders...
Fig. 2. — Doppler ultrasound of the nose. Color Doppler ultrasound image (A) obtained at the level of the clinical swelling confirms the vascular nature of the lesion. The high diastolic flow in the arterial component on pulsed Doppler (B) reflects a potential communication with the internal carotid artery system.

Fig. 3. — Selective angiography (internal carotid artery, ICA, and external carotid artery, ECA) shows the vascular anatomy of the AVF with arterial feeders (thin black arrows) and venous pouch (thick white arrows) with draining veins. The AVF is fed from the left internal maxillary artery through a hypertrophied infra-orbital artery (A – left ECA injection, lateral view) and from the left ophthalmic artery through the dorsal nasal artery (B – left ICA injection, lateral view). Right ECA injection (C – anteroposterior view) show feeding from the left angular artery through the right facial artery, using right to left collaterals. The venous outflow of the fistula is mainly through the right angular vein and frontal veins (D – anteroposterior view, left ECA injection late arterial phase).
and the venous pouch with draining veins (Fig. 3). On the left side the AVF was fed from the left internal maxillary artery by a hypertrophied infra-orbital artery and from the left ophthalmic artery by the dorsal nasal artery. Across small right to left collaterals the feeding left angular artery was supplied by the right facial artery and right ophthalmic artery. The venous outflow was mainly through the right angular vein and frontal veins.

Because of the easy surgical access and the difficult direct arterial approach for femoral (transarterial) treatment, surgery was performed to treat this condition.

Through an external skin incision the venous pouch was exposed in the subcutaneous plane. Several feeding arteries were coagulated and transected, and the pouch was removed (Fig. 4). Pathologic exam of the resected tissue confirmed the vascular nature of the lesion. The further postoperative course was uneventful and the patient remained without complaints until the last follow-up visit four months after the surgical procedure.

Discussion

Arteriovenous fistulas (AVFs) are uncommon vascular lesions with abnormal communications between arteries and veins resulting in shunting of blood. Mostly, they are acquired after trauma (including surgery), due to rupture of an arterial aneurysm or due to erosion in neoplasms.

Most of the AVF’s in head and neck region are intracranial, i.e. carotico cavernous fistulas and dural AVF’s. AVF formation in the facial area after surgery has been described (1, 2). We did – however – not find a similar case to the current case after a medline search, using the search terms “rhinoplasty, septrhinoplasty, rhinosurgery, rhino surgery”, combined with “arteriovenous”. Descriptions exist of AVF formation through direct damage of the anterior ethmoidal artery (2). This in our opinion was not the underlying mechanism in our case, since there were no SRP-related peroperative or postoperative signs suggestive of any other than pre-septal localization of vascular trauma.

Carotico cavernous AVF has been described as an unusual and dramatic complication of nasal surgery (3). It is clear from the clinical presentation and angiographic findings in our case that it is not comparable to a traumatic carotico-cavernous AVF.

We believe that in our case a direct trauma of the left angular artery has been the primary vascular lesion, caused by transcutaneous left lateral osteotomy.

Pulsatile tinnitus is a known early sign of AVF of the midface, nose or sinuses (4). The tinnitus in our case was also the first sign and we believe to be explained by bony sound conduction of the turbulent flow at the AVF.

The development of the venous pouch and its typical clinical presentation in our case have possibly been delayed by the use of external nasal splints and masked by the immediate normal postoperative swelling.

The arterial contribution to the fistula from both internal and external carotid artery is striking. Several anastomotic routes between extracranial and intracranial circulation exist. One of these possible collateral routes is the orbital plexus, which connects the ophthalmic artery with facial, middle meningeal, maxillary and ethmoidal arteries (5). It is known that in some cases of internal carotid artery occlusion collateral connections between external carotid artery and the intracranial and orbital circulation may develop. The blood supply to the ipsilateral eye and even to the ipsilateral brain hemisphere can depend solely on retrograde filling of the ophthalmic artery (6). During embolization procedures or due to high-flow shunts, these potentially collateral pathways can become more prominent (7).

In the case of clinical suspicion of a superficially located AVF, due to its low cost and wide availability, color Doppler ultrasound is the first-line imaging technique to confirm the vascular nature of the lesion. It also demonstrates arterial flow in the feeding arteries, turbulent flow at the junction between artery and vein and high-velocity arterIALIZED flow within the draining veins (8). However, catheter angiography is often needed for more precise vascular mapping of feeding arteries, nidus and draining veins (1). Angiography is very useful in showing the sometimes complex anatomy of the AVF in order to plan an adequate treatment strategy. It is very important to visualize the entire nidus with all feeding vessels, including other possible collateral feeders, and draining vessels. A proper angiography protocol in the case of a facial AVF includes arteriograms of both the external and internal carotid arteries (9, 10).

A specific treatment choice is always a trade-off between benefits and risks. A femoral transarterial embolization is preferred in a case with
good arterial access, with no dangerous interconnections with the internal carotid artery system, and easily accessible collateral feeders. Another embolic therapeutic approach could be by direct or femoral transvenous approach. The embolization could be done by glue, non-adhesive liquid embolic agents, coils, particles or a combination of the aforementioned embolic agents. In comparison with surgery endovascular therapy has higher rates of recurrence. Direct transcutaneous injection of a sclerosing agent is in selected cases possible as well.

Surgical treatment of a sinonasal AVF is a valuable option whenever its location allows radical resection. It may be the only option of treatment in those cases where embolization is not feasible or has failed. Resection of the venous pouch and all feeding arteries is of utmost importance, since reformation of AVF has been described after incomplete resection (10).

In conclusion, AVF developing from a terminal branch of the facial artery after SRP is unusual. Feeders were recruited from both internal and external carotid arteries. Doppler-ultrasound is an excellent first-line imaging technique for confirming the vascular nature of a lesion. For treatment strategy planning catheter angiography, including angiograms of both the external and internal arteries, provides more precise vascular mapping. Visualizing the entire nidus with all feeding and draining vessels is very important.

References