Transarterial onyx embolization of arteriovenous malformation in the infratemporal fossa and parotid region

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ABSTRACT

Maxillofacial arteriovenous malformation (AVM) is a rare, but potentially life-threatening entity. Surgical excision usually associates with a high rate of significant blood loss and cosmetic defects. We report a patient who had an AVM involving infratemporal fossa and parotid region, supplied by an enlarged branch of the left ophthalmic artery, cavernous internal carotid artery, middle meningeal artery, and internal maxillary. Successful treatment of this lesion was achieved by transarterial embolization with Onyx. Less invasive transarterial embolization with Onyx is rewarding when curing certain types of maxillofacial AVMs.

Key words: Arteriovenous malformation, embolization, infratemporal fossai

INTRODUCTION

We report the case of a young patient who revealed an arteriovenous malformation (AVM) located in infratemporal fossa and parotid region. We report this particular case because such an extensive AVM, fed by branches of internal and external carotid artery was extremely rare in the literature and transarterial embolization as first choice modality for cure of the AVM was achieved successfully without any complications.

CASE REPORT

We encountered a young patient who suffered from a mass in the left angle of mandible area, had a pain and discontinuous bruit in the right ear for about 3 months. She received cyst excision in left angle of mandible area 10 years ago with bleeding complication. Contrast-enhanced computed tomography scan and magnetic resonance image detected an abnormal vascular structure involving infratemporal fossa and parotid region. Catheter angiography demonstrated a 3 cm AVS supplied by an enlarged branches of the left ophthalmic artery, cavernous internal carotid artery, middle meningeal artery and internal maxillary, and drained into external carotid venous [Figure 1].

Under general anesthesia, a 6F introducer sheath was placed in the right femoral artery, a 6F guiding catheter (Envoy; Cordis Endovascular, Miami Lakes, FL, USA) was placed in the origin of the left external carotid artery after systemic heparinization. A Hyperform 7 × 7 balloon catheter (Micro Therapeutics, Inc.) was preliminarily positioned the distal of the middle meningeal artery to facilitate micro catheter super selection, Marathon micro catheter (ev3, Irvine, CA) were super selectively navigated to reach the proximal to the venous porch with the aid of a 0.008 in. guide wire (Mirage, ev3). Micro catheter angiography was then performed to confirm optimal positioning. The micro catheter was flushed with 10 mL of normal saline. Then, 0.25 ml dimethyl sulfoxide (DMSO) was injected into the micro catheter to fill the dead space. Onyx-34 (Micro Therapeutics Inc., Irvine, CA) was slowly injected using the "reflux-hold-reinjection" technique. When unwanted reflux of Onyx or flow into undesirable vessels was observed, we held the injection 20 s to 2 min to solidify the Onyx and then restarted. The other 5-French catheter was placed in the ipsilateral common carotid arteries. During the injection of Onyx, angiography was performed through the guiding catheter or angiographic catheter to confirm the total occlusion of fistula and undesirable embolization. The micro catheters were withdrawn when the angiogram showed complete occlusion of the fistula [Figures 2 and 3].

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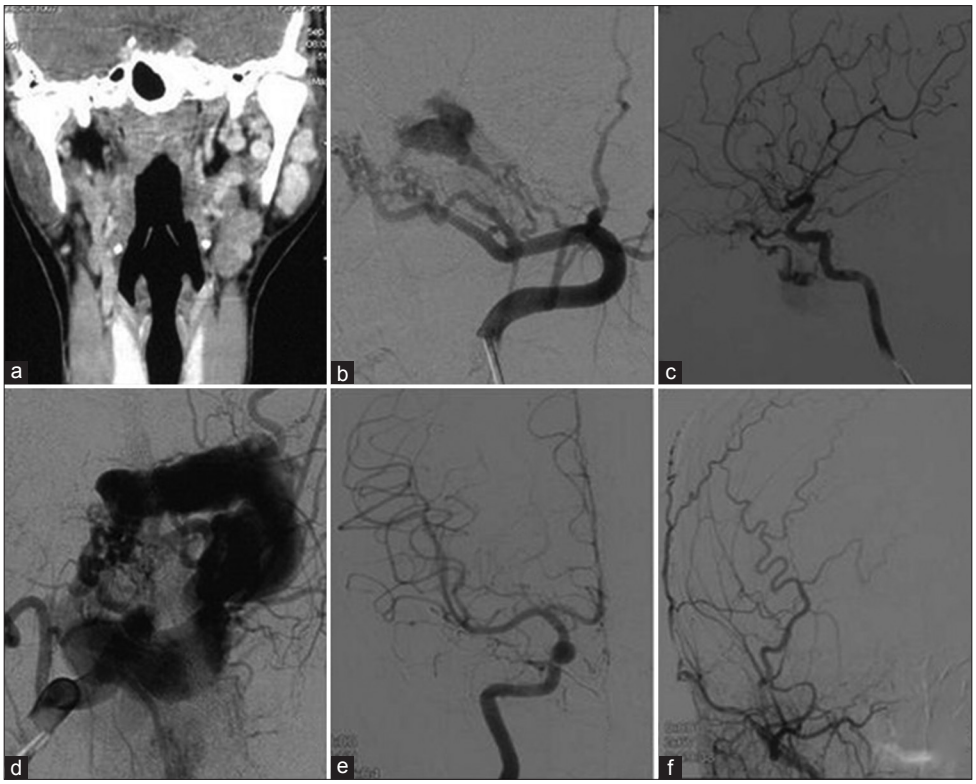

Figure 1: (a) Contrast-enhanced computed tomography scan detected an abnormal vascular structure involving infratemporal fossa and parotid region. (b) The left external carotid arteriogram show the arteriovenous shunt arising branches of the middle meningeal artery and internal maxillary. (c) The left internal carotid arteriogram show the arteriovenous shunt arising branches of the left ophthalmic artery, cavernous internal carotid artery. (d) The arteriovenous shunt drains via a large venous pouch to the external carotid vein. (e) The right internal carotid arteriogram. (f) The right external carotid arteriogram

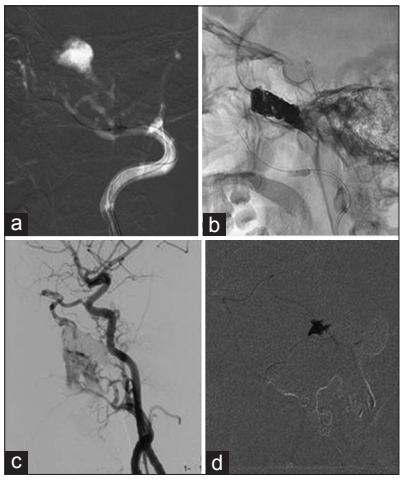

Figure 2: (a) Balloon-assisted micro catheter supersletselection via middle meningeal artery. (b) Onyx cast after injection of Onyx-34 (1.2 mL). (c) The residual fistula fed by branches of the left ophthalmic artery. (d) The small residual fistula was occluded by super selective ophthalmic artery injection of Onyx-18 (0.2 mL)

Figure 3: (a) Anteroposterior left common carotid artery angiograms demonstrating complete occlusion of the fistula. (b) Lateral left common carotid artery angiograms demonstrating complete occlusion of the fistula

DISCUSSION

Although there are large published series of head and neck AVMs, we could not find any previously published case of such an extensive AVM involving infratemporal fossa and parotid region.[1] maxillofacial AVM remain challenging to treat. Therapeutic options include surgical, endovascular or combined approaches. Surgical excision is technically demanding and has a high rate of significant intraoperative bleeding and functional and esthetic difficulties. Endovascular embolization (transarterial, transvenous or percutaneous) using the different embolic agents (alcohol, glue, particles, coils, balloons) have been proposed for the treatment of mandibular AVMs. It is difficult to obtain complete cure for most AVM by

arterial embolization alone, because of the feeding arteries are often multiple and tortuous, making them not easy to catheterize individually. Transvenous embolization is now recognized as one of more effective treatment for treatment mandibular AVM. Kiyosue *et al*. present a case with high-flow mandibular AVM using a several size 57 microcoils and 3 Gianturco coils was performed through a right femoral vein access. The small residual AVM was occluded by superselective transarterial injection of cyanoacrylate.[2] Benndorf *et al*. described a bleeding mandibular AVM cure by transfemoral venous embolization with NBCA on an emergency basis.[3] Fan *et al*. reported four cases of mandibular AVM that were successfully treated by transvenous embolization through the mental foramen.[4] Meng-Chao Chen reported a patient who had an AVM in the parotid region was transarterial complete occlusion with NBCA.[5]

Onyx as a new embolic agent, has been reported for embolization of cerebral AVMs and dural arteriovenous fistula.[6,7] Cohen *et al*. reported two cases of mandibular AVMs occluded by endovascular transarterial and transvenous approaches with Onyx.[8] In the presented case, AVM supplied by branches of four arteries, draining into the same venous pouch. From a single arterial super selection, Onyx-34 (1.2 mL) was injected for 25 min, a subtotal lesion could be embolized, no retention of micro catheter occurred. The small residual AVM was occluded by super selective ophthalmic artery injection of Onyx-18 (0.2 mL). Compared to NBCA, precipitated Onyx is less adherent to the micro catheter, a longer length of time for the precipitation. The diffusion properties of the agent permit progressive filling of the arteriovenous network and veins, which avoids the need for multiple catheterizations and embolization. Effective treatment requires precise target embolization, including the orifice of fistula itself and/or the most proximal venous outlet. We recommend that a wedged injection position and the micro catheter tip be positioned as close as possible to the fistula, which may guarantee a complete obliteration.

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