Surgical Treatment of a Post–Traumatic Arteriovenous Fistula of the Superficial Temporal Artery and Vein

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We describe a rare case of traumatic arteriovenous fistula of the superficial temporal artery (STA) and superficial temporal vein (STV), which was treated with direct clipping with coagulation of fistula site of STV and preservation of STA. This report describes successful treatment by surgery, along with reviews of the related literatures. (J Kor Neurotraumatol Soc 2007;3:59-61)

KEY WORDS: Trauma · Arteriovenous fistula · Superficial temporal artery.

Introduction

Traumatic arteriovenous fistulas (AVFs) are rare, including the scalp, carotid cavernous sinus, vertebral artery and ophthalmic artery.1) AVF of the scalp is direct connections between the arterial feeding vessels of the scalp and the draining veins without intervening capillary beds. The draining veins are often grossly enlarged and tortuous, like a varix.2) We experienced a rare case of traumatic AVF involved the superficial temporal artery (STA) and the superficial temporal vein (STV). This report describes successful treatment by clipping at the fistula site and coagulation of draining STV, along with reviews of the related literatures.

Case

A 33-year-old man bumped his right head against the ground during playing soccer. He lost his consciousness for several minutes and noticed the swelling at his temporal region one day after the accident as it became pulsative and enlarged. He couldn’t sleep for a month because of unpleasant sound: such as bruit. Physical examination revealed a 10 × 15 mm sized pulsatile and round mass on the right temporal scalp, which was located on the course of the anterior branch of the STA (Figure 1). The pulsation of the mass disappeared with compression on the proximal portion of the STA. The presumptive diagnosis of STA-STV fistula was confirmed by selective angiography of the right external carotid artery (Figure 2). It demonstrated the fistula was fed by the STA and drained through the STV. The ectatic venous component of fistula could be seen located beside the dilated venous complex. Brain magnetic resonance image (MRI) showed a high-flow vasculature on T2-weighted images in the right temporal region, but no abnormality lesion in the intracranial compartment (Figure 3).

The operation was performed under the local anesthesia. A longitudinal incision was then made in the right temporal region. After the right STA and AVF were dissected gently from adjacent subcutaneous tissues. Fistula site was the proximal part of anterior branch of STA. The STV was enlarged along its course and arterialized (Figure 4). A hemoclip was applied on the AVF site beside STA. The STV was coagulated and sacrificed, while the STA was preserved. The bruit and thrill disappeared during the operation. No complication was observed, and the patient was discharged the day operation. No recurrence was observed after a clinical follow-up of one year.

Discussion

We could find 12 patients (including ours) with AVF of the STA-STV have been reported in the papers.1,3-12,15) Three kinds of cause are described in these reports. One is incidental injuries (6 of 12), another is iatrogenic injuries (4 of
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12) and the other is spontaneousness (2 of 12). And also, 2 kinds of method for treatment are described as 8 surgical excisions⁴,⁶,⁸,¹¹,¹²,¹⁵) and 4 endovascular embolizations.³,⁹,¹⁰,¹⁵)

The STA originates at the border of the parotid gland, and courses between the skull and the scalp along with its veins. STA and STV are exposed to potential trauma when reaching the superior temporal line of the skull, so they are easy to injury by trauma.⁴ Therefore, the anterior and posterior branches of the STA are the most frequent sites of injury and AVF.

There are two theories that pathologically describe traumatic AVFs. One is the disruption theory of the vasa vasorum of the arterial wall which proposes that endothelial cells proliferating from the vasa vasorum into the hematoma around the disrupted vasa vasorum form endothelial buds and numerous small vessels, resulting in numerous vascular channels created to adjacent veins.⁷ The other is the laceration theory that simultaneous lacerations of the artery and the accompanying vein result in a single fistula.¹⁴) In our case, immediate occurrence of the pulsatile tinnitus and the pulsating mass lesion suggested that the STA and the STV

FIGURE 1. Preoperative photograph of the right temporal pulsatile mass (arrow).

FIGURE 2. Right ECA angiogram. Lateral view of right external carotid artery (ECA) angiogram demonstrates early opacification of the dilated and tortuous superficial temporal vein (black arrow) and a high-flow AVF (wide arrow), the site of which was marked by an enlargement of its venous side. The fistula was fed by the superficial temporal artery, and drained through the large superficial temporal vein into the external jugular vein (white arrow).

FIGURE 3. Preoperative axial T2-weighted MRI show a signal-void lesion (arrow) in the right temporal area.

FIGURE 4. Fistula (arrow) was present at the proximal part of STA-A. STA-A: anterior branch of superficial temporal artery, STA-P: posterior branch of superficial temporal artery, STV: superficial temporal vein.
were directly connected. Therefore, the pathogenesis of our patient is the laceration by trauma.

Radical surgical excision has been the most common method in the majority of cases. Complete excision of the fistula with ligation of all feeding vessels is necessary as there is a high propensity of these lesions to recur.1,4-8,11,12,15) In this case we modified the method of radical surgical excision, because our patient had single fistula. We applied a hemoclip on the A VF site and sacrificed the STV after coagulation, but didn’t ligate the STA. The bruit and thrill disappeared immediately after clipping, and no more fistula was observed. The STA of lesion site was preserved but, no recurrence was noticed after a clinical follow-up of one year.

Other therapeutic methods such as embolization and balloon occlusion have been used to treat AVF. These endovascular treatments can be the other therapeutic modality.3,5,10,15)

Conclusion

Traumatic AVF of the STA-STV must be considered if the patient had trauma in the preauricular temporal region and has a palpable trill and/or pulsatile mass lesion, disappeared after proximal STA compression. There are many different methods to treat with these lesions and we choose modified radical excision under local anesthesia. No complication was observed, and no recurrence was noticed after a clinical follow-up of one year.

REFERENCES