

Endovascular Treatment of Traumatic Aneurysms of the Superficial Temporal Artery

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Traumatic aneurysm of the superficial temporal artery (STA) is rare. Description of such an aneurysm can be traced back to a report by Thomas Bartholin in 1740.¹ Since then, fewer than 200 cases of aneurysm of the STA have been reported in the literature.²⁻⁶ Although surgical resection is the treatment of choice in most cases today, endovascular treatment after diagnostic angiography in one session can be an alternative. To our knowledge, until now, three cases of aneurysm of the STA have been treated by embolization with selective injection of embolic materials to the STA.⁷⁻⁹ This procedure may cause necrosis of the scalp or may result in incomplete occlusion of the aneurysm because of proximal occlusion of the STA. We report two additional patients treated by endovascular trapping (occlusion of both proximal and distal portions of the STA to the aneurysm) and discuss its efficacy for the treatment of aneurysms of the STA.

CASE PRESENTATION

Patient 1

A 21-year-old man noticed a right temporal mass, which had been slowly increasing in size. He had sustained a fist blow to the right temporal region 2 years before admission. Local scalp swelling caused by the blow had disappeared spontaneously in 2 weeks. His medical history was otherwise unremarkable. On admission, he was neurologically completely normal except for the pulsatile mass, approximately 1.5 cm in diameter, in the right temporal region.

We explained to the patient the possibility of a diagnosis of traumatic aneurysm of the STA. The patient consented to embolization after diagnostic angiography if it disclosed an aneurysm. Under local anesthesia, right external carotid angiography through the transfemoral route disclosed the aneurysm of the STA (Fig. 1A). The lumen of the aneurysm was approximately 0.5 cm in size, suggesting a partially thrombosed aneurysm. Through the diagnostic catheter, a microcatheter (FasTRACKER-18, Target Therapeutics, Fremont, Calif) with a hydrophilic polymer-coated guide wire (0.016 in, Radifocus, Terumo Inc., Tokyo, Japan) was advanced to the right STA and up to the position of the aneurysm. Using fibered platinum coils (Cook Inc., Bloomington, Ind), not

only the proximal portion of the STA but also its distal portion near the aneurysm were occluded (trapping of the aneurysm) (Fig. 1, B and C). The entire procedure required 1.5 hours. The patient tolerated these procedures well. Immediately after treatment, pulsation of the mass disappeared. The mass gradually decreased in size and disappeared within 2 months. During the follow-up period of 10 months, no recurrence was observed.

Patient 2

A 78-year-old man struck his left forehead when he fell down. Immediately after the trauma, only slight local swelling was noted, but 4 hours later, marked swelling began and continued to increase in size for the next 12 hours. Thereafter, the size of the swelling did not change. Nine days after the trauma, a local physician, using a diagnosis of purulent abscess, attempted to open the mass, which resulted in profuse bleeding. The physician then closed the wound tightly with silk sutures. Two weeks after the trauma, the patient came to our hospital. A pulsating mass approximately 3 cm in diameter was observed in the left forehead. Four stitches of silk suture were observed over the mass (Fig. 2A). The patient's medical history was unremarkable except for a duodenal ulcer for which he had been under treatment for several years.

The patient consented to diagnostic angiography and possible endovascular treatment for a traumatic aneurysm of the STA. Under local anesthesia, transfemoral angiography confirmed the diagnosis (Fig. 2B). In the same manner as in the case of patient 1, trapping of the aneurysm with fibered platinum coils was carried out through a microcatheter, which was introduced into the anterior branch of the left STA (Fig. 2, C and D). The mass became hard and lost pulsation immediately after embolization. The next day, the mass became less tense, and over several days, it grew progressively smaller. Three days after embolization, the silk sutures were removed without any sequelae. The mass disappeared within 2 months, and no recurrence was noted during the follow-up period of 4 months.

DISCUSSION

Some 75 to 90% of aneurysms of the STA are caused by trauma, which is attributable to the STA's position superficially above the bone and its relatively long course.⁴ About 80% of the cases occur in men.⁴ Most patients with traumatic aneurysms of the STA present within 2 to 6 weeks of ictus

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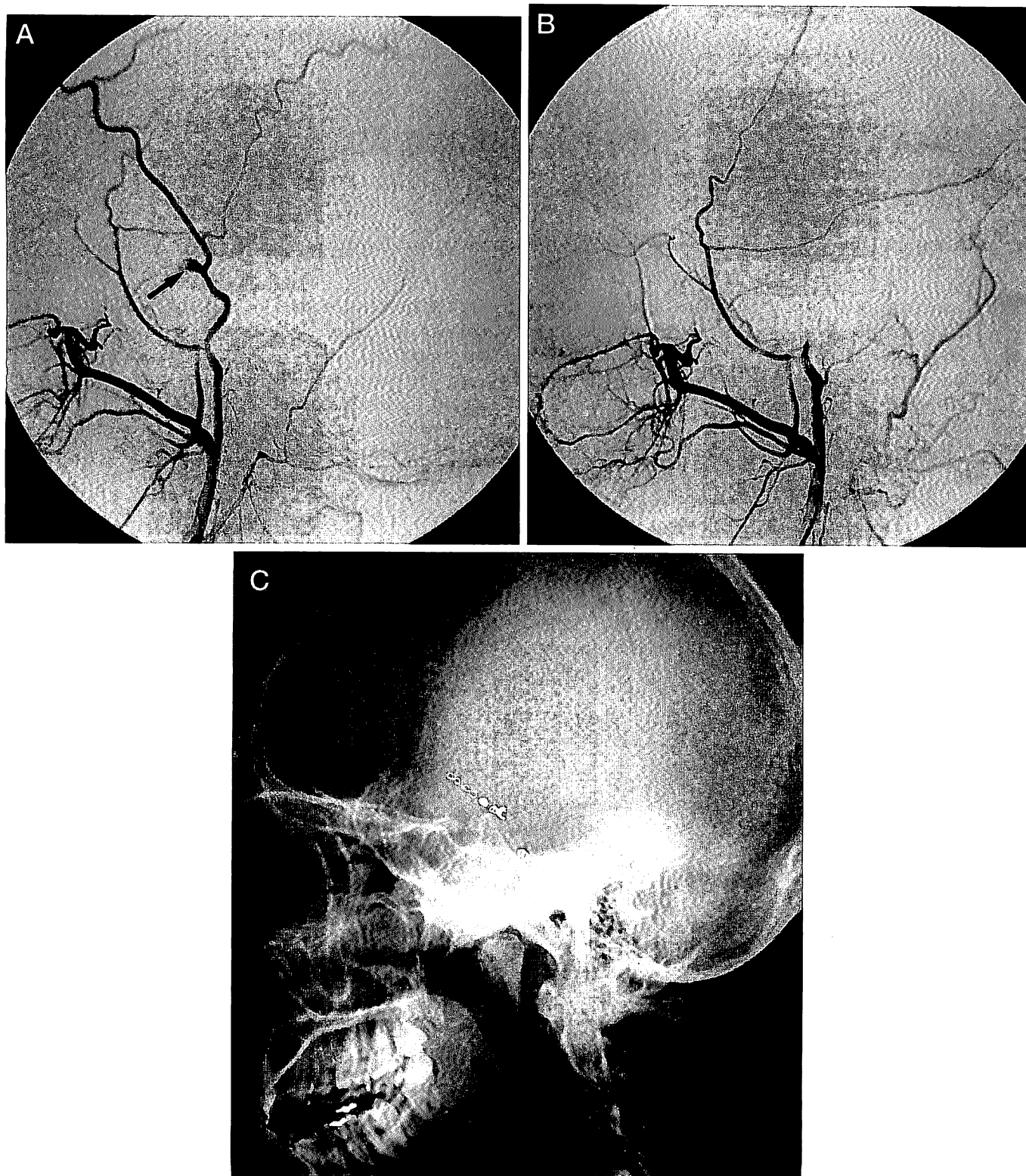


FIG 1. Patient 1. (A) Right external carotid angiogram (lateral view) demonstrates the aneurysm of the superficial temporal artery (*arrow*). (B) Control angiogram after trapping of the aneurysm with fibered platinum coils. Aneurysm is no longer visible. (C) Plain roentgenogram (lateral view) shows the coils in the STA.

complaining of a pulsating mass, pulsatile headache, local pain, or, rarely, bleeding.^{4,5}

A previous history of trauma to the scalp may suggest the diagnosis. Inspection and palpation of the lesion along with clinical history are enough to form a diagnosis of a traumatic aneurysm of the STA in most cases. Digital compression of the proximal STA may cause cessation of pulsation of the

aneurysm. Differential diagnoses, however, should include arteriovenous fistula, subgaleal hematoma, cysts, tumor, purulent abscess, and aneurysm of the middle meningeal artery with bony erosion.⁴ As occurred in the case of patient 2, misdiagnosis may cause unexpected, profuse bleeding when resection is attempted under the different diagnoses. Noninvasive diagnostic modalities include duplex ultrasonogra-

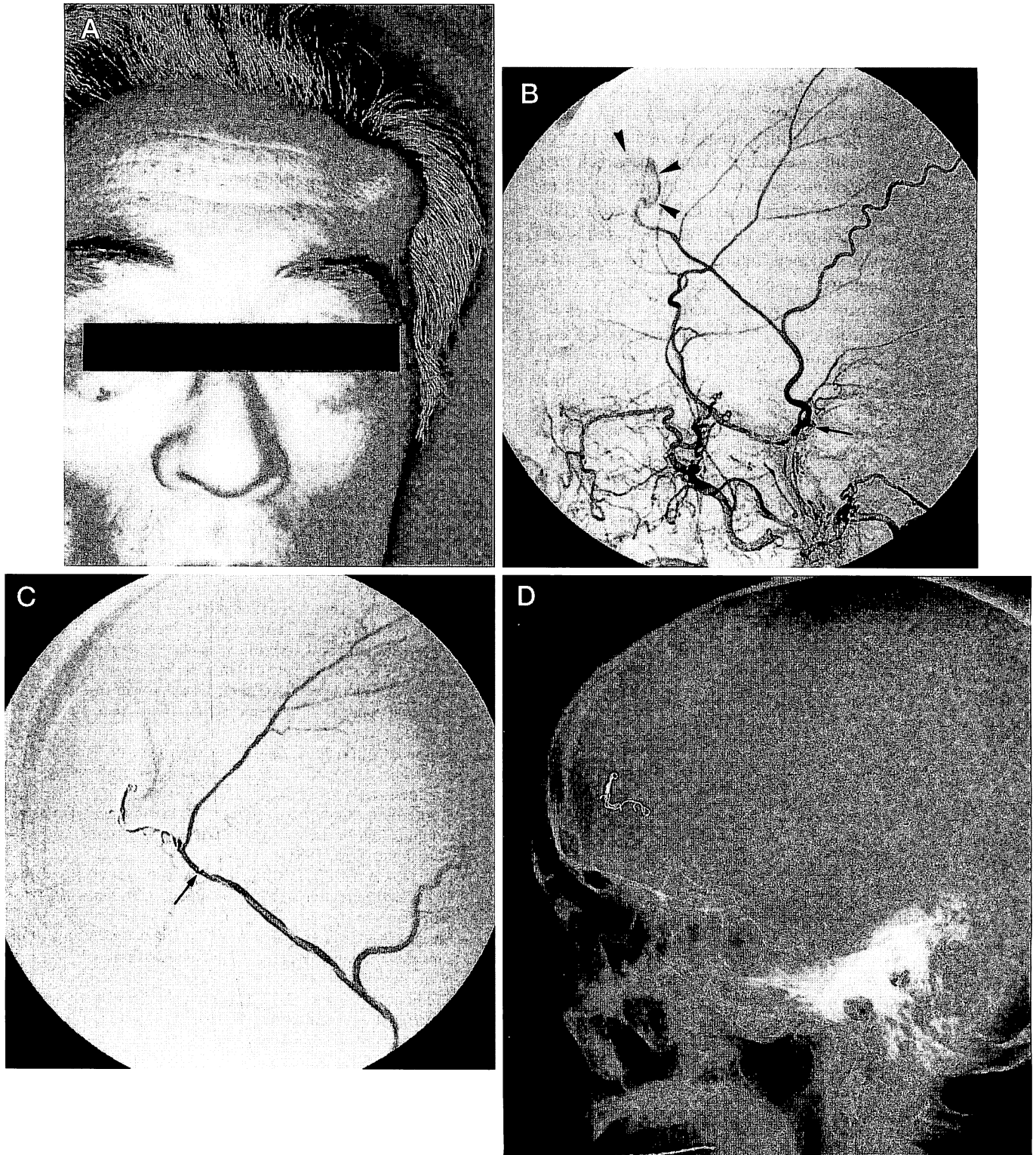


FIG 2. Patient 2. (A) Photograph of the left forehead pulsatile mass, 3 cm in diameter. (B) Left external carotid injection (lateral view) shows the aneurysm at the anterior branch of the STA (arrowheads). Arrow indicates coiling of the STA. (C) Immediately after coil trapping of the aneurysm, the aneurysm is no longer visible. Arrow indicates the tip of the microcatheter in the STA. (D) Plain roentgenogram (lateral view) shows the fibered platinum coils in the STA.

phy¹⁰ and computed tomography with contrast enhancement.¹¹ Angiography is indicated for properly evaluating the underlying vascular diseases.⁷ First carried out by Wortzman in 1963,³ diagnosis of aneurysm of the STA by angiography is a straightforward procedure.

Indications in the treatment of aneurysm of the STA include reduction of the risk of hemorrhage, pain relief, and, in

most cases, alleviation of cosmetic disfigurement.¹² Historically, aneurysms of the STA were treated nonsurgically, relying instead on constant pressure over the aneurysm.¹³ Treatment options in recent years have included simple resection of the aneurysm, proximal ligation of the STA or trapping of the aneurysm, and endovascular treatment. To our knowledge, embolization has been carried out so far in only

three cases, in which selective injection of embolic materials to the STA^{7,8} or proximal occlusion of the STA with coils⁹ was performed. Of course, microcatheters and steerable guide wires were not available in early cases.^{7,8} In any case, selective embolization to the STA may cause necrosis of the soft tissue or incomplete occlusion of the aneurysm, which may result in a recurrence of the aneurysm. Kornbrot et al.⁹ reported selective occlusion of the proximal STA with coils. Although the pseudoaneurysm subsequently occluded spontaneously, angiograms obtained immediately after embolization showed the aneurysm to be opacified from the distal STA. Proximal occlusion with various materials may cure the aneurysm. There remains the possibility, however, that a distal branch of the STA may continue to feed the aneurysm, because the scalp has rich vascular collaterals from the other areas and occasionally from the opposite side. Furthermore, intraluminal occlusion of the aneurysm with various embolic materials is not indicated because the aneurysm is a pseudoaneurysm without normal wall structure. Intraluminal emboli may cause mass effect, thus resulting in cosmetic problems. We believe that in endovascular treatment, occlusion of both proximal and distal portions of the STA to the aneurysm (trapping) with platinum coils is the treatment of choice because this method does not cause cosmetic defects or soft-tissue necrosis, but it enables complete occlusion of the aneurysm. From the technical point of view, the proximal portion of the STA is occasionally looping, as was the case with patient 2. When navigating this loop with the microcatheter system, gentle maneuvering is necessary to avoid mechanical irritation, which can easily cause vasospasm. In our experience, the mass will disappear within 2 months after the embolization. Patients are informed of this clinical course of shrinkage of the occluded aneurysm.

Although we do not rely exclusively on endovascular treatment for this disease, we believe that it should be included among the treatment options because the procedure does not require surgical exploration, thus avoiding the operative scar and postoperative hypesthesia. Embolization is particularly useful when the aneurysm is located in the proximal portion of the STA, where surgical resection is relatively difficult because of the depth of the artery and its proximity to the facial nerve and the parotid gland. Our two patients came to our hospital for surgical treatment, but after being informed

of the possibility of endovascular treatment, both of them chose the endovascular procedure.

In conclusion, traumatic aneurysm of the STA can be treated with endovascular techniques. Endovascular trapping of the aneurysm obviates surgical resection and general anesthesia, thus avoiding the wound scar and the paresthesia that accompany it. Embolization can be carried out after diagnostic angiography in one session. This procedure should therefore be included among the therapeutic options.

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