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Delayed Transcutaneous Extrusion of Embolic Coils After Embolization of Facial Artery Pseudoaneurysm

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Summary

External carotid artery (ECA) pseudoaneurysm is a known complication of treatment for head and neck cancer. We report a case of facial artery pseudoaneurysm arising after irradiation and salvage surgery for advanced tonsillar cancer, that was treated with endovascular embolization. The case was complicated by delayed transcutaneous extrusion of embolization coils through the skin of the anterior neck. We review the literature for related cases of coil extrusion in the head and neck, and discuss the implications for pseudoaneurysm surveillance.

Introduction

We report our experience with a ruptured facial artery pseudoaneurysm after irradiation and salvage surgery for recurrent head and neck cancer. We review its detection, subsequent management with embolization, and the rare ensuing complication of transcutaneous coil extrusion.

Case Report

A 47-year-old woman with history of left tonsillar T1N2b squamous cell carcinoma presented with a left neck hematoma and external hemorrhage. She had received primary chemoradiation 14 months prior to presentation, modified radical neck dissection complicated by methicillin-resistant Staphylococcus aureus infection 12 months prior to presentation, and a pectoralis major flap for wound coverage. Overlying the operative site, she had developed a draining, non-healing skin ulcer or fistula that was ongoing until the day of presentation with neck bleeding.

CT angiography (CTA) demonstrated a 2.5 cm pseudoaneurysm of the external carotid artery (ECA) adjacent to a neck hematoma. Digital subtraction angiography (DSA) (Figure 1A) confirmed that the pseudoaneurysm emanated from the proximal left facial artery. Given the patient's history of wound flap, chronic non-healing ulcers, and poor overlying tissue quality, preserving the patency of the distal facial artery was considered necessary to promote wound healing, rather than the alternative of the open surgical or endovascular parent artery sacrifice. Thus, a microcatheter was used to enter the pseudoaneurysm itself and a series of GDC-18 detachable platinum coils (Stryker Neurovascular, Fremont, CA, USA) were used to create a frame, followed by packing with GDC-18 fibered VortX coils and fibered pushable coils within the frame. Post-procedure DSA demonstrated preserved flow to the distal facial artery with minimal filling at the aneurysm neck (Figure 1B).

The patient made a good recovery with no further bleeding, but continued to have low-grade serous drainage from the nonhealing ulcer overlying the pseudoaneurysm. Ten months after embolization, the patient noted metallic coils protruding through her skin ulcer (Figure 2A). These coils were manually extracted with forceps and scissors with minimal associated

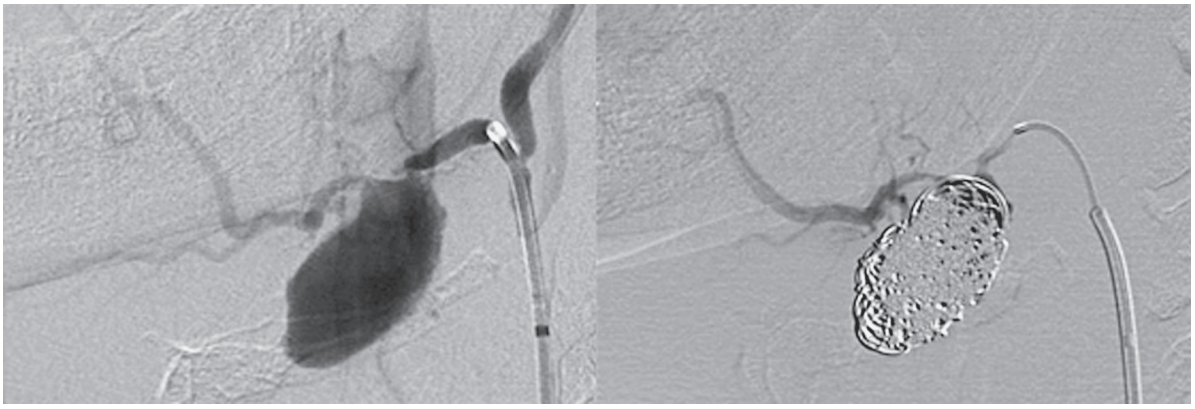

Figure 1 A) DSA of the left ECA identifies an inferiorly directed pseudoaneurysm emanating from the side of the proximal facial artery. B) Control DSA after embolization confirms aneurysm coiling with preservation of flow in the distal facial artery.

soft tissue bleeding (Figure 2B). Because of the absence of ongoing inflammation, no cultures were taken at that time. The wound was covered with Xeroform and dry sterile gauze, and the patient received a short course of empiric oral clindamycin. Four months later, the patient had healing of her skin ulcer back to her prehemorrhage baseline, and had no further episodes of neck bleeding.

Discussion

Pseudoaneurysms of the ECA are preceded by arterial damage, which may be induced by blunt or penetrating neck trauma, hyperextension/rotation injury, direct compression of the neck, irradiation, or anastomotic disruption following surgery. The facial artery is particularly susceptible to injury given its tortuous course over the mandibular angle, masseter, and cheek. In patients undergoing irradiation for recurrent nasopharyngeal carcinoma, most pseudoaneurysms arise from arterial branches at the skull base [1]. ECA pseudoaneurysms may be detected incidentally on imaging. Alternately, they may present as enlarging painless pulsatile masses associated with pharyngeal, nasal, or transcutaneous hemorrhage, or present with embolic strokes after intraaneurysmal thrombus dislodgement. In stable patients, these symptoms should prompt imaging with CTA or magnetic resonance angiography.

Once diagnosed, facial artery pseudoaneurysms require treatment to prevent expansion, rupture, and the development of life-threatening vascular and neurologic complications. Management has historically included surgical exploration with ligation of the facial artery or the ECA. Endovascular treatment was performed in this case given prior neck irradiation and the expected fragility of the vessels involved. Endovascular options include parent vessel occlusion, selective endovascular coiling of the pseudoaneurysm, or covered stent placement – although the lattermost would not be possible in a vessel as small as the facial artery. The preferred and most efficient endovascular treatment for facial artery pseudoaneurysm is occlusion of the facial artery itself across the neck of the pseudoaneurysm. In this case, however, the overriding clinical concern to preserve as much blood flow as possible to the irradiated face and neck led to the decision to selectively coil the pseudoaneurysm. Detachable coils were also used in this case to reduce the risk of retrograde migration of pushable coils from the proximal ECA into the ICA, leading to nontarget cerebral embolization.

Cancer, subsequent radiation therapy, and salvage surgery predisposed our patient to pseudoaneurysm formation and subsequent complications. Intracranial and extracranial pseudoaneurysms arising after primary chemoradiation and salvage surgery have been reported in association with primary head and neck malignancies involving the oral cavity [2], nasopharynx [1,3,4], and larynx [5]. However, the relationship of radiation-induced pseudoaneurysm to radiation dose, field, fractionation, and location is not clear. The pathogenesis of radiation-induced pseudoaneurysm is speculated to

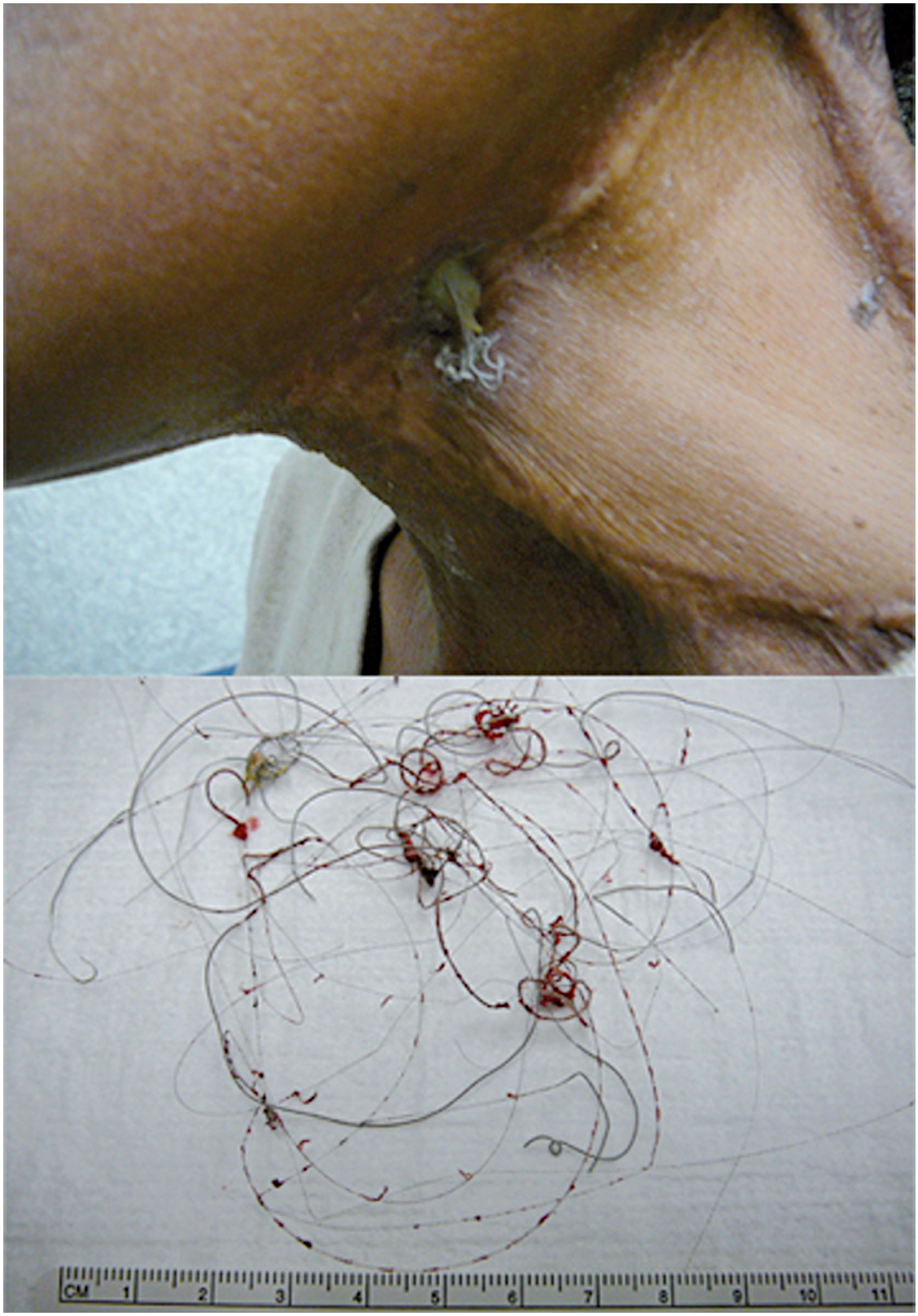

Figure 2 A) A photograph of the left neck demonstrates extrusion of coils through a skin ulcer. B) The extracted coils demonstrate accumulated fibrinous scar and thrombus.

involve tissue hypoxia related to radiation-induced obliteration of the vasa vasorum, accelerated local atherosclerosis, and mechanical weakening of the arterial wall. Just as the latency of the osteoradionecrosis ranges from one to twenty years after radiation for nasopharyngeal carcinoma, the development of radiation vasculopathy is also unpredictable [1]. In our case, prior post-operative infection at the time of embolization and ongoing low-grade active infection at the time of coil extrusion both further compromised vascular integrity by inducing local arteritis and degrading the quality of the overlying tissue. These factors delayed and compromised wound healing in the setting of newly introduced foreign bodies, such as embolic coils.

Coil extrusion as a rare long-term complication of endovascular pseudoaneurysm treatment has been observed throughout the body both with and without previous irradiation. Coil migration and extrusion have been reported in the bronchus, stomach, duodenum and colon [6-8]. Coil extrusion through the skin in radiated neck was documented in two cases [9,10] joining three other cases of extruded coils into the nasal cavity [3], middle ear [4], and pharynx [5, 11]. In one previous case, a patient with oropharyngeal squamous cell cancer and subsequent laryngeal carcinoma treated with chemoradiation and salvage surgery later developed recurrent transoral bleeding necessitating embolization of a right ECA pseudoaneurysm, followed two months later by coil extrusion, local infection of the retained coils in the neck, and serratia and pseudomonas septicemia [9]. In another case, a patient who underwent resection and radiotherapy for pharyngeal cancer complicated by development of a right ICA stenosis necessitating carotid endarterectomy developed a post-operative pseudoaneurysm that was treated by both stents across the neck of the aneurysm and detachable coils in the aneurysm sac [10]. The coils eroded through the skin of the anterolateral neck within two years and were removed, only to be followed by transcutaneous balloon extrusion four months later. Further studies across institutions could help clarify the true incidence of these rare complications.

Conclusions

Despite the rarity of coil extrusion following endovascular treatment of pseudoaneurysm, interventionalists should be aware that compromised wound healing in irradiated tissue in the setting of intravascular foreign bodies such as embolic coils may eventually lead to coil migration and skin erosion, particularly if the embolized structure lies close to the skin surface. In patients with prior neck irradiation and surgery, pre-emptive imaging surveillance to detect and treat coil erosion should be considered. Antibiotic therapy may be warranted in the setting of ongoing active infection to prevent local and disseminated infection.

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