RUPTURED PSEUODANEURYSM OF THE INTERNAL MAXILLARY ARTERY COMPLICATING CT-GUIDED FINE-NEEDLE ASPIRATION IN AN IRRADIATED, SURGICAL BED

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Abstract: Background. CT-guided fine-needle aspiration (FNA) is a safe procedure, but major complications can occur rarely. Pseudoaneurysm rupture in the head and neck region following CT-guided FNA is an emergency that can result in life-threatening hemorrhage. This case emphasizes the salient risk factors for pseudoaneurysm formation and rupture in the head and neck region following CT-guided FNA.

Methods. A patient was seen with oral and facial hemorrhage as a result of a ruptured pseudoaneurysm 11 weeks following CT-guided FNA in a previously irradiated surgical bed.

Results. The patient was treated with coil embolization in and around the pseudoaneurysm and discharged without any further complications.

Conclusions. Although CT-guided FNA is a safe and effective procedure, some patients may be at increased risk for rare but major complications. Caution should be used in proceeding with CT-guided FNA in an irradiated surgical bed of the head and neck. ©2007 Wiley Periodicals, Inc. Head Neck 29: 1156–1159, 2007

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Vascular pseudoaneurysms are lesions with a fibrous wall in communication with a parent vessel. These lesions differ from saccular aneurysms, which are developmental expansions that involve all layers of the artery. Pseudoaneurysms can remain clinically silent within their fibrous wall. However, rupture can cause complications ranging from focal, contained hematomas to exsanguination, depending on the location of the aneurysm and the vessel involved. Although uncommon, pseudoaneurysms are a potential complication following radiation therapy.1 Other iatrogenic causes have also been reported, including surgery, biopsy, catheterization, and fine-needle aspiration (FNA).2–4

In the head and neck region, hemorrhage is the most significant complication from pseudoaneurysm rupture and can be frequently life threatening. We report a case of bleeding from an exposed surgical bed and transoral hemorrhage due to a ruptured pseudoaneurysm of the internal maxillary artery following CT-guided FNA in an irradiated field.
A 64-year-old man was seen with oral hemorrhage as well as bleeding from his left facial surgical bed. His past medical history was notable for a desmoplastic neurotropic melanoma in the left temporal and zygomatic area with multiple recurrences that required multiple surgical procedures. During surgery for his last recurrence, intracavitary radiation therapy was performed and a pectoralis flap was placed. Complications from the patient's treatment included wound infection, osteoradionecrosis of the mandible, and 2 slowly healing open wounds in the left temporal and mandibular regions exposing portions of the ramus of the mandible.

Two years following all therapies, the patient was referred to our institution, where CT and MRI showed abnormal tissue in the superficial and deep masticator spaces. From imaging it was not possible to distinguish recurrent melanoma from soft tissue changes related to surgery and irradiation. Therefore, a CT-guided FNA of the masticator space was performed. Under CT guidance, 2 separate passes were made into the region of interest, 1 pass with a 25-gauge needle and another with a 22-gauge needle. There were no immediate complications. Cytology revealed no evidence of recurrent melanoma.

Approximately 11 weeks later, the patient presented to another institution with profuse bleeding from his exposed surgical bed on the left side of his face. Bleeding was temporarily controlled with packing. Several hours later, the patient rebled from the same area. He also developed a cough and began to hemorrhage transorally. Within 3 hours, a total of 4 U of blood was transfused before he was emergently transferred to our institution for evaluation and definitive management.

On arrival to our institution, left common and external carotid angiography was performed, and an occlusion of the left superficial temporal artery and an estimated 3-mm pseudoaneurysm of the left internal maxillary artery were observed. Marked irregularities and narrowing of the internal maxillary artery likely secondary to irradiation were also noted (Figures 1A and 1B). The pseudoaneurysm was within the field of irradiation and surgery and in close approximation to the previous CT-guided FNA of the masticator space.

Treatment consisted of coil embolization in and around the pseudoaneurysm. Postembolization digital subtraction arteriography revealed adequate occlusion of the distal aspects of the internal maxillary artery (Figure 1C). Flow was maintained in the proximal portions of the artery such that the middle meningeal artery was preserved. The patient was discharged shortly thereafter without any further complications.

DISCUSSION
CT-guided FNA in the head and neck region is a well-established diagnostic procedure because of
its relatively high accuracy and low complication rate. This procedure has been especially useful in the setting of deep nonpalpable head and neck lesions and in distinguishing treatment sequelae from recurrent or residual neoplasm. One study of 1000 CT-guided FNAs from a spectrum of sites reported a complication rate of 1.1%, with the rate being directly related to needle size and number of passes. In the head and neck region, however, an incidence as low as 0.46% has been reported. Complications of FNA are usually minor and include locally controllable bleeding, infection, and vasovagal reaction. Major complications include massive hemorrhage and sepsis, depending on where the procedure is performed anatomically. These severe complications are very uncommon and have been reported to occur in just 0.003% to 0.031% of procedures. Large needles, especially those under 20-gauge in size, have most often been associated with pseudoaneurysm formation. The etiology is likely secondary to direct trauma to the vessel. To our knowledge, major complications following CT-guided FNA specific to the head and neck region have been rarely described. Similar to this case, Walker et al reported a rupture of a pseudoaneurysm from the buccal branch of the internal maxillary artery following CT-guided FNA of the masticator space.

Pseudoaneurysm formation has been implicated in a variety of surgical procedures postoperatively, but it is still considered an infrequent event. Similar to FNA, the pathogenesis is likely related to direct trauma to the vessel involved. Although surgical resection is the primary treatment for desmoplastic neurotropic melanoma, radiation has been employed alone or as adjuvant treatment, particularly in those patients judged to be at high risk of recurrence. Radiation is known to cause arterial stenosis and pseudoaneurysm formation within the irradiated field, but the exact incidence is not known.

Radiation somehow compromises the integrity of the arterial wall such that pseudoaneurysm formation is more favorable, but the pathogenesis is still unclear. Possible mechanisms include direct radiation trauma to arterial endothelial cells, leading to adventitial fibrosis and hemorrhage; destruction of the vasa vasorum, which would eventually weaken arterial walls over time; and a more controversial mechanism that suggests arterial walls are weakened through radiation-induced atherosclerotic degeneration. One study suggests that roughly 42% of pseudoaneurysms arise from atherosclerotic arteries. Mechanical or inflammatory stress (perhaps related to FNA or other types of manipulation) on these arteries may eventually lead to wall dissection, making conditions favorable for pseudoaneurysm formation.

It should be emphasized that our patient underwent multiple surgical procedures, 1 session of intracavitary radiation therapy, and 2 FNAs of the masticator space over a 5-year period. It is unclear which procedure played a greater role in pseudoaneurysm formation and rupture. We know that tumor recurrence is ruled out as a cause as a result of the negative cytology. It is likely that the FNA and radiation treatment in the surgical bed collectively put the patient at greater risk for complications. Despite the rare potential pitfalls, we believe that the benefits of CT-guided FNA far outweigh the rare occurrence of any significant complications that may accompany this procedure. Pseudoaneurysm formation is a rare event even in this population of higher risk patients. In the setting of hemorrhage, where conservative measures fail to resolve the bleeding and a source for the bleeding is uncertain or inaccessible, as in this case, an emergent angiogram and potential endovascular therapy should be pursued. Extra consideration should be given before pursuing FNA of a surgically manipulated and irradiated bed of the head and neck. If CT-guided FNA is indicated, smaller needles should be used with as few as needed passes into the field to decrease the potential risk of complications. In more recent years, positron emission tomography (PET) has been useful in distinguishing tumor from treatment sequelae. PET should be considered in future cases to guide biopsy of lesions with similar findings discussed in this case.

REFERENCES