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Sentinel Transoral Hemorrhage from a Pseudoaneurysm of the Internal Maxillary Artery: A Complication of CT-Guided Biopsy of the Masticator Space

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Summary: A patient presented with transoral hemorrhage 3 months after CT-guided percutaneous biopsy of the masticator space, prompting concern about sentinel hemorrhage from impending carotid artery rupture related to prior radical head and neck surgery and radiation therapy. Angiographic evaluation showed the internal carotid artery to be normal but demonstrated a pseudoaneurysm of the buccal branch of the internal maxillary artery exactly corresponding to the site of prior fine-needle biopsy.

Index terms: Biopsies, computed tomography guidance; Aneurysm; Mouth; Iatrogenic disease or disorder

The use of computed tomography (CT)-guided fine-needle biopsy for tissue diagnosis of head and neck disease has been previously described (1–3). Although a large case series experience has not been reported, complications from this technique are considered to be very rare.

The development of transoral bleeding in patients who have undergone prior combination therapy for head and neck cancer presents unique diagnostic and therapeutic considerations. These patients typically have had multiple procedures including biopsy, radical surgery, and radiation therapy. The primary concern is that the bleeding represents a "sentinel" hemorrhage, indicating disruption of the carotid artery and impending vascular catastrophe (ie, so-called carotid blowout syndrome) (4–6). These patients are evaluated immediately with angiography and frequently demonstrate a pseudoaneurysm of the internal carotid artery, which can be effectively treated by therapeutic balloon occlusion (7, 8) (Chaloupka JC, Putman CM, Varma PK, "Endovascular Therapy of Carotid Blowout Syndrome in Head and Neck Surgical Patients: An Evolving Diagnostic and Management Paradigm" [abstract], presented at the annual meeting of the American Association of Neurological Surgeons, April 1995). Alternative bleeding sources, which also can be effectively treated by endovascular techniques, can occur (Chaloupka JC, Putman CM, Varma PK, "Endovascular Therapy").

Case Report

A 52-year-old man with a history of squamous cell carcinoma of the tongue base and oral cavity previously had a composite oropharyngeal and mandibular resection with reconstruction, right modified radical neck dissection, and intraoperative brachytherapy with Iodine 125 seeds. On follow-up CT, there was a right-sided masticator space mass that was suspicious for tumor recurrence (Fig 1). This prompted referral for CT-guided fine-needle biopsy. Using the tandem needle technique, CT-guided fine-needle biopsy of the mass was executed with two passes of a 22-gauge Chiba needle (Cordis, Miami, Fla) (Fig 1A and B). Adequate tissue was obtained (confirmed by cytologic wet reading), and no significant bleeding occurred during the procedure. He was discharged after 2 hours of observation with stable vital signs and no significant pain or tenderness at the biopsy site. Histologic examination of the biopsy material showed only inflammatory changes.

The patient presented to the head and neck surgery service 3 months later with several episodes of brisk transoral hemorrhage that were self-limited. Because of his history of squamous cell carcinoma and radical neck surgery, these episodes of transoral hemorrhage were viewed with great concern, because this is a typical presentation of sentinel hemorrhage associated with impending carotid blowout syndrome (4–6) (Chaloupka JC, Putman CM, Varma PK, "Endovascular Therapy"). This prompted an emergency referral to the interventional neuroradiology

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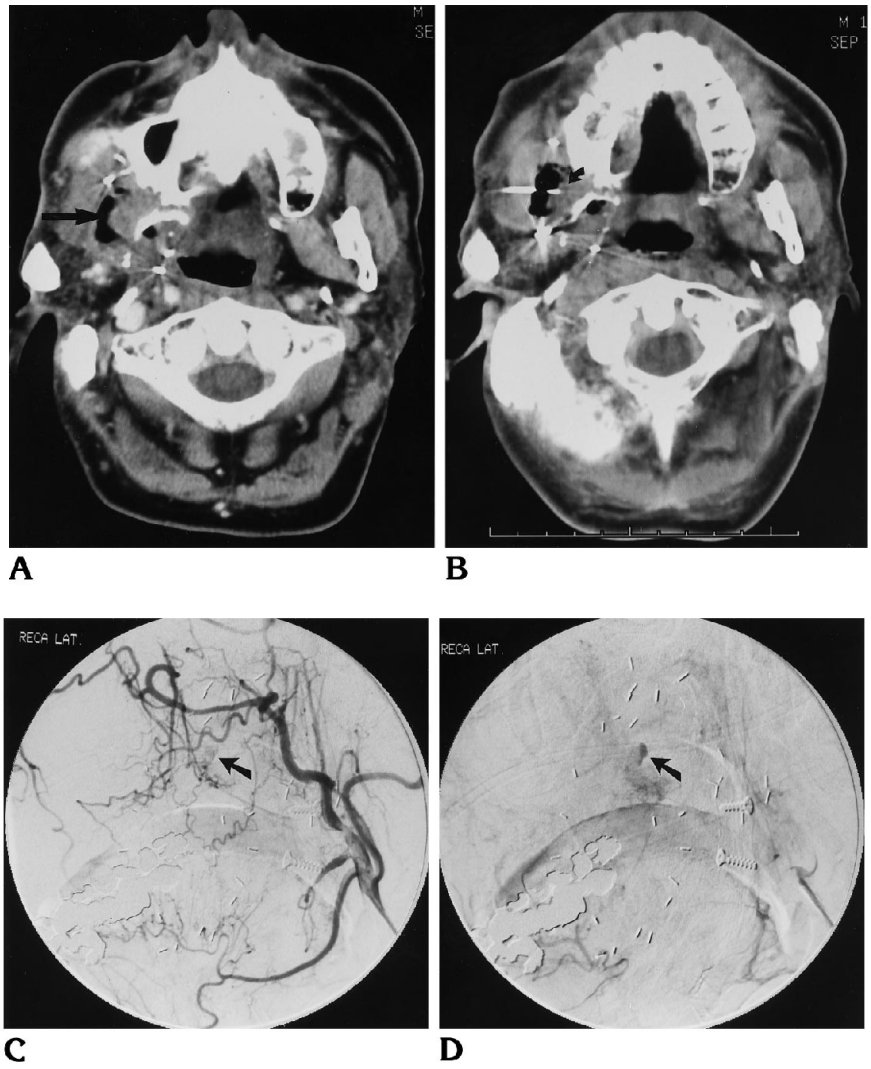


Fig 1. *A–B*, CT-directed fine-needle biopsy.

A, Contrast-enhanced axial CT image shows a focal soft-tissue mass within the masticator space (*arrow*). Gas surrounding the lesion is related to a postsurgical defect that communicates with the oral cavity.

B, Axial nonenhanced CT image shows the tip of a 22-gauge Chiba needle within the anterior aspect of the soft-tissue abnormality (*curved arrow*). The region was sampled twice. Histologic analysis showed only inflammatory changes.

C–D, Pseudoaneurysm of the buccal branch of the distal internal maxillary artery.

C, Selective right external carotid arteriogram, lateral projection, shows mild irregularity of the distal internal maxillary artery and focal dilatation of the distal buccal branch (*arrow*).

D, Delayed image from same injection shows filling of a 5-mm pseudoaneurysm (*arrow*). *Figure continues.*

service for diagnostic and therapeutic evaluation of presumed carotid blowout syndrome.

Right common carotid angiography showed mild irregularity of the distal common and proximal internal carotid arteries, consistent with postsurgical and postradiation changes. There was no evidence of extravasation or pseudoaneurysm of the right common and internal carotid arteries. Selective right external carotid angiography, however, showed a 5-mm pseudoaneurysm of the buccal branch of the distal internal maxillary artery (Fig 1C and D).

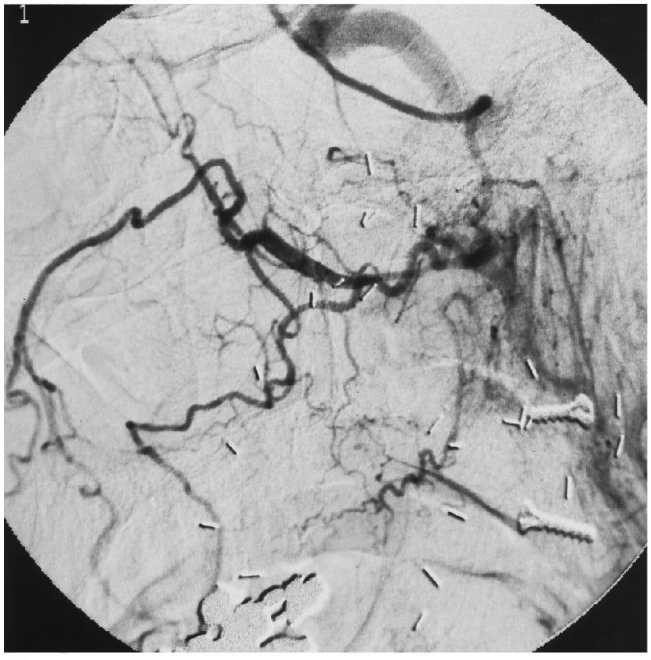
Using a small microcatheter and microguidewire combination (FasTracker 10 and Dasher 10, Target Therapeutics, Fremont, Calif), the common trunk of the descending palatine and buccal branches of the internal maxillary artery were superselectively catheterized. Direct supply to the pseudoaneurysm was documented by digital subtraction angiography. A small bolus of liquid adhesive suspension (ethiodized oil/*N*-butyl cyanoacrylate) was delivered into the pseudoaneurysm and the proximal parent artery. Repeat digital subtraction angiography from selective right external carotid injection showed complete occlusion of the pseudoaneurysm and the buccal branch (Fig 1E, F, and G). The patient reported transient minor facial pain immediately after the embolization and no additional episodes of transoral hemorrhage developed. The site of the pseudoaneurysm correlated well with the patient's description of the location of his transoral hemorrhages and corresponded to the needle track from previous CT-guided fine-needle biopsy (Fig 1H and I).

Discussion

The risks of percutaneous CT-guided fine-needle biopsy within various anatomic locations usually are minor and include pain, vasovagal reaction, minor infection, pneumothorax, and minor hemorrhage (2). More significant complications, such as seeding of the biopsy tract, severe hemorrhage, and death, have been estimated to occur in only 0.003% to 0.031% of

E

F



G

Fig 1, *continued.*

E–G. Endovascular therapeutic embolization.

E, Superselective arteriogram, lateral projection after catheterization of the common trunk of the descending palatine and buccal arteries, shows filling of the pseudoaneurysm (*large arrow*) and adjacent extravasation (*small arrow*).

F, Delayed image (unsubtracted) from same injection shows persistent filling of the pseudoaneurysm.

G, Selective right external carotid arteriogram immediately after embolization shows complete occlusion of the buccal branch pseudoaneurysm. *Figure continues.*

patients (9–11). The incidence of complications after needle biopsy also is directly related to needle size, ranging from 0.3% with 21-gauge needles to 3% with 15-gauge needles (12).

Pseudoaneurysm and arteriovenous fistula formation have been reported almost exclusively after hepatic and renal biopsy and occurs in 7% to 17% of renal biopsies (13, 14). The presumed mechanism is direct vessel wall injury by the biopsy needle and is more common with the use of cutting needles. Reports of endovascular treatment of pseudoaneurysms and arteriovenous fistulas after renal and hepatic biopsy have been published (13–14).

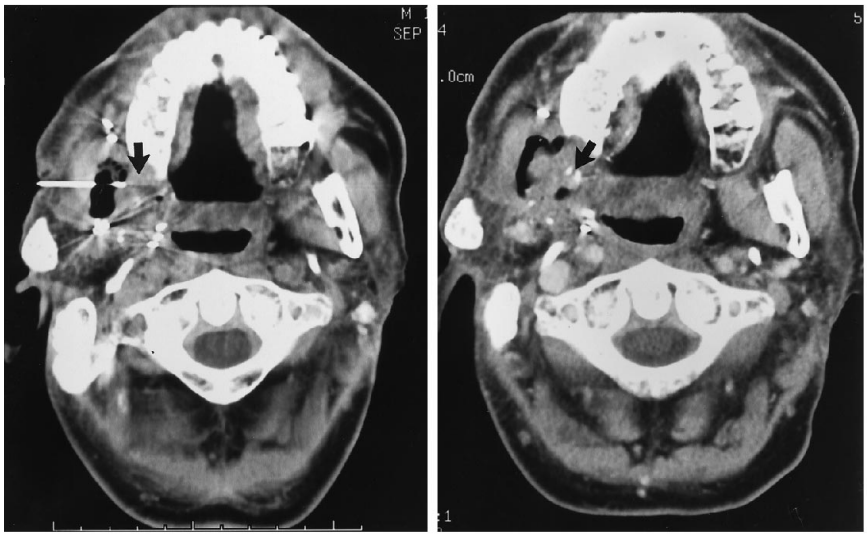
Our case illustrates two important points related to CT-guided fine-needle biopsy in patients with head and neck malignancy. First, we describe an angiographically documented CT-

Fig 1, *continued.*

H–J. Location of pseudoaneurysm and biopsy tract with CT.

H, Contrast-enhanced axial CT image from the original biopsy scan (see A) shows masticator space soft tissue mass with biopsy needle (*arrow*). Gas surrounding the lesion is related to a postsurgical defect which joins with the oral cavity.

I, Noncontrast axial CT image after therapeutic embolization at comparable level shows embolic material (*arrow*) within the buccal branch pseudoaneurysm. Location of the pseudoaneurysm closely matches the position of the biopsy needle.



H I

guided fine-needle biopsy pseudoaneurysm of the head and neck region. Others have discussed the theoretical risk of neurovascular injury in this region (1). As in our case, the potential for vascular complication from CT-guided fine-needle biopsy may be increased in patients who have undergone prior radical neck surgery and radiation therapy. Both of these interventions may lead to the development of either abnormal vascularity (eg, neoangiogenesis near a myocutaneous flap), or large vessel vasculopathy (eg, thinning of the carotid arterial wall from medial necrosis), resulting in a greater predilection for hemorrhagic complication. Furthermore, the significant alterations in normal anatomic structures and boundaries may increase the likelihood of inadvertent passage of a needle into a large vessel, resulting in a clinically significant vascular injury (eg, large pseudoaneurysm formation). More extensive experience with CT-guided fine-needle biopsy in this subset of patients is needed to determine how significant these theoretical risks are, although it is likely that the overall incidence of serious complication remains small. Therefore, we agree with others that the benefits of this minimally invasive method of obtaining biopsy material generally far outweigh any potential small increase in risk of biopsy-related vascular injury (1–3).

Our case also illustrates the need for thorough angiographic evaluation of patients with sentinel hemorrhage and presumed carotid blowout syndrome. High-resolution, good-quality images of the internal and external carotid must be obtained. Although transoral hemorrhage from carotid blowout syndrome represents a life-threatening vascular emergency requiring prompt recognition and therapy, it is imperative to exclude bleeding sources other than from a pseudoaneurysm of the internal or common carotid artery, because therapeutic internal carotid occlusion is associated with a significant risk of neurologic morbidity (15–18). Therefore, the importance of a thorough angiographic evaluation of both the internal and external carotid territories cannot be overemphasized. In reviewing our recent institutional experience, a minority of cases (27%) was found to have alternate sources of hemorrhage, such as external carotid territory pseudoaneurysms and tumor hemorrhage, which were effectively treated with endovascular therapy without the need for therapeutic internal carotid artery occlusion (Chaloupka JC, Putman CM, Varma PK, "Endovascular Therapy").

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