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Case report

Differential diagnosis of a ring-enhancing brain lesion in the setting of metastatic cancer and a mycotic aneurysm ☆

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ABSTRACT

A diagnostic challenge arises when a patient presents with a ring-enhancing lesion of the brain in the setting of both metastatic cancer and a source of infection. We report a case depicting this dilemma in an 80-year-old man with a history of metastatic oral squamous cell carcinoma who presented for left-sided hemiparesis. Computed tomography and magnetic resonance imaging revealed a ring-enhancing lesion of the right parietal vertex without signs of stroke. He was also found to have an aneurysm of the right common carotid artery with abnormal surrounding soft tissue density and gas, findings suspicious for a mycotic aneurysm. The likelihood of the brain lesion being an abscess formed by septic embolization was raised, leading to the recommendation to surgically explore the brain lesion and repair the aneurysm. Nevertheless, a high index of suspicion for a brain abscess and mycotic aneurysm is necessary in this type of clinical scenario.

Introduction

Brain metastasis from head and neck squamous cell carcinoma (SCC) occurs in less than 1% of all reported cases [1]. Metastasis of oral SCC to remote regions of the brain is an even rarer occurrence with only a few cases reported in literature [2–4]. The incidence of mycotic aneurysms is also low, as 0.7%-3.0% of aortic aneurysms are infectious in origin [5]. There are even fewer reported cases of extracranial mycotic aneurysm associated with brain septic embolization [6–8]. We report a case of a man with a history of metastatic oral SCC who presented for weakness and was found to have a ring-enhancing brain lesion and simultaneous aneurysm of the right common carotid artery suspicious for a mycotic pseudoaneurysm. Because of concern for infection, the patient underwent surgical exploration of the brain lesion, revealing a pyogenic abscess, most likely from septic embolization from the mycotic aneurysm. This case is worthwhile to share for 2 major reasons. Firstly, it is extremely uncommon for a brain abscess to develop from septic embolization of an extracranial mycotic aneurysm. Secondly, the patient's history of metastatic

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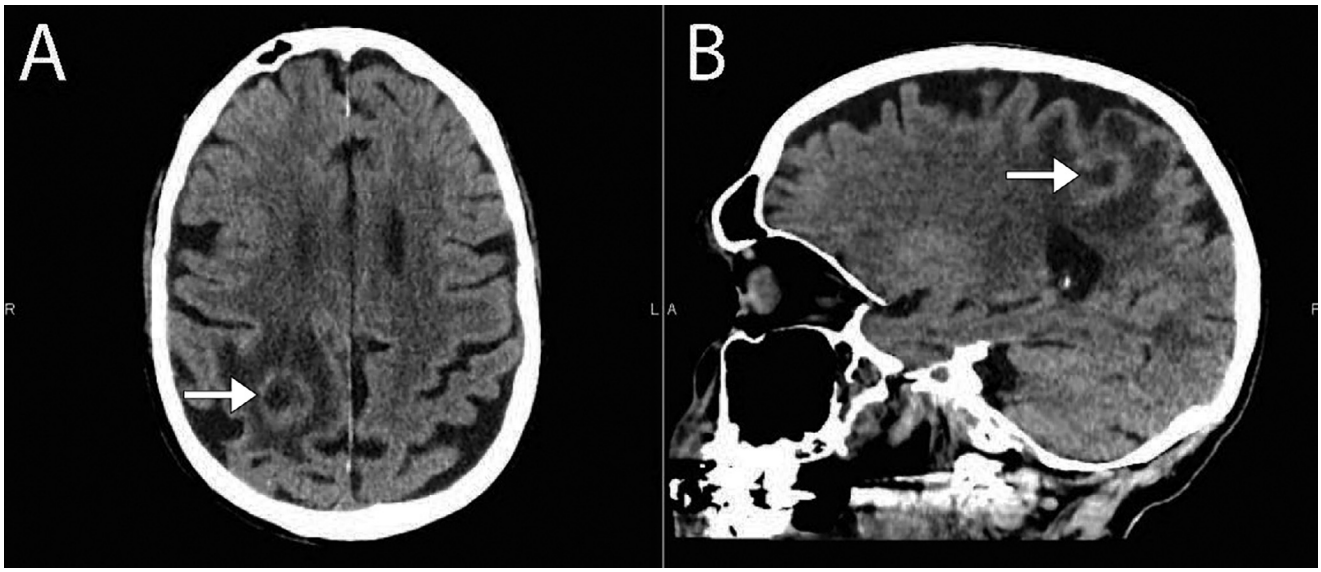

Fig. 1 – Axial (A) and sagittal (B) non-enhanced CT showing a region of hypodensity at the right parietal vertex with a focal circular lesion (arrows) measuring 15 mm in the anteroposterior dimension with surrounding adjacent edema.

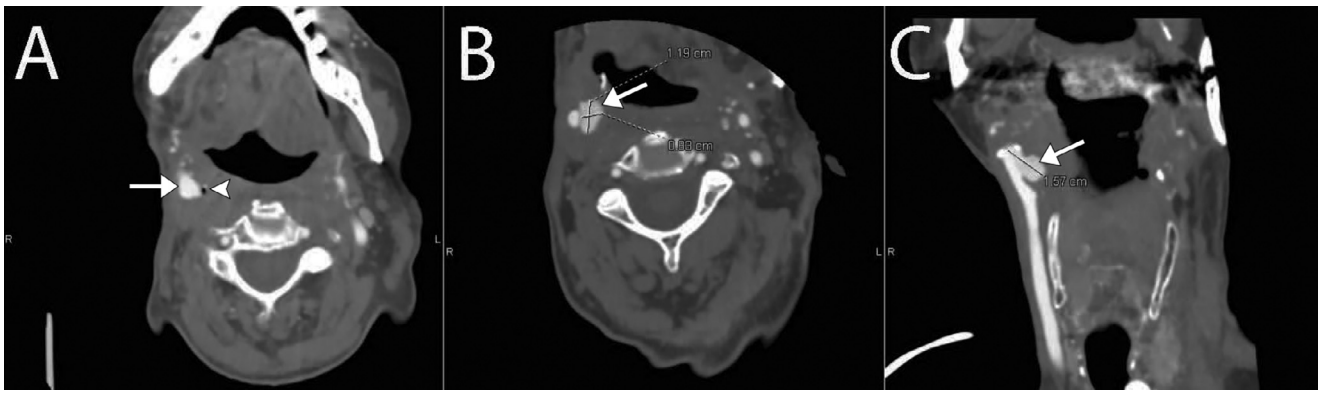

Fig. 2 – Axial (A-B) and coronal (C) CT angiography showing a large, eccentric, saccular aneurysm (arrows) in the distal right common carotid artery. They also show asymmetry of the soft tissues lateral to the right hyoid bone with displacement of the styloid process and dislocation of stylohyoid articulation. Abnormal soft tissue density and gas (arrowhead) surrounds this region. (A) was taken 2 weeks prior to admission and a day after embolization procedure. (B & C) were taken on admission.

SCC added an extra diagnostic challenge for the radiologist, as the brain lesion masqueraded as metastasis. Diagnosing brain metastasis would have led to drastically different management decisions.

Case report

An 80-year-old man with a history of oral SCC presented to the emergency department for left upper and lower extremity weakness for the last 3 days. He had no associated sensory symptoms or any symptoms in the face. On review of systems, he denied speech or vision changes, dizziness, headache, seizure, fever, urinary symptoms, chest pain, cough, or shortness of breath. He denied any recent falls or head trauma. About 2 weeks prior, he presented for hemoptysis due to bleeding of his tongue cancer mass, so he underwent endovascular embolization of multiple branches of the bilateral, external carotid arteries.

His past medical history is relevant for poorly-differentiated SCC of the base of the tongue (TNM stage: cT2N2b) which had spread to lymph nodes and was deemed terminal. He had tracheostomy and gastrostomy tubes placed about 2 months prior. He had not recently traveled anywhere. He was only taking acetaminophen as needed.

The patient's vital signs remained within normal limits. His physical exam was significant for ⅘ strength in the left upper and lower extremities with an NIH stroke scale of 2. Laboratory tests were unremarkable. No blood cultures were taken.

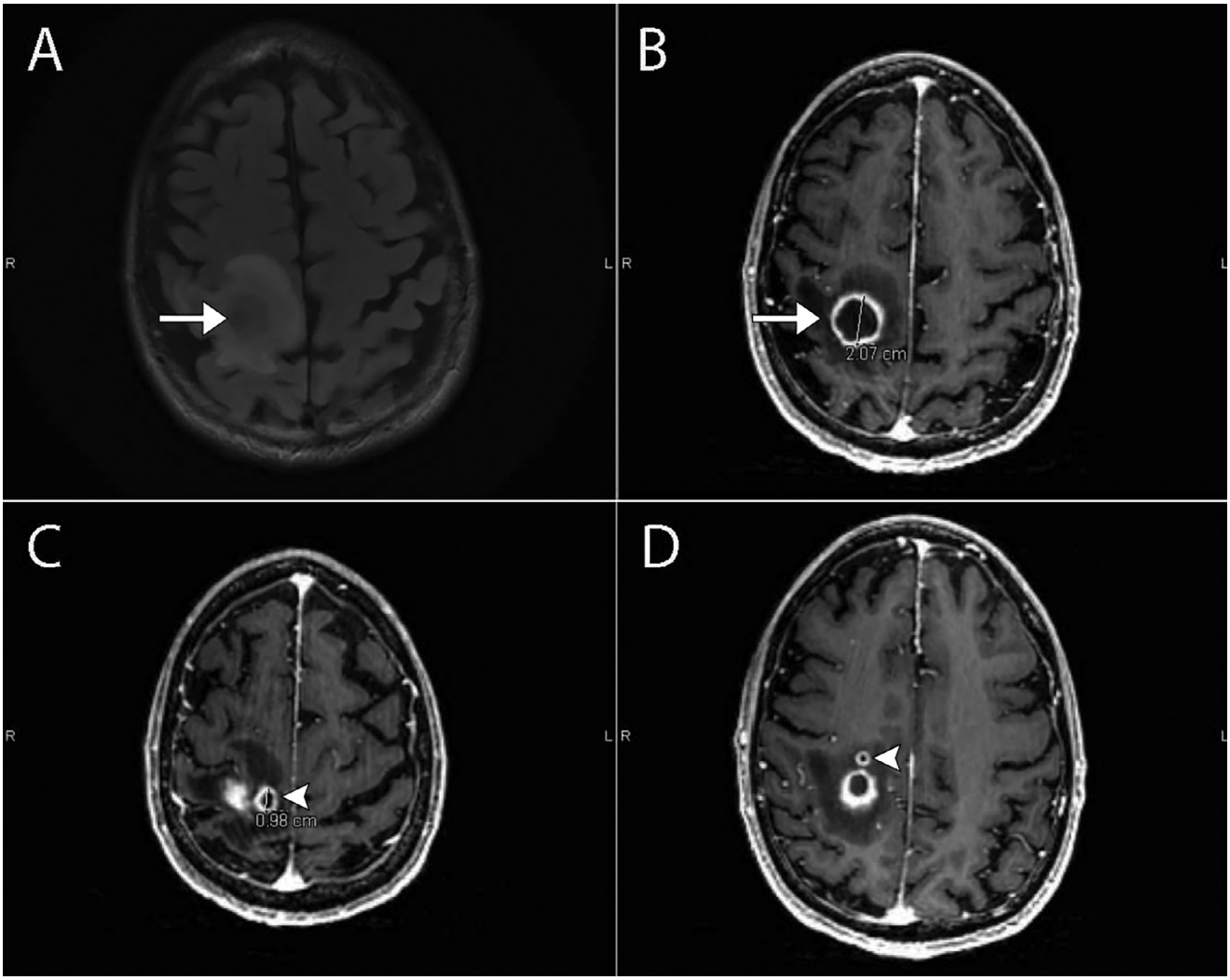

Fig. 3 – MRI of the brain without (A) and with (B-D) gadolinium enhancement. (A) shows a 2 cm lesion (arrow) at the right parietal vertex. (B) shows the same 2 cm lesion (arrow) with peripheral ring enhancement and avid restricted diffusion of central fluid. (C) shows a medially adjacent 1 cm lesion (arrowhead). (D) shows an anteriorly adjacent sub-1 cm lesion (arrowhead).

Computed tomography (CT) of the brain without contrast enhancement (Fig. 1) revealed a region of hypodensity at the right parietal vertex with a focal circular lesion measuring 15 mm in the anteroposterior dimension with surrounding adjacent edema. It also showed a smaller focus adjacent to the large lesion. There was no acute infarct or hemorrhage.

CT angiography of the head and neck with intravenous (IV) contrast (Fig. 2) revealed interval development of a large, eccentric, saccular aneurysm from the distal right common carotid artery. It also showed asymmetry of the soft tissues lateral to the right hyoid bone with displacement of the styloid process and dislocation of stylohyoid articulation. Abnormal soft tissue density and gas surrounded this region. The aneurysm and soft tissue abnormalities enlarged since they were first discovered 2 weeks prior, after the patient's arterial embolization procedure.

Magnetic resonance imaging (MRI) was obtained for further evaluation. MRI of the brain with and without IV gadolinium contrast (Fig. 3) revealed a 2 cm lesion at the right parietal vertex with peripheral ring enhancement and avid restricted diffusion. It also showed a medially-adjacent 1 cm lesion and an anteriorly-adjacent sub-1 cm lesion. There was significant surrounding vasogenic edema. MRI of the neck with IV contrast showed an irregular aneurysm at the right carotid bulb and diffuse soft tissue enhancement that was better characterized on CT.

Because of concern for infection, the patient was initially started on broad-spectrum antibiotics with vancomycin, cefepime, and metronidazole. He subsequently underwent surgical exploration of the brain lesion. An abscess was found and aspirated. Cultures of the brain abscess grew *Streptococcus anginosus*, and his antibiotic regimen was switched to ceftriaxone and metronidazole based on susceptibility results. His neurological status is currently improving. Surgical repair of the carotid aneurysm to prevent rupture is currently planned.

Discussion

The differential diagnosis for a ring-enhancing cerebral lesion commonly includes metastasis, abscess, glioblastoma, infarct, contusion, demyelinating disease, radiation necrosis, or resolving hematoma [9]. Radiographic features which favor an abscess include restricted diffusion of central fluid content, thin and regular enhancing wall, intermediate to low T2 signal capsule, and extensive surrounding edema relative to lesion size [10].

A mycotic aneurysm is a dilation of an arterial wall due to infection. Risk factors for the development of a mycotic aneurysm include arterial injury, antecedent infection, impaired immunity (eg, cancer), atherosclerosis, and pre-existing aneurysm [11–16]. There are 4 major etiologies for a mycotic aneurysm: direct bacterial inoculation, bacteremic seeding, contiguous infection, and septic emboli from infective endocarditis [17–19]. Direct bacterial inoculation can result from arterial injury during a catheter-involving procedure. Injury to an arterial wall could also lead to the formation of a pseudoaneurysm, which is defined as a collection of blood that has leaked out of an artery but is then confined by the surrounding tissue. The most useful imaging study for diagnosing a mycotic aneurysm is CT angiography [20]. Findings suggestive of a mycotic aneurysm on CT angiography include saccular, eccentric, or multilobulated appearance, surrounding soft tissue inflammation, and intramural or surrounding air [20–23].

Making the diagnosis required a contextualization of imaging on clinical history. The patient's aneurysm was likely a mycotic pseudoaneurysm based on its radiographic features and interval development. The most likely etiology was direct bacterial inoculation from vascular injury during the patient's embolization procedure. The aneurysm and surrounding tissue abnormalities rapidly developed soon after. Less likely was that catheter-related injury led to a non-infectious pseudoaneurysm, and the soft tissue abnormalities could be a sequela of embolization and post-radiation necrotic changes.

Despite the patient's history of metastatic oral SCC, the radiographic features of his large, ring-enhancing brain lesion favored an abscess. Particularly, the lesion demonstrated restricted diffusion of central fluid and extensive surrounding edema. In terms of etiology, the recent catheter-directed embolization procedure could have led to bacteremia. Moreover, the diagnosis of a mycotic pseudoaneurysm further raised the likelihood of a brain abscess from possible septic embolization.

Diagnosis based on imaging heavily affected management decisions for this patient. Concern for infection led to the decision to start broad-spectrum antibiotics. Raising the likelihood of a brain abscess led to the recommendation to surgically explore the lesion. Had the diagnostic pendulum not swung away from metastatic disease, the patient may have been recommended surveillance of the lesion over time with palliative care rather than immediate intervention.

This case report demonstrates the important role of a diagnostic radiologist in piecing together multiple imaging findings and clinical history to solve a patient's case and affect management decisions. A brain abscess should be considered when a patient with a history of metastatic cancer presents with a cerebral ring-enhancing lesion and an aneurysm suspicious for infection.

Patient consent

Written, informed consent was obtained for publication of this case report was obtained from the patient.

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