

# Unusual presentation of distal ICA aneurysm in relation to dental abscess

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## ABSTRACT

Mycotic extracranial carotid artery aneurysms are a rare vascular phenomenon with a number of implicated pathogens, most commonly *Staphylococcus aureus* and *Salmonella*. Presentation of a mycotic extracranial carotid artery aneurysm after dental abscess or procedure is similarly not frequently described in the literature. We present a unique case of a large, distal mycotic internal carotid artery aneurysm, which developed secondary to *Haemophilus parainfluenzae* infection and dental abscess. (J Vasc Surg Cases Innov Tech 2022;8:542-4.)

**Keywords:** Dental abscess; Internal carotid artery; Mycotic aneurysm

Although the natural history of carotid artery aneurysms is not well-defined, extracranial carotid artery aneurysms have been estimated to account for approximately 1% of carotid operations.<sup>1</sup> Mycotic aneurysms arise from infection of the vessel wall, and the most common pathogens implicated include *Staphylococcus aureus* and *Salmonella* species.<sup>2</sup> We present a case of a large mycotic distal internal carotid artery (ICA) aneurysm, which developed secondary to dental abscess and *Haemophilus parainfluenzae* inoculation of the ICA vessel wall. The patient subsequently developed a transient common complication related to high dissection of the parapharyngeal space and uncommon complication related to antibiotic treatment. The patient provided express written permission for publication of data.

## CASE REPORT

A 53-year-old female patient with a past medical history of end-stage renal disease on peritoneal dialysis presented to the emergency department with 3 days of increasing soft tissue swelling of her left neck. She underwent extraction of tooth number 18 the previous day and was noted to have significant purulent drainage. Maxillofacial computed tomography (Fig 1)

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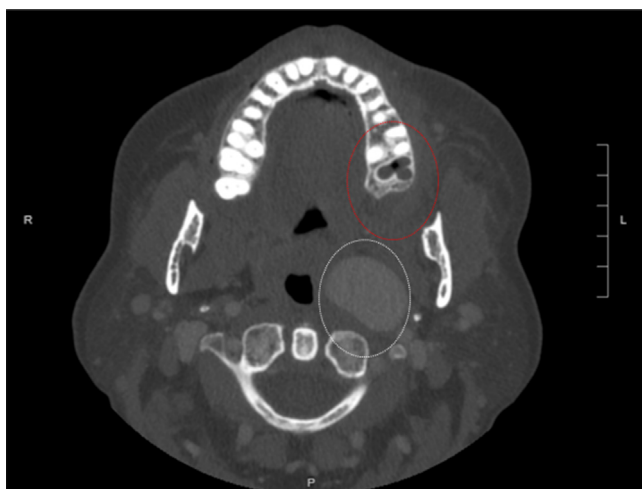
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demonstrated a large internal carotid artery aneurysm measuring 2.3 × 2.7 × 2.3 cm, located 1.3 cm posterior to a small residual abscess. No previous imaging was available for comparison. Dentistry was consulted and recommended treatment with intravenous antibiotics. Peripheral blood cultures were obtained, and the patient was started on intravenous levofloxacin and metronidazole. The proximity of the ICA aneurysm to the dental abscess raised concern for a potential mycotic aneurysm.

She underwent repair of the carotid artery aneurysm 3 days after presentation to the emergency room. To facilitate access to the parapharyngeal space at C1/C2, the patient underwent nasotracheal intubation and mandibular subluxation. After standard platysma muscle division and mobilization of the sternocleidomastoid muscle and internal jugular vein to expose the carotid artery, the hypoglossal nerve was skeletonized along its length to allow for mobilization, and the posterior belly of the digastric muscle was divided. The styloid process was subsequently fractured posteriorly, and a portion of the stylohyoid muscle was divided to fully expose the post styloid compartment of the parapharyngeal space.

The glossopharyngeal nerve was visualized tightly adherent to the anterior surface of the aneurysm sac (Fig 2). The patient was systemically heparinized early in the dissection, and the distal and proximal left ICA was clamped to prevent any embolization from the aneurysm sac. The aneurysm was resected, with a small cuff of the aneurysm sent for culture. The ICA was spatulated and reconstructed with end-to-end artery anastomosis. Intraoperative duplex of the left ICA demonstrated excellent flow with a small area of bleeding on the anterior surface of the anastomosis, which was repaired with suture and a muscle pledget before completing the case. Given the lack of gross purulence in the surgical field and overall healthy appearance of the peri-aneurysmal artery, additional infection control maneuvers such as temporary closure and serial washouts, antibiotic bead placement, and pedicled muscle flap closure were deferred.

The patient was discharged on postoperative day 3 with recommendations to continue levofloxacin 500 mg every 48 hours and metronidazole 500 mg every 8 hours for 6 weeks. Blood



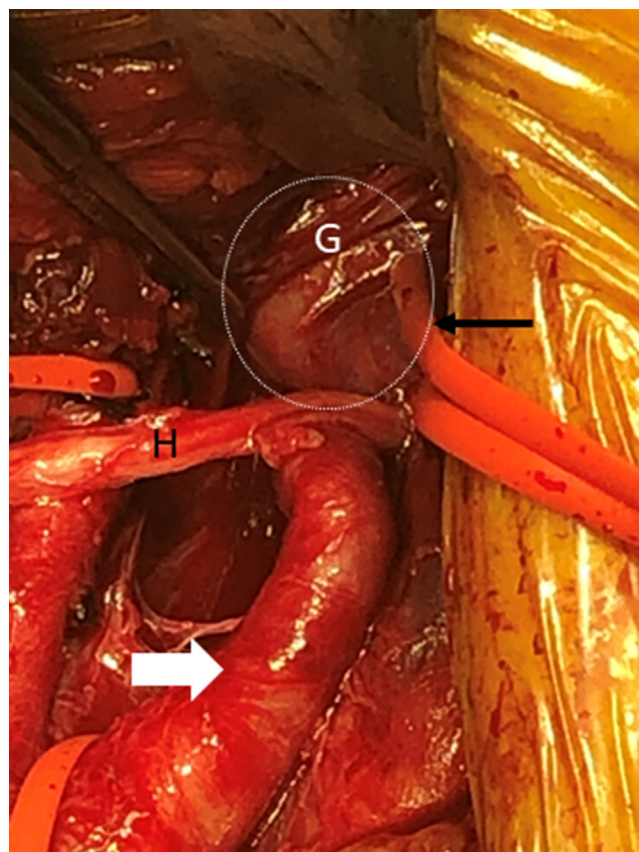
**Fig 1.** Axial computed tomography (CT) of the head and neck. The left dental abscess (red circle) and left internal carotid artery (ICA) aneurysm (white circle) at the base of C1 are visualized.

cultures were negative; however, aneurysm tissue was found to grow *Haemophilus parainfluenzae*. As this bacterial pathogen has been implicated in endocarditis, a transthoracic echocardiogram was ordered and showed no evidence of valvular vegetations. During a follow-up virtual visit, the patient reported new, persistent depressed mood, which is an uncommon but described side effect of levofloxacin. This prompted transition to oral moxifloxacin 400 mg daily. She initially reported difficulty swallowing solid foods, which improved to normal with occupational and speech therapy. The patient has no residual symptoms at over 2 years follow-up.

## DISCUSSION

Mycotic extracranial carotid artery aneurysms are a rare presentation of carotid artery aneurysms, with approximately 100 cases reported in the literature.<sup>2</sup> Mycotic aneurysms are hypothesized to arise from direct bacterial inoculation of the arterial wall, bacteremic seeding of an atherosclerotic plaque or existing aneurysm, contiguous spread from a nearby focus of infection, septic occlusion of the vasa vasorum, or immune complex deposition with subsequent arterial wall damage.<sup>3</sup> Only a handful of cases have been reported following dental procedures or abscess.<sup>4-6</sup> A review by de Souza et al found 16 ruptured extracranial carotid artery aneurysms with bacterial cultures in the literature, implicating a number of pathogens including *Staphylococcus*, *Mycobacterium*, *Salmonella*, *Proteus*, *Streptococcus*, *Klebsiella*, and *Pseudomonas*.<sup>7</sup> However, to our knowledge, presence of *H. parainfluenzae* has not been reported as a potential pathogenic driver of mycotic ICA aneurysm.

*H. parainfluenzae* is a small, gram-negative, anaerobic coccobacillus, and part of the normal microbiota of the upper airway.<sup>8</sup> Although acute dental abscesses are polymicrobial, *H. parainfluenzae* has been shown to be



**Fig 2.** Perioperative image of the proximal (white arrow) and distal (black arrow) internal carotid artery (ICA); aneurysm noted in dotted white circle. The glossopharyngeal nerve (G) overlies the ICA aneurysm, and the hypoglossal nerve (H) is pictured below the aneurysm on the mid-ICA.

abundantly present within dental plaques, thus implicating it as a potential contributor to dental infections and abscesses.<sup>9</sup> Case reports have described mycotic abdominal aortic aneurysms and popliteal aneurysms attributed to *H. influenzae* infection.<sup>10-12</sup> In these reports, the time course of suspected bacterial seeding to symptom onset range from 1 week to a month. There was concern for risk of rapid aneurysmal growth and rupture in these reported cases, resulting in prompt surgical management. Although rupture of mycotic ICA aneurysm is a rare occurrence, we elected to treat in a similar manner with definitive surgical repair within 72 hours of admission.

Specific techniques were required in this case to achieve appropriate exposure to our patient's ICA aneurysm located in the retro-styloid region above C1-C2. Nasotracheal intubation, mandibular subluxation, and posterior belly of the digastric muscle division are all well-described techniques in the vascular surgery armamentarium.<sup>13</sup> Fracturing the styloid process and dividing the stylohyoid muscle, which improved visualization of the aneurysm sac, is less commonly utilized.<sup>14</sup> The

glossopharyngeal nerve was carefully preserved with sharp dissection. A previous case report described a patient presenting with dysphagia secondary to ICA aneurysm compression of the glossopharyngeal nerve, which may be a potential sequela of delayed presentation or surgical management.<sup>15</sup>

Dissection in the parapharyngeal space and division of the stylohyoid muscle, which draws the hyoid bone backwards and elongates the floor of the mouth, as well as traction on the glossopharyngeal nerve can also cause difficulty swallowing. Long-term sequelae of parapharyngeal space dissection are limited, and most patients have an uneventful recovery. First bite syndrome is a common complication and is described as a sharp pain with the initiation of eating, that improves with subsequent "bites." This is hypothesized to be due to parotid gland sympathetic disruption, causing "denervation sensitivity" of myoepithelial cells.<sup>16</sup>

Multidisciplinary management of the patient with infectious diseases was essential in establishing an antibiotic regimen as well as trying to mitigate potential infectious complications and antibiotic side effects. Because *Haemophilus* species are a rare cause of endocarditis, with an estimated incidence of 0.8% to 1.3%, our patient underwent a transthoracic echocardiogram.<sup>17</sup> Furthermore, the patient's reported onset of depressed mood while taking levofloxacin is a known adverse effect of the drug and prompted a switch to moxifloxacin.<sup>18</sup> This medication was subjectively better tolerated by our patient.

## CONCLUSIONS

*Haemophilus parainfluenzae* from a dental abscess is a potential cause of mycotic ICA aneurysm. ICA aneurysms at the C1/C2 level may require an extended cervical approach, including some or all of the following maneuvers: fracture/resection of styloid process as well as muscles and ligaments inserted into the styloid process, dissection of the last four cranial nerves, and, rarely, sternocleidomastoid muscle detachment from the tip of the mastoid.<sup>14</sup> Evaluating for endocarditis by echocardiography is standard of care in patients with endovascular infections (ie, mycotic aneurysms); however, this case demonstrates direct bacterial invasion from a dental abscess to the ICA as mechanism for rapid development of a mycotic aneurysm.

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