A Rare Case of Superficial Temporal Artery Pseudoaneurysm in the Context of Endocarditis

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Human And Animal Rights
This case report was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

ABSTRACT

Infectious aneurysm related to endocarditis is a complication that usually involves the distal middle cerebral artery branches. There is paucity in the literature of cases involving the common or external carotid arteries, which are extremely rare. We report the case of a previously healthy 30 years old female with bacterial endocarditis-related infected skin lesions, complicated with infectious aneurysm involving a distal segment of the frontal branch of the right superficial temporal artery, intraparenchymal hematoma and septic embolisms. To our knowledge, this is the first case reported of an infectious aneurysm involving a distal external carotid artery branch in the context of proven bacterial endocarditis.

CASE REPORT

BACKGROUND

Septic embolisms and infectious aneurysms are well-known but rare complications from bacterial endocarditis. In particular, intracranial infectious aneurysms can lead to parenchymal hematoma or subarachnoid hemorrhage if untreated [1,2]. However, infectious aneurysms are rarely described in the external carotid arteries (ECA) branches. We describe a case in which a patient with bacterial endocarditis (Staphylococcus aureus) requiring surgical mitral valve replacement was diagnosed with cerebral septic embolisms, parenchymal hematoma and infectious aneurysm involving a distal segment of the frontal branch of the right superficial temporal artery.

CASE REPORT

A 30-year-old woman without any medical history was transferred to our hospital in the context of endocarditis. She presented systemic infectious symptoms (myalgia, fever and arthralgia) with elevated white blood cells, positive blood culture to Staphylococcus aureus and mitral valve vegetations on transthoracic echocardiogram. The source of infection was uncertain, possibly related to excoriated skin lesions.

Imaging Findings

During her admission, she developed headaches and mild visual changes. CT head and CT angiogram of the head and neck were obtained and demonstrated a large right frontal parenchymal hematoma with surrounding edema and mass effect. There was also minimal intraventricular hemorrhage. No aneurysm was identified on the CT angiogram (Figure 1).

MRI was obtained the same day and showed in addition to the hematoma multifocal foci of restricted diffusion, with ring and nodular enhancement and blooming artifacts mostly in the gray-white matter junction that highly suggested septic emboli (Figure 2).

Further assessment by a conventional cerebral angiogram was obtained to rule out infectious aneurysms. The angiogram

of the internal carotid arteries and vertebral arteries was unremarkable. While there was evidence of intracranial emboli, a pseudoaneurysm was found involving a distal segment of the frontal branch of the right superficial temporal artery arising from the right ECA (Figure 3).

Other imaging investigations showed multiple splenic infarcts without visible vessel occlusion or aneurysm.

Management and Follow-Up

The patient was treated with IV antibiotics and bioprosthesis mitral valve replacement. One year later, she had recovered and had no residual neurological symptoms. No further endovascular treatment was required for the extracranial pseudoaneurysm.

DISCUSSION

In the context of bacterial endocarditis, infectious aneurysms, previously named mycotic aneurysms, are well-known but rare complications that may occur. Mycotic aneurysms, originated from their resemblance to fungal vegetations, are a misnomer predominantly caused by bacterial infections. Intracranially, they are more frequent in the distal MCA branches and may cause intracranial bleed (hematoma or microbleeds), infarction or micro abscess [1,3]. They have also been described in the visceral arteries (splenic, hepatic, mesenteric), coronary arteries and rarely in peripheral arteries [4,5]. Most of these cases occur in the context of intravenous drug use.

Aneurysms of the external carotid artery are rare. They can occur with atheromatous. Pseudoaneurysm of the ECA can be related to trauma, neck neoplasm, iatrogenic (radiation, neck surgery or endovascular treatment of the carotid), or infectious process [6,7]. Most of the reported cases in the literature involve the proximal ECA near the bifurcation or proximal branches [6].

Infectious aneurysms of the ECA are extremely uncommon. There are only a few case reports and case series in the literature, mainly from the proximal external carotid artery and related to neck infection [7,8]. A case report described an infectious aneurysm of the ECA trunk in the context of intravenous drug use with mitral endocarditis, which also complicated small intracranial septic emboli [9]. More recently, a small distal scalp branch pseudoaneurysm was described in the context of prolonged hospitalization post-trauma with positive blood culture but without endocarditis [10].

Even if intracranial bleeding in the context of endocarditis is not always related to infectious aneurysms, in the case present herein, the presence of the ECA aneurysm and septic embolisms reinforced the hypothesis of a ruptured infectious aneurysm to explain the parenchymal hematoma [11].

Endovascular or surgical treatment is recommended for intracranial or proximal ECA aneurysms [1,2,6, 12,13]. Due to the rarity of distal ECA branches aneurysms, there is no current treatment recommendation. The other similar case reported in the literature was also managed conservatively with IV antibiotics alone and demonstrated a favorable outcome, similar to our case [10].

TEACHING POINT

Our case report demonstrates the rare occurrence of infectious aneurysms in the external carotid artery (ECA) as a complication of bacterial endocarditis. Key imaging modalities, including the use of CT angiography, MRI, and digital subtraction angiography (DSA), are critical for identifying such aneurysms and differentiating them, emphasizing the importance of comprehensive imaging in the diagnosis of infectious vascular complications.

QUESTIONS

Question 1: Which of the following statements about infectious aneurysms in the context of bacterial endocarditis is false?

A. Infectious aneurysms in bacterial endocarditis are always located in the distal branches of the external carotid artery. (applies)

B. Infectious aneurysms can lead to complications like parenchymal hematoma and septic embolisms.

C. Imaging findings for infectious aneurysms in bacterial endocarditis may include a pseudoaneurysm detected on CT angiography.

D. Mycotic aneurysms are a misnomer, as they are predominantly caused by bacterial infections.

E. Conservative management with IV antibiotics can be sufficient for treating distal ECA infectious aneurysms.

Explanation: False: Infectious aneurysms in bacterial endocarditis are more commonly found in intracranial arteries, particularly the distal middle cerebral artery (MCA), not in the distal branches of the external carotid artery (ECA).

True: Infectious aneurysms in bacterial endocarditis can lead to parenchymal hematoma, septic embolisms, and other complications if untreated.

True: Imaging findings for infectious aneurysms in bacterial endocarditis may include a pseudoaneurysm detected on CT angiography as evident in this case and the literature cited.

True: The term "mycotic aneurysms" is a misnomer, as these aneurysms are predominantly caused by bacterial infections, not fungi.

True: In rare cases of distal ECA aneurysms, conservative management with IV antibiotics may be sufficient, as seen in this case, with no need for further surgical intervention.

Question 2: Which of the following imaging modalities were essential in identifying the pseudoaneurysm in the patient with bacterial endocarditis?

A. X-ray imaging

B. CT angiography (applies)

C. Digital subtraction angiography (DSA) (applies)

D. Ultrasound with Doppler

Explanation:

False: X-ray imaging is not typically used to detect aneurysms or vascular malformations.

True: CT angiography was used in this case to initially assess the patient's condition, although it did not reveal the pseudoaneurysm.

True: Digital subtraction angiography (DSA) was essential in identifying the pseudoaneurysm of the right superficial temporal artery arising from the external carotid artery.

False: Ultrasound with Doppler is not typically used for diagnosing pseudoaneurysms in this location.

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FIGURES

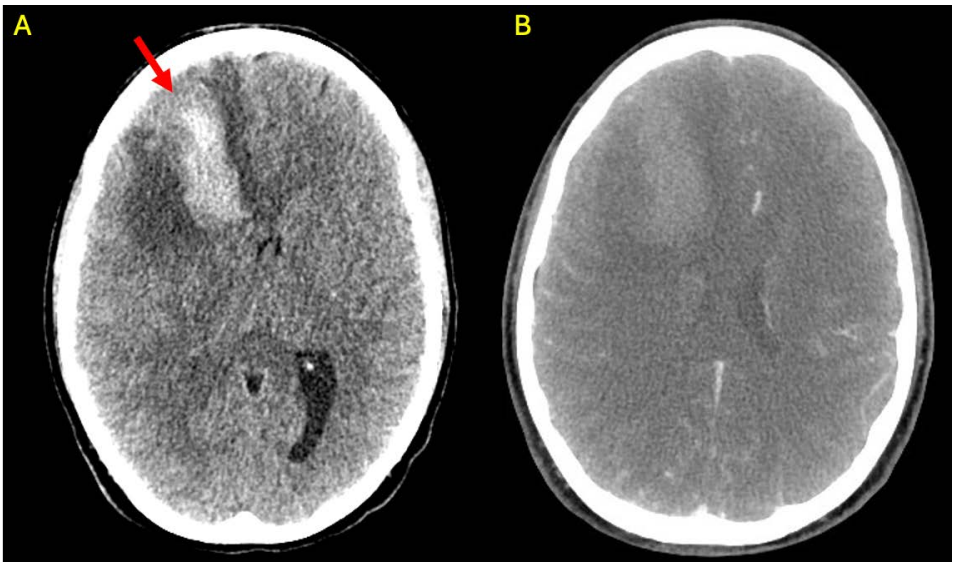

Figure 1: 30-year-old female with bacterial endocarditis- CT.

FINDINGS: CT head axial image (A) shows right frontal parenchymal hematoma with surrounding vasogenic edema and local mass effect. CT angiogram axial image (B) demonstrated the hematoma without underlying aneurysm or vascular malformation.

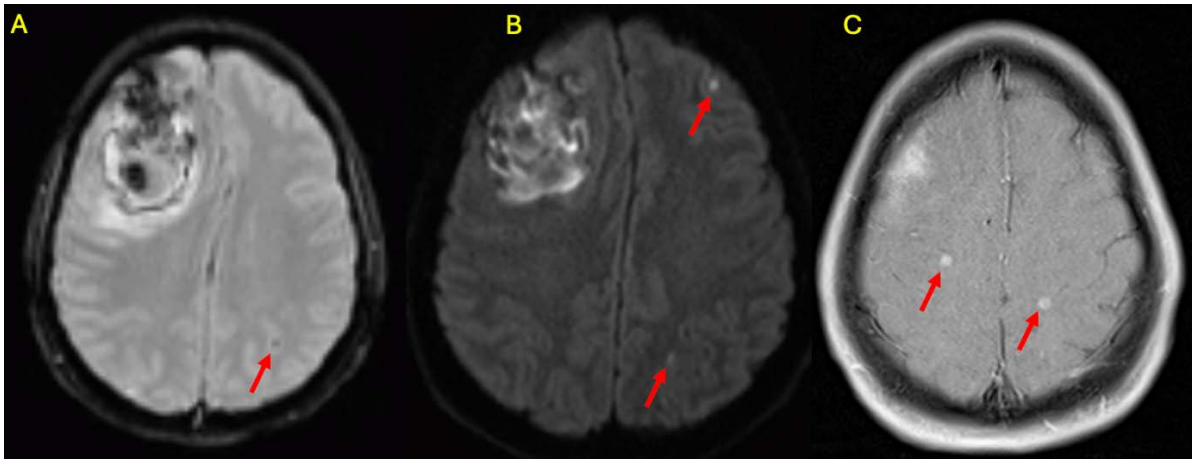

Figure 2: 30-year-old female with bacterial endocarditis- MRI

FINDINGS: MRI axial GRE (A) shows right frontal parenchymal hematoma and foci of microbleeds in the left cerebral hemisphere, axial DWI (B) shows foci of restricted diffusion, and Axial T1 VIBE post-contrast (C) demonstrates enhancement associated with microbleeds in keeping with septic emboli.

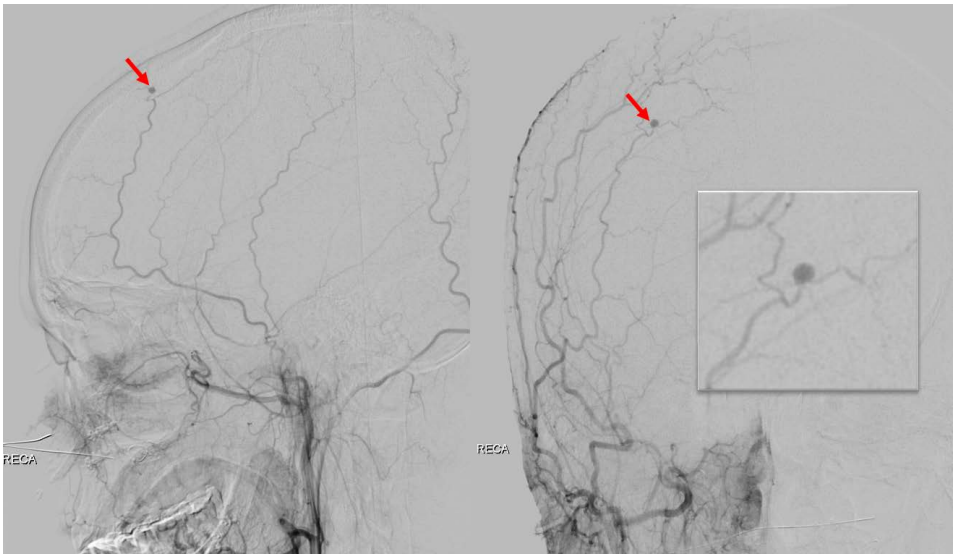

Figure 3: 30-year-old female with bacterial endocarditis- DSA images

FINDINGS: DSA images with ECA injections demonstrated pseudoaneurysm involving a distal segment of the frontal branch of the right superficial temporal artery (red arrow).

KEYWORDS

Infectious aneurysm; Bacterial endocarditis; Superficial temporal artery; Septic embolism; Diagnostic imaging

ABBREVIATIONS

CT = Computed Tomography
MRI = Magnetic Resonance Imaging
ECA = External Carotid Artery
GRE = Gradient Recalled Echo
DWI = Diffusion-Weighted Imaging
VIBE = Volumetric Interpolated Breath-Hold Examination
DSA = Digital Subtraction Angiography
MCA = Middle Cerebral Artery
IV = Intravenous

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