

A Rare Cause of Recurrent Massive Epistaxis: Post-traumatic Cavernous Carotid Artery Pseudoaneurysm

Rekürren Massif Burun Kanamasının Nadir Bir Nedeni: Travma İlişkili Kavernoöz Karotis Psödoanevrizması

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ABSTRACT Internal carotid artery pseudoaneurysm due to head trauma is an extremely rare but life-threatening condition. A pseudoaneurysm in the cavernous segment of the internal carotid artery should be considered in patients with ocular region injury, unilateral vision loss and delayed epistaxis. In cases of cavernous carotid pseudoaneurysm, a period between trauma and the first episode of epistaxis is usually observed. In this paper, a 36-year-old patient with cavernous carotid pseudoaneurysm related to head trauma is presented. The patient's epistaxis started approximately 5 months after the trauma. On his examination, a pulsatile mass in the left nasal cavity was detected, and a diagnosis of giant cavernous carotid pseudoaneurysm was made with computed tomography-angiography imaging. Then, he was successfully treated with coil embolization in the interventional radiology unit.

Keywords: Epistaxis; aneurysm, false; carotid artery, internal; carotid artery injuries; cavernous sinus

ÖZET Kafa travmasına bağlı internal karotid arter psödoanevrizması, oldukça nadir görülen ve yaşamı tehdit eden bir durumdur. Özellikle oküler bölgede kemik kırığı, tek taraflı görme kaybı, gecikmiş burun kanaması bulguları saptanan bir hastada, internal karotid arterin kavernoöz segmentinde psödoanevrizma olabileceği akla gelmelidir. Kavernoöz karotis psödoanevrizması olgularında, genellikle travma ile ilk burun kanaması atağı arasında bir periyot gözlenir. Bu çalışmada, 36 yaşında kafa travması ile ilişkili kavernoöz karotis psödoanevrizması olan bir olgu sunulmuştur. Olgunun, travmadan yaklaşık 5 ay sonra massif ve tekrarlayıcı karakterde burun kanaması başlamıştı. Muayenesinde sol nazal kavitede pulsatil kitle saptanan hastaya uygulanan bilgisayarlı tomografi-anjiyografi görüntüleri ile dev kavernoöz karotis psödoanevrizması tanısı kondu. Ardından girişimsel radyoloji ünitesinde koil embolizasyon ile başarılı bir şekilde tedavi edildi.

Anahtar Kelimeler: Epistaksis; anevrizma, yalancı; karotis arter, internal; karotis arter yaralanmaları; kavernoöz sinüs

Traumatic pseudoaneurysm of the internal carotid artery is a rare but serious condition. It can give symptoms according to the size of the pseudoaneurysm and the structures it is related to. Particularly pseudoaneurysms in the cavernous segment of the internal carotid artery can cause cranial nerve compression, leading to symptoms and signs such as visual loss.¹ However, in the literature massive epistaxis due to cavernous carotid pseudoaneurysm have been reported.²⁻⁴ Although epistaxis is one of the most common otorhinolaryngology emergencies, head trauma related epistaxis occupies less than 5% of all

etiological factors.⁵ Nevertheless delayed recurrent or massive epistaxis, especially after head trauma, can be an alarm symptom in terms of pseudoaneurysms in large arteries.

Here in we present a case with recurrent massive epistaxis due to cavernous carotid artery pseudoaneurysm, nearly five months after head injury.

CASE REPORT

A 36-year-old male patient was admitted to the emergency service with vomiting blood (hematemesis).

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There was no active nasal bleeding at admission. His arterial blood pressure was normal. Hemoglobin level in complete blood count (CBC) was 11.1 g/dl, biochemical parameters and bleeding profile were normal. The patient was hospitalized to the gastroenterology service with a prediagnosis of upper gastrointestinal bleeding. In the detailed history of the patient, he had a whole body trauma due to falling high ground (3rd floor of the apartment) 5 months ago. The patient was followed in the intensive care unit for about 2 months in another hospital. He had multiple operations due to C2 fracture of the cervical vertebra and fractures in the maxillofacial region. The patient had vision loss in the left eye after the trauma, but it was detected approximately 1 month after the trauma. The patient was discharged approximately 4 months after the trauma. Abdominal ultrasound was performed to detect bleeding focus and was normal. Afterwards, upper gastrointestinal tract endoscopy was performed. No bleeding focus or pathology was detected. A severe bleeding started from the patient's nose shortly after the procedure, but stopped spontaneously within a few minutes. Approximately one day later, he was consulted to ear nose throat (ENT) ward with severe and active nasal bleeding. At the ENT examination of the patient, coagulum was observed in the nasal cavity and in the mouth. Coagulum was cleared. Active bleeding was observed from the left nasal cavity. Later, lidocaine soaked tampons were placed to bilateral nasal cavity and waited for 5 minutes with applying digital pressure. Then tampons were removed and nasal endoscopy was performed. According to his endoscopic examination, septum was deviated to right side, both side little area was clear. At the left nasal cavity, a reddish mass with smooth surface was observed. It was possibly originated from sphenoid sinus (Figure 1). There was a pulsation which was synchronous with the arterial beat. Because of the pulsation and previous recurrent and serious bleeding, it was thought to be a pseudoaneurysm. Anterior packing was made with non-absorbable material (Merocel® Standart Nasal Dressing, 8 cm, without airway, Medtronic Xomed, USA) in order to create some pressure and delay a possible life threatening bleeding. Hemoglobin level decreased to 7.1 g/dl in the control CBC. Therefore,

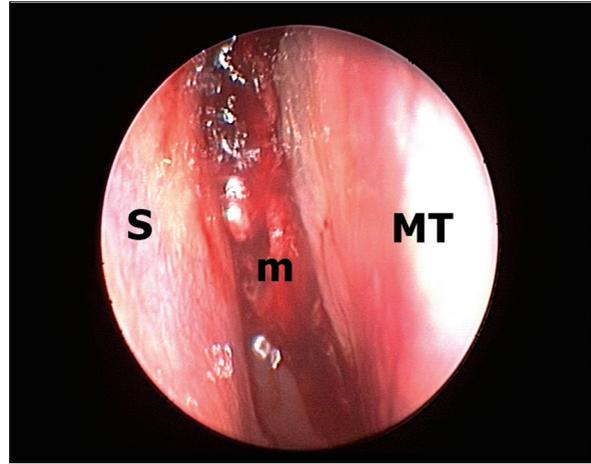


FIGURE 1: Endoscopic view of the pulsating mass in left nasal cavity.
MT: Middle turbinate; S: Septum; m: Mass.

7 units of erythrocyte suspension transfusion was applied to the patient in total. Paranasal computed tomography (CT) and CT angiography with contrast enhancement was held and interpreted rapidly. There was a 21x18x17 mm pseudoaneurysm arose from cavernous segment of the left cavernous part of internal carotid artery, enlarged into sphenoid sinus and left nasal passage through sphenoid sinus anterior wall (Figure 2 A-D). The patient was transferred to the interventional radiology unit and coil embolization was successfully applied to the patient's left internal carotid artery (ICA) and cavernous carotid pseudoaneurysm (Figure 3 A, B). Informed consent was obtained from the patient.

DISCUSSION

Cavernous carotid aneurysm (CCA) is a rare but serious condition and accounts for only 2-9% of all intracranial aneurysms.⁶ Apart from trauma, causes such as hypertension, ischemic heart diseases, hyperlipidemia, autosomal dominant polycystic kidney disease, Type 4 Ehler-Danlos syndrome, pituitary tumor, aortic coarctation, Graves' disease, Marfan syndrome, neurofibromatosis type 1 are also accused in the etiology of CCA.⁷ However, traumatic pseudoaneurysm is less common and occurs as a result of injury to the artery wall due to head injury or previous surgical damage. The pseudoaneurysms are not true aneurysms because they consist the hematoma surrounded by a fibrous layer rather than

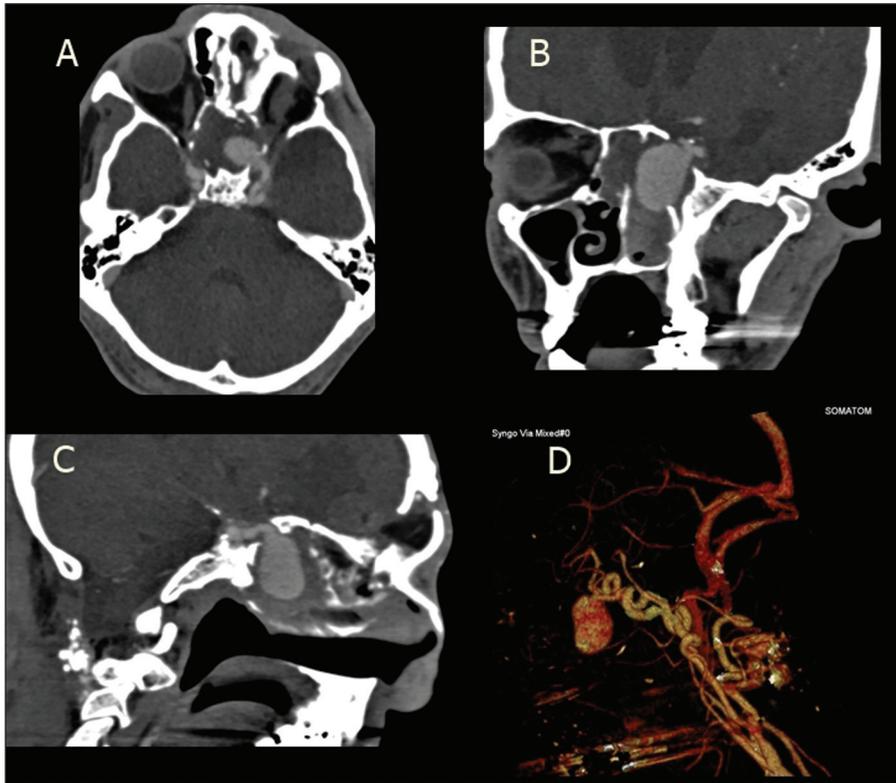


FIGURE 2: CT-Angiographic imaging of cavernous pseudoaneurysm, A) Axial section, B) Paracoronaral section, C) Parasagittal section, D) 3D colored reconstruction.

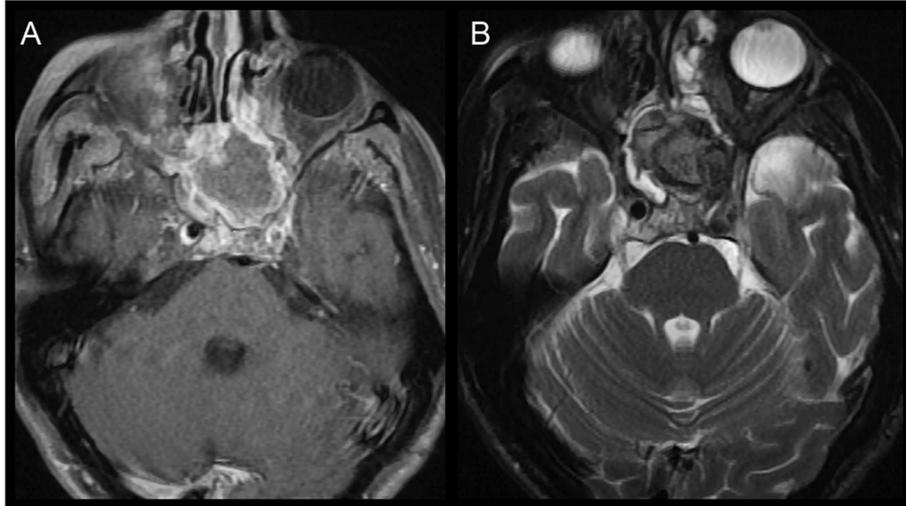


FIGURE 3: MR images after coil embolization of a cavernous pseudoaneurysm. These images show that there is no flow in the pseudoaneurysm and in the left ICA. A) T1 axial sequence with contrast, B) T2 axial TSE sequence.

a true arterial wall. Due to the influence of continuous pulsatile arterial pressure the latter expands to a saccular shape.^{5, 8} Since non-durable structure of pseudoaneurysms, massive bleeding spontaneously or related to minor trauma can occur. Similar to our

case, sometimes the large cavernous pseudoaneurysms can pass through the sphenoid sinus and reach the nasal cavity.⁸

Patients with cavernous pseudoaneurysm may present with different symptoms such as headache,

visual loss or recurrent epistaxis due to rupture of pseudoaneurysm or asymptomatic. In our case, due to the patient's history of blunt head trauma, severe and recurrent epistaxis, and the presence of a pulsatile mass in the left nasal cavity, we thought that pseudoaneurysm might be in the differential diagnosis. Besides, existing a period between the onset of persistent epistaxis and trauma, similar to our case, supported the prediagnosis. Han et al. reported that the time between trauma and the onset of massive epistaxis can vary from 1 week to 8 months.⁹ As in our case, one-sided blindness, orbital fractures and massive epistaxis, which is Maurer's classic symptom triad, should bring the pseudoaneurysm into the clinician's mind.⁵ Initial bleeding is rarely fatal, but the frequency and severity of bleeding gradually tends to increase.¹⁰ However rapid diagnosis and urgent treatment intervention is crucial as it is unknown which bleeding can be mortal. The pseudoaneurysm must be demonstrated with a radiologic method such as digital subtraction angiography, magnetic resonance angiography or CT angiography for definitive diagnosis.

Nowadays, open surgical procedures have replaced by endovascular interventions in the treatment of pseudoaneurysms. The expansion of new endovascular techniques with technological advances, for example, coiling, stent, balloon occlusion or flow-diverting devices used in endovascular interventions have made the endovascular route more effective in the treatment of intracranial vascular events. In addition, mortality and morbidity rates of endovascular methods offer better results, especially in large aneurysms.¹¹ Higashida et al. reported a 17.9% rate of mortality for cavernous carotid aneurysm obliteration with balloon occlusion in 84 patients.¹² Choulakian et al. reported no mortality and 20% morbidity with coiling/stent coiling in a number of 113

patient with cavernous carotid aneurysm.¹³ Lempert et al. presented 11 patients with traumatic pseudoaneurysms, 6 of which were located on cavernous carotid and all were treated successfully by coil embolization.¹⁴

As a conclusion, severe epistaxis with a history of head trauma should warn the clinician about a carotid artery pseudoaneurysm. Particularly, if it is accompanied by unilateral vision loss, it is likely to be cavernous carotid pseudoaneurysm. Therefore, CT or MRI angiographic imaging should be performed rapidly. After diagnosis of a cavernous carotid aneurysm, appropriate treatment can be provided with endovascular methods.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, shareholding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Erdoğan Özgür, Coşkun Atay; **Design:** Erdoğan Özgür, Coşkun Atay, İbrahim Önder Yeniçeri; **Control/Supervision:** Erdoğan Özgür, İbrahim Önder Yeniçeri; **Data Collection and/or Processing:** Erdoğan Özgür, Coşkun Atay, İbrahim Önder Yeniçeri, Mehmet Serkan Gür; **Analysis and/or Interpretation:** Erdoğan Özgür, İbrahim Önder Yeniçeri, Mehmet Serkan Gür; **Literature Review:** Erdoğan Özgür, Coşkun Atay; **Writing the Article:** Erdoğan Özgür, Coşkun Atay; **Critical Review:** Erdoğan Özgür, Coşkun Atay, İbrahim Önder Yeniçeri; **Materials:** İbrahim Önder Yeniçeri, Mehmet Serkan Gür.

REFERENCES

1. Chen G, Li J, Xu G, Qin S, Gong J, Yang M, et al. Diagnosis and treatment of traumatic internal carotid artery pseudoaneurysm primarily manifested by repeated epistaxis. *Turk Neurosurg.* 2013;23(6):716-20. [[Crossref](#)] [[PubMed](#)]
2. Sridharan R, Low SF, Mohd MR, Kew TY. Intracavernous internal carotid artery pseudoaneurysm. *Singapore Med J.* 2014;55(10):e165-8. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
3. Bhatoe HS, Suryanarayana KV, Gill HS. Recurrent massive epistaxis due to traumatic intracavernous internal carotid artery aneurysm. *J Laryngol Otol.* 1995;109(7):650-2. [[Crossref](#)] [[PubMed](#)]
4. Asma A, Putra SH, Saim L. Massive epistaxis secondary to pseudoaneurysm of internal carotid artery. *Med J Malaysia.* 2006;61(1):84-7. [[PubMed](#)]
5. Chen D, Concus AP, Halbach VV, Cheung SW. Epistaxis originating from traumatic pseudoaneurysm of the internal carotid artery: diagnosis and endovascular therapy. *Laryngoscope.* 1998;108(3):326-31. [[Crossref](#)] [[PubMed](#)]
6. Stiebel-Kalish H, Kalish Y, Bar-On RH, Setton A, Niimi Y, Berenstein A, et al. Presentation, natural history, and management of carotid cavernous aneurysms. *Neurosurgery.* 2005;57(5):850-7. [[Crossref](#)] [[PubMed](#)]
7. Zipfel GJ, Dacey RG. Update on the management of unruptured intracranial aneurysms. *Neurosurg Focus.* 2004;17(5):E2. [[Crossref](#)] [[PubMed](#)]
8. Ruiz-Juretschke F, Castro E, Mateo Sierra O, Iza B, Manuel Garbizu J, Fortea F, et al. Massive epistaxis resulting from an intracavernous internal carotid artery traumatic pseudoaneurysm: complete resolution with overlapping uncovered stents. *Acta Neurochir (Wien).* 2009;151(12):1681-4. [[Crossref](#)] [[PubMed](#)]
9. Han MH, Sung MW, Chang KH, Min YG, Han DH, Han MC. Traumatic pseudoaneurysm of the intracavernous ICA presenting with massive epistaxis: imaging diagnosis and endovascular treatment. *Laryngoscope.* 1994;104(3 Pt 1):370-7. [[Crossref](#)] [[PubMed](#)]
10. Chambers EF, Rosenbaum AE, Norman D, Newton TH. Traumatic aneurysms of cavernous internal carotid artery with secondary epistaxis. *AJNR Am J Neuroradiol.* 1981;2(5):405-9. [[PubMed](#)]
11. Higashida RT, Halbach VV, Dowd C, Barnwell SL, Dormandy B, Bell J, et al. Endovascular detachable balloon embolization therapy of cavernous carotid artery aneurysms: results in 87 cases. *J Neurosurg.* 1990;72(6):857-63. [[Crossref](#)] [[PubMed](#)]
12. Choulakian A, Drazin D, Alexander MJ. Endosaccular treatment of 113 cavernous carotid artery aneurysms. *J Neurointerv Surg.* 2010;2(4):359-62. [[Crossref](#)] [[PubMed](#)]
13. Lempert TE, Halbach VV, Higashida RT, Dowd CF, Urwin RW, Balousek PA, et al. Endovascular treatment of pseudoaneurysms with electrolytically detachable coils. *AJNR Am J Neuroradiol.* 1998;19(5):907-11. [[PubMed](#)]