



doi: 10.4103/2221-6189.307393

jadweb.org

Acute onset of massive epistaxis due to post-traumatic cavernous internal carotid artery pseudoaneurysm: A case report

Santosh Kumar Swain [✉], Alok Das, Satyabrata Acharya, Nibi Shajahan, Rohit Agrawala

Department of Otorhinolaryngology, IMS and SUM Hospital, Siksha "O" Anusandhan University (Deemed to be), K8, Kalinga Nagar, Bhubaneswar-751003, Odisha, India

ABSTRACT

Rationale: Cavernous internal carotid artery (ICA) pseudoaneurysm caused by non-penetrating head trauma is a rare cause of massive epistaxis. The sudden onset of epistaxis due to such a fatal aneurysm protruding into the sphenoid sinus is extremely rare in clinical practice. The management is often challenging because of anatomical inaccessibility of the bleeding point.

Patient's concern: A 42-year-old man with a history of head trauma showing an ICA aneurysm eroding the sphenoid sinus followed by massive epistaxis.

Diagnosis: A computerized tomography (CT) scan showed a fracture in the sphenoid sinus. CT angiogram revealed cavernous ICA pseudoaneurysm.

Interventions: Endovascular coil embolization.

Outcomes: The patient recovered well and was discharged without any neurological deficits

Lessons: Cavernous ICA pseudoaneurysm may lead to a life-threatening situation. If a patient has a history of head trauma, post-traumatic cavernous ICA pseudoaneurysm should be considered a differential diagnosis of massive epistaxis.

KEYWORDS: Massive epistaxis; Pseudoaneurysm; Internal carotid artery; Coil embolization

1. Introduction

Epistaxis is a common manifestation after a head injury. In most cases, nasal bleeding occurs because of the laceration at the nasal mucosa or tear of the anterior ethmoid or sphenopalatine artery after head injury[1]. Blunt trauma of the head rarely cause injury to the cavernous segment of the internal carotid artery (ICA) and form pseudoaneurysm that may expand medially, enter into the sphenoid sinus through the post-traumatic bony defect and cause torrential bleeding from the nasal cavity. In these patients, there may be a triad

of the history of head trauma, epistaxis, and monocular blindness[2]. Massive epistaxis after head trauma must alert the clinician for the possibility of pseudoaneurysm of the cavernous part of the ICA. The management of these cases is still challenging. Here, we present a case of post-traumatic intra-cavernous ICA pseudoaneurysm.

2. Case report

This study was approved by the Institutional Ethics Committee, IMS and SUM Hospital, SOA University, Bhubaneswar, India, and informed consent was obtained from the patient.

A 42-year-old man was admitted to the emergency department with severe epistaxis for one day. He had a history of mild blunt trauma to the head one month ago during a road traffic accident, and one month later, he developed severe epistaxis. His blood pressure was normal at the admission. Initially, he was treated with an immediate anterior nasal pack in both nostrils. Once the bleeding stopped, the results of routine blood tests were sent for investigations, and the results showed no abnormality. After 48 h, the nasal pack was removed, and no active bleeding was noted. Then a non-contrast CT scan of the paranasal sinus and brain was done to detect any injury. It is found that erosion of the sphenoid sinus with protrusion of the soft tissue into the sinus. CT angiogram revealed a right ICA pseudoaneurysm projecting into the right sphenoid sinus through a bony defect at the roof of the sphenoid sinus (Figure 1). CT

[✉]To whom correspondence may be addressed. E-mail: santoshvoltaire@yahoo.co.in

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

©2021 Journal of Acute Disease Produced by Wolters Kluwer- Medknow. All rights reserved.

How to cite this article: Swain SK, Das A, Acharya S, Shajahan N, Agrawala R. Acute onset of massive epistaxis due to post-traumatic cavernous internal carotid artery pseudoaneurysm: A case report. J Acute Dis 2021; 10(1): 39-41.

Article history: Received; Revision; Accepted; Available online 25 January 2021

angiogram was done after right trans-femoral catheterization which showed a vascular protrusion or cavernous ICA pseudoaneurysm into the right side of the sphenoid sinus. The severity of the epistaxis, imaging, and the history of the head trauma lead to the diagnosis of the cavernous ICA pseudoaneurysm. The patient was referred to the interventional radiologist for endovascular coil embolization (Figure 2). A digital subtraction angiogram showed detachable coil embolization with preservation of the carotid flow. The patient recovered well and discharged without the development of any neurological deficits. He was asymptomatic at the follow-up visit after one year.

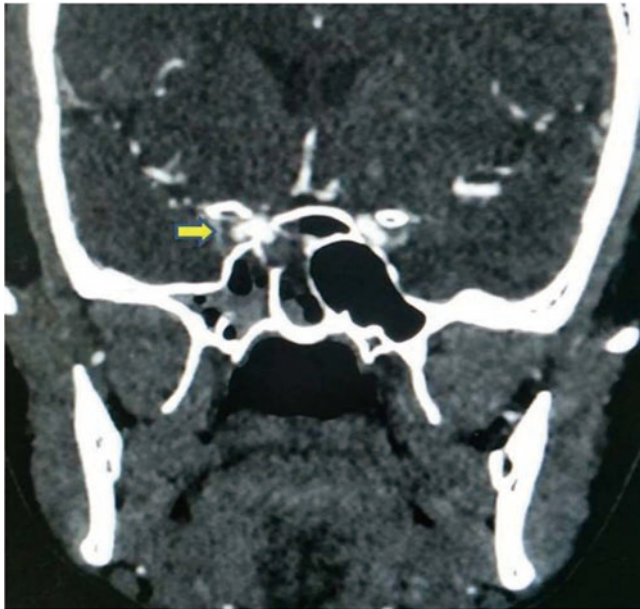


Figure 1. CT angiogram shows a right carotid siphon pseudoaneurysm protruding into the sphenoid sinus through the traumatic bony defect (arrow).

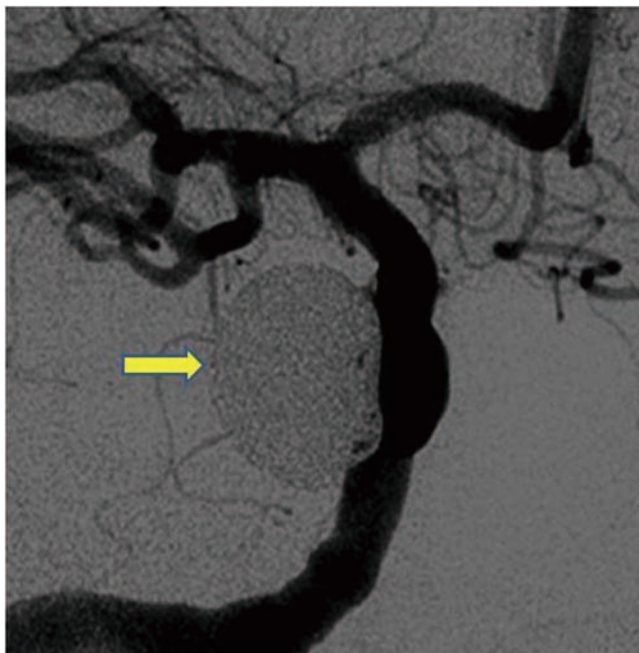


Figure 2. Endovascular embolization by coiling of the ruptured cavernous ICA pseudoaneurysm (arrow).

3. Discussion

Cavernous ICA pseudoaneurysm is extremely rare, and it accounts for only 3% to 5% of all intracranial aneurysm cases[3]. The majority of cases of cavernous ICA pseudoaneurysm are associated with trauma and have a mortality rate of 30% to 50%[2]. Besides head trauma, the ICA pseudoaneurysm is associated with mycotic, congenital, and inflammatory etiologies. Pseudoaneurysm occurs because of the hematoma from ICA forming a peripheral fibrous wall. Continuously weakening pulsatile forces from ICA and the enlargement of the hematoma may result in the breakdown of the fibrous wall and cause a rupture with massive epistaxis. Traumatic ICA aneurysm is often seen in its cavernous and petrous parts. The first case of the post-traumatic cavernous ICA aneurysm was reported in 1928, where a 23-year-old man presented with severe recurrent epistaxis after six months of head trauma[4]. However, there was no pathological or radiological confirmation, and the patient was treated by carotid ligation. There are various mechanisms for explaining the formation of ICA pseudoaneurysm after blunt or penetrating injury. Tear at the intimal layer of ICA can be augmented by dissection of blood, which finally leads to reduced blood flow and formation of thrombus in the lumen[5]. Arterial weakening is not a sudden process, and the latent period between the trauma and onset of the epistaxis is often variable. This process can take days to years with an average duration of approximately three weeks (88% of cases) [5]. In our case, the duration from head trauma to massive epistaxis was one month. As the intra-cavernous part of the ICA is close to the optic, oculomotor, abducens, trochlear, and trigeminal nerves so these nerves may be damaged during the development of the pseudoaneurysm leading to blindness, facial numbness, or palsy of the third cranial nerve. Blunt trauma to the head accounts for the cause of 3% to 10% of all the ICA injuries, and occlusion is seen in a very small portion of the cases[6]. Blunt head injury may cause damage to the ICA through different pathogenesis such as carotid-cavernous fistula, dissection of the ICA with secondary occlusion, rupture of the internal carotid artery, and false aneurysm of ICA which may rupture into the sphenoid sinus[7]. The patient often presents with massive epistaxis, a history of head injury, and unilateral blindness, called Maurer's triad, which is considered as pathognomonic of ICA pseudoaneurysm[2]. In our case, there were no retro-orbital pain and blindness.

The diagnosis is usually delayed due to a latency period between head injury and epistaxis. A high index of suspicion and proper treatment is required for successful treatment. The intra-cavernous part of the ICA is intimately related to the sphenoid sinus and bulging to the lateral wall of the sphenoid sinus in approximately 71% of cadaveric dissections[8]. The bony part which covers the cavernous part of the ICA within the sphenoid sinus is less than 1 mm in approximately 66% of the cases and in approximately 4% there was no bony covering[8]. This interface bony plate is prone to potential injury to the head trauma and sphenoid sinus surgery.

An early episode of epistaxis is usually not severe but the severity

increases in further episodes. As the initial nasal bleeding is not much impressive, so the diagnosis and treatment are often delayed. The delayed nasal bleeding is explained by the time required for weakening the vessel wall and for pulsatile pressure to erode the bony covering of the sphenoid sinus[9]. Thus, cavernous ICA pseudoaneurysm may be a source of the fatal and massive epistaxis which needs quite different management from that of the epistaxis due to other causes.

As for the diagnosis of ICA pseudoaneurysm with epistaxis, carotid angiography should be done as soon as possible. Carotid angiography is considered as gold standard investigation, although the alternative procedure like three dimensional CT angiography is less invasive than conventional angiography[10]. CT and magnetic resonance imaging can help provide information about the possibility of ICA aneurysm. Blood inside the sphenoid sinus indicates dehiscence of the sphenoid sinus wall which alerts the possible trauma.

ICA pseudoaneurysm with epistaxis manifestation is often difficult to treat. Currently, endovascular treatment has been reported in the case of ICA pseudoaneurysm. Besides, complete trapping of the patent artery and bypass has been done conventionally. So it is controversial for a selective treatment option for ICA pseudoaneurysm. Trapping of the ICA *i.e.* ligation of the cervical part of ICA and severance of intracranial ICA below ophthalmic artery is an insufficient treatment option. The ICA pseudoaneurysm below dura is also difficult to treat since vial clipping and even approaching by its neck is difficult owing to the cavernous sinus. Currently, endovascular therapy has been introduced for treating ICA pseudoaneurysm with epistaxis. ICA pseudoaneurysm is more susceptible to rupture than the true aneurysm. Stent-assisted coiling is a preferred option with patent vessel preservation or carotid artery sacrifice by using coils or balloons[10]. In our case, endovascular coil embolization of the cavernous ICA pseudoaneurysm was done. Our patient was also symptom-free after a one-year follow-up visit.

4. Conclusions

Post-traumatic pseudoaneurysm of the cavernous part of the ICA is a challenging clinical entity both in diagnosis and treatment. Post-traumatic pseudoaneurysm of ICA may be ignored as there may not have any nasal bleeding or only minor bleeding at the time of head trauma. Post-traumatic intra-cavernous ICA aneurysm is a rare fatal complication of the head injury. This clinical manifestation should be suspected in the patient with a history of head injury, massive recurrent epistaxis, and delayed onset of blindness. Epistaxis should be temporarily managed by the nasal pack, and the diagnosis should be confirmed by the angiography at the earliest time. The treatment options include trapping, balloon

occlusion or carotid ligation, or coil embolization as per the availability of the expertise and resources. The treatment must be initiated early for preventing mortality.

Conflict of interest statement

The authors report no conflict of interest.

Authors' contributions

S.K.S.: Concept and design of the study, acquisition of data, drafting the article, performing the surgery. A.D.: Performing the surgery, acquisition of data, revising the article critically for important intellectual content. S.A.: Revising article critically for important intellectual content. N.S.: Revising article critically for important intellectual content. R.A.: Revising article critically for important intellectual content.

References

- [1] Bhatoe HS, Suryanarayana KV, Gill HS. Recurrent massive epistaxis due to traumatic intracavernous internal carotid artery aneurysm. *J Laryngol Otol* 1995; **109**(7): 650-652.
- [2] Maurer MY, Mills M, German WJ. Triad of unilateral blindness, orbital fracture and massive epistaxis in head injury. *J Neurosurg* 1961; **18**(6): 837-846.
- [3] Goleas J, Mikhael MA, Paige ML, Wolff AP. Intracavernous carotid artery aneurysm presenting as recurrent epistaxis. *Ann Otol Rhinol Laryngol* 1991; **100**(7): 577-579.
- [4] Birley JL, Trotter W. Traumatic aneurysms of the intracranial portion of the carotid artery. *Brain* 1928; **51**: 184-208.
- [5] Radkowski D, McGill TJ, Healy GB, Jones DT. Penetrating trauma of the oropharynx in children. *Laryngoscope* 1993; **103**(9): 991-994.
- [6] Pathak PN. Epistaxis due to ruptured aneurysm of the internal carotid artery. *J Laryngol Otol* 1972; **86**(4): 395-397.
- [7] Brasiliense LB, Dumont TM. Alarming internal carotid artery aneurysm eroding the sphenoid sinus. *World Neurosurg* 2017; **108**: 985.e13-985.e14.
- [8] de Bonnacaze G, Gallois Y, Chaynes P, Bonneville F, Dupret-Bories A, Chantalat E, et al. Intractable epistaxis: which arteries are responsible? An angiographic study. *Surg Radiol Anat* 2017; **39**(11): 1203-1207.
- [9] Kim JY, Farkas J, Putman CM, Varvares M. Paraclinoid internal carotid artery aneurysm presenting as massive epistaxis. *Ann Otol Rhinol Laryngol* 2000; **109**(8 Pt 1): 782-786.
- [10] Kumar Swain S, Mohapatra SS. A rare and fatal complication of ear syringing: Rupture of pseudoaneurysm at petrous internal carotid artery. *Arch Trauma Res* 2018; **7**(4): 166-168.