

CASE REPORT

Endovascular Coil Occlusion of Traumatic Intradural Aneurysm with Presentation as Carotid Cavernous Fistula

Lakshmi S P Karanam, Anand B Alurkar, M Natarajan¹, B Pugazhenth²

Departments of Interventional Radiology, ¹Neurosurgery, and ²Radiology, KG Hospitals, Coimbatore, Tamil Nadu, India

Address for correspondence:

Dr. Anand B. Alurkar,
Department of Interventional Radiology,
KG Hospitals, Coimbatore,
Tamil Nadu, India.
E-mail: anandalurkar@gmail.com

Received : 25-08-2013

Accepted : 18-10-2013

Published : 27-02-2014

ABSTRACT

Carotid cavernous fistulae (CCF) are abnormal communication between cavernous segment of the internal carotid artery and cavernous sinus. These entities are usually encountered in 0.2-0.8% of patients with traumatic skull base fractures. Traumatic cerebral aneurysms are rare and account for less than 1% of intracranial aneurysms. CCF due to ruptured intradural traumatic aneurysm is very rare and difficult to treat by surgical methods. We present one such case of a 40-year-old man with post-traumatic CCF due to a ruptured intradural aneurysm successfully treated with endovascular embolization.

Key words: Carotid cavernous fistula, endovascular coiling, intradural aneurysm

INTRODUCTION

Traumatic cerebral aneurysms with carotid cavernous fistula (CCF) are rare and difficult to treat by surgery.^[1,2] If left untreated mortality rate of 50% is reported in these cases.^[3] Hence, the presence of these lesions should be diagnosed and treated at the earliest in order to prevent the untoward effects due to their poor prognosis. We report our experience in one such case.

CASE REPORT

A 40-year-old man presented to the emergency room following a road traffic accident. Computed tomography scan of the brain (plain) revealed frontal hematoma, intraventricular hemorrhage, and subarachnoid hemorrhage with depressed skull fracture. Emergency craniotomy with decompression was performed. On the 4th day of hospitalization, he developed increasing proptosis and conjunctival congestion [Figure 1a]. Magnetic resonance (MR) imaging showed hyperintense signals in the basal cisterns suggestive of subarachnoid hemorrhage on T1-weighted sequence. Time of flight MR angiogram maximum intensity projection image showed abnormal communication between internal carotid artery and cavernous sinus. However, the precise location of the rent was not identified [Figure 1b and c]. Digital subtraction angiogram of the left internal carotid

Access this article online

Quick Response Code:



Website:

www.clinicalimaging-science.org

DOI:

10.4103/2156-7514.127961

Copyright: © 2014 Karanam L S P. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

This article may be cited as:

Karanam LS, Alurkar AB, Natarajan M, Pugazhenth B. Endovascular Coil Occlusion of Traumatic Intradural Aneurysm with Presentation as Carotid Cavernous Fistula. J Clin Imaging Sci 2014;4:11. Available FREE in open access from: <http://www.clinicalimaging-science.org/text.asp?2014/4/1/1/127961>

artery showed intradural aneurysm (caused by the trauma), which was seen communicating inferiorly with cavernous sinus, basillar plexus, and petrosal sinus [Figure 2a and b]. There was severe vasospasm seen in all the cerebral vessels. Endovascular treatment was planned in order to occlude the aneurysm and the fistulous communication. Balloon occlusion test was not tolerated and hence we chose to occlude the aneurysm and the fistulous communication (preserving the parent artery) over parent vessel occlusion.

Under general anesthesia, 6 French guiding catheter was placed in the left internal carotid artery. Echelon micro catheter with traxcess microwire was inserted into the aneurysm. A gentle steam shaping of the micro catheter tip was done to facilitate the navigation of the distal end of the micro catheter into the sinus [Figure 2c]. Selective micro-catheter angiogram showed high flow through the aneurysm into the cavernous sinus and inferior petrosal sinus. After achieving stable position of the micro-catheter distally, multiple platinum detachable coils were placed occluding the flow into the sinus. Thereafter, the aneurysm was completely packed with multiple coils and complete occlusion was achieved with no flow into the fistulous communication. Post-coiling angiogram showed complete obliteration of the fistula and exclusion of the aneurysm from the circulation [Figure 3a-c]. Patient's proptosis and congestion dramatically decreased over the next few days. Long-term follow-up to assess the coil compaction and recanalization is waiting to be done.

DISCUSSION

Traumatic cerebral aneurysms account for less than 1% of intracranial aneurysms.^[1,2] The presentation of this entity as CCF is very rare. Only a few cases have been reported in the literature.^[4] A recent history of trauma with skull base fracture and presentation of CCF with no clear aneurysm and vasospasm on angiogram confirms the diagnosis of the traumatic cerebral aneurysm.^[2]

In the present case, the traumatic internal carotid artery injury caused pseudoaneurysm dilatation, which ruptured into the venous sinus and caused the presentation of CCF with an ophthalmological manifestation.

Supraclinoid segment aneurysms presenting as CCF is unusual and very few reports of these intradural aneurysms are known.^[5-7]

This entity is difficult to access surgically and the presence of the fragile wall of the aneurysm increases the risk of complications during surgery. Risk of hemorrhage increases

with clipping of these fragile aneurysms. Endovascular treatment remains a feasible treatment modality in these

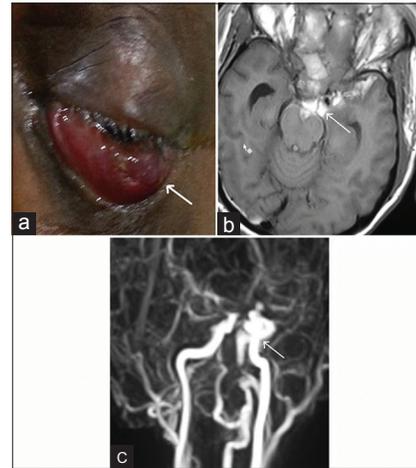


Figure 1: 40-year-old male accident victim with skull fracture presented with increasing left-sided proptosis which was diagnosed as carotid cavernous fistula due to rupture of intradural aneurysm. (a) Photograph of the patient's left eye shows proptosis and congestion. (b) T1-weighted magnetic resonance (MR) imaging done shows hyperintensity in the basal cisterns suggestive of subarachnoid hemorrhage (arrow). (c) Time of flight MR angiogram shows the fistulous communication on the left side (arrow).

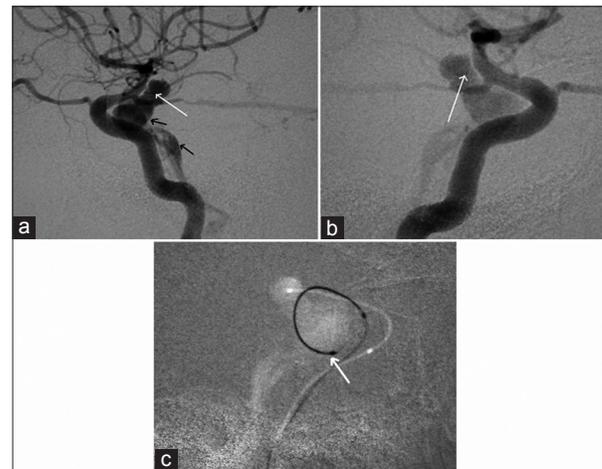


Figure 2: Digital subtraction angiograms of left internal carotid artery in the (a) left oblique and (b) right oblique views show intradural aneurysm (white arrow) and the fistulous communication into the cavernous sinus and petrosal sinus (black arrows in a). (c) Road map image with stable position of the micro catheter achieved distally with gentle maneuver (arrow).

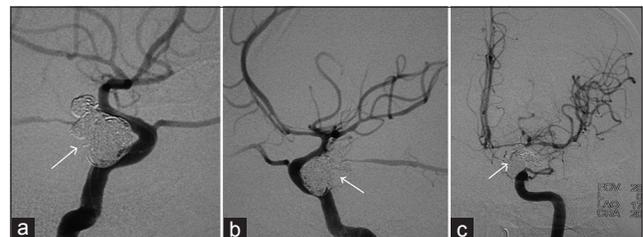


Figure 3: Post-coiling left internal carotid angiogram in (a) right oblique and (b) left oblique projections show complete occlusion of the aneurysm and the fistulous communication (arrows). (c) Townes view (arrow) shows the patent internal carotid artery with good flow in all the distal branches and no remnant fistula.

cases. A study by Lempert et al., described the use of coil occlusion in treating these aneurysms.^[8]

Today, the treatment of choice for direct CCF is balloon occlusion of the rent of the internal carotid artery. This treatment option could not be used in the present case, since the inflated balloon could cause rupture of the aneurysm and worsen the condition of the patient. Parent vessel occlusion could not be done due to the distal aneurysm and also because of the absence of cross-flow from the right internal carotid artery. Selective exclusion of the fistula and the aneurysm while preserving the parent artery is the treatment of choice in this type of pathology. Due to high flow from the aneurysm into the fistula, initially this communication needs to be occluded, for which a stable positioning of the micro-catheter in the sinus is required. Cho et al.,^[9] in their study have reported a case of the traumatic supraclinoid aneurysm with CCF where aneurysm with fistula was partially occluded with coils and glue was used in the second session to cure the remnant fistula.

Zhao et al.,^[10] reported a similar case which was treated by endovascular coils and onyx embolization. In their case, they first coiled the aneurysm in spite of which there was continuous opacification of the cavernous sinus. Hence, they used onyx 34 to occlude the residual fistula in the same session. In our case, we initially placed the pre-shaped micro catheter distally into the communicating portion and completely packed the same with micro coils and then coiled the aneurysm after obliterating the fistula. Migration of the liquid embolic agent is a known complication. Hence, we decided not to use any liquid embolic agents and only coils were placed to obliterate both the fistula and the aneurysm. One should be extremely careful while negotiating the micro catheter through the traumatic aneurysm into the fistulous site to prevent the complication of hemorrhage due to the rupture of the aneurysm.

CONCLUSION

Traumatic cerebral aneurysms with presentation as carotid cavernous fistula are very rare. Endovascular treatment is the treatment of choice in such cases and should be considered as an emergency procedure due to the high mortality rates encountered in these cases.

REFERENCES

1. Reddy SV, Sundt TM Jr. Giant traumatic false aneurysm of the internal carotid artery associated with a carotid-cavernous fistula. Case report. *J Neurosurg* 1981;55:813-8.
2. Masana Y, Tameda M. Direct approach to a traumatic giant internal carotid artery aneurysm associated with a carotid-cavernous fistula. Case report. *J Neurosurg* 1992;76:524-7.
3. Holmes B, Harbaugh RE. Traumatic intracranial aneurysms: A contemporary review. *J Trauma* 1993;35:855-60.
4. Haddad FS, Haddad GF, Taha J. Traumatic intracranial aneurysms caused by missiles: Their presentation and management. *Neurosurgery* 1991;28:1-7.
5. Komiyama M, Yasui T, Yagura H, Fu Y, Nagata Y. Traumatic carotid-cavernous sinus fistula associated with an intradural pseudoaneurysm: A case report. *Surg Neurol* 1991;36:126-32.
6. Weaver KD, Ewend MG, Solander S. Successful transarterial Guglielmi detachable coil embolization of posttraumatic posterior communicating artery-cavernous sinus fistula: Technical note. *Neurosurgery* 2003;52:458-60.
7. Lee CY, Yim MB, Kim IM, Son EI, Kim DW. Traumatic aneurysm of the supraclinoid internal carotid artery and an associated carotid-cavernous fistula: Vascular reconstruction performed using intravascular implantation of stents and coils. Case report. *J Neurosurg* 2004;100:115-9.
8. 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;19:907-11.
9. Cho JH, Jung C, Sheen SH, Kwon BJ, Hee Han M. Traumatic carotid cavernous fistula caused by intradural aneurysm rupture: A case report. *Neurointervention* 2006;10:39-43.
10. Zhao P, Liu L, Jiang C, Jiang P, Yang X. Coils and onyx embolization of traumatic carotid-cavernous fistula caused by an intradural internal carotid artery pseudoaneurysm. *Neuroradiol J* 2012;25:231-6.

Source of Support: Nil, **Conflict of Interest:** None declared.