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Technical Notes & Surgical Techniques

Direct cover-clip for ICA blood blister-like aneurysm

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ABSTRACT

Blood blister aneurysm (BBA) is the aneurysm characterized by fragile neck usually arising from the dorsal wall of internal carotid artery (ICA). Application of aneurysm clip on the neck of BBA usually tears out the wall of the parent artery, leaving a defect on ICA. Trapping of ICA or fail to control bleeding may cause death of patient. Although various surgical procedures were proposed, there is no consensus with regard to the best option for the treatment of BBA. Direct clipping is a simple and fast way to treat BBA, which avoids long time temporary occlusion of ICA, prevents the occurrence of brain ischemia, and provide direct observation of clipping under microscope. We report a rescue technique direct "cover-clip" for intraoperative rupture of BBA in this paper.

1. Introduction

Intraoperative rupture of internal carotid artery (ICA) is a dangerous event which is prone to occur in blood-blister aneurysm (BBA) clipping surgery. A cover-clip rescuing technique is provided and discussed in this paper.

2. Case report

A 44-year-old male presented with headache and dizziness for 10 days. He was alert on admission without any neurological deficit. CT scan showed thick subarachnoid hemorrhage (SAH) mainly in the left carotid cistern. In the subsequent digital subtraction angiography (DSA), a small delayed filling of left internal carotid artery (ICA) dorsal wall aneurysm was revealed, matching a diagnosis of blood-blister aneurysm (BBA) [Fig. 1].

Using a left pterion craniotomy, supraclinoid ICA was exposed by opening proximal sylvian fissure and carotid cistern for proximal control. A purplish bulging emitted from superomedial wall of ICA was covered by a clot attached tightly to the base of frontal lobe. Full exposure of BBA was then reached by identification and dissecting surrounding structures. After the temporal clipping of proximal ICA, an attempt of clipping using a straight clip vertical to ICA was failed due to the fragile wall that was torn. When the clip was removed, an oval defect was revealed on the medial wall of ICA. A Yasargil aneurysm clip with curved blades, model FT807T was applied parallel to ICA to close the defect but slipped medially, which only closed part of the defect after several attempts [Fig. 2A]. At this point, another FT807T clip was applied to clip more normal wall of ICA, using the former aneurysm clip as cover, to close the defect. The second aneurysm clip still slipped medially for a short distance but blocked by the first clip, leaving some leakage from the defect. Finally, the third FT807T clip was applied the same way, using former clips as cover, to close the defect successfully. Two clips close to ICA were kept for reinforcement of the clipping [Fig. 2B]. Postoperative DSA demonstrated total obliteration of aneurysm and slight stenosis of left ICA [Fig. 3]. The postoperative recovery was uneventful and the patient was discharged without any neurological deficit.

3. Discussion

BBAs are very fragile aneurysms, composed of thin adventitia and fibrous tissue covering focal defect of ICA where lack the internal elastic lamina and media. Application of aneurysm clip on the "neck" of BBA usually tear out the wall of the parent artery, leaving a defect on the artery wall [1–3]. Besides direct clipping, surgical procedures such as wrapping-clipping, suturing technique have been reported [4,5]. However, for BBA arising from superomedial wall of ICA, it is hard to perform suturing due to limitations of space and viewing angle. Wrapping-clipping technique should be an alternative option but not the first choice because the material applied prevents observation of artery defect after clipping under direct vision. Direct clipping using the suitable aneurysm clip is ideal since it is simple and fast, which prevents the occurrence of brain ischemia after temporary occlusion for a long

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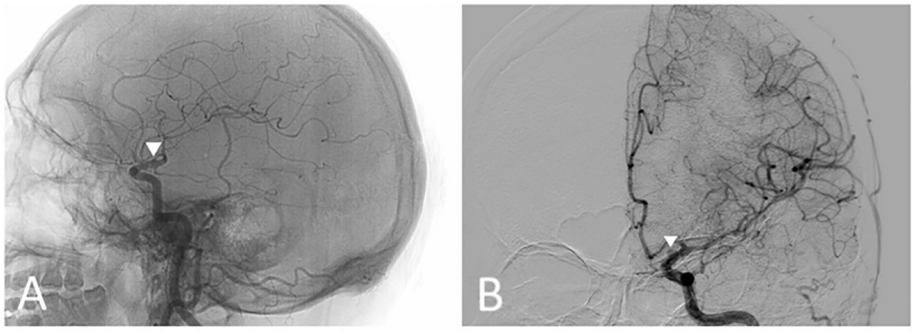

Fig. 1. (A) Preoperative DSA showing a small dorsal BBA (white arrow). (B) Lateral view of left ICA BBA.

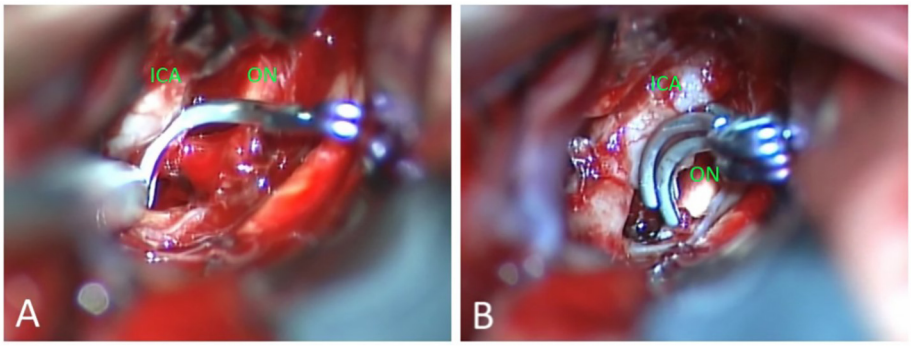

Fig. 2. (A) The first aneurysm clip only clipped part of the ICA defect. (B) Using the cover-clip technique, all the defect of ICA was closed.

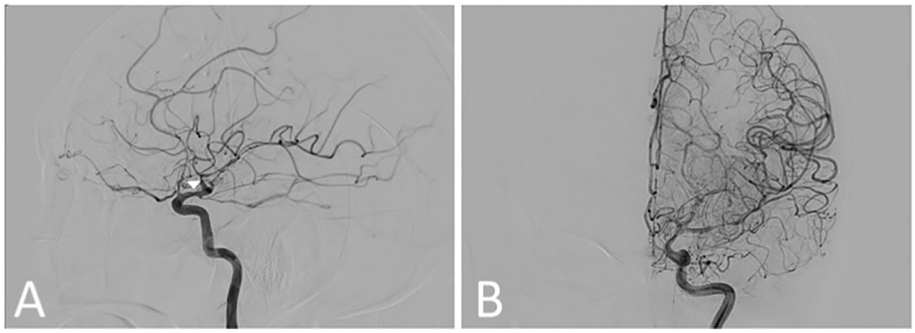

Fig. 3. (A) Postoperative DSA demonstrated the absence of aneurysm and a mild stenosis of left ICA (white arrow). (B) Lateral view indicated verified the absence of aneurysm.

time, and provide direct observation of clipping under microscope.

We report a novel rescue technique “cover-clip” for intraoperative rupture of ICA. The most important part of this technique is to keep the first aneurysm clip as cover when attempt to apply the second clip, even if it only clips a small part of the fragile artery wall. All the defect will be clipped when more clips are applied, using former clips as cover. Another important point is to keep ICA suffused by temporary proximal control but not trapping the defect, which could facilitate observation of the defect and precise application of aneurysm clip.

4. Conclusion

Direct clipping of ICA breakage using cover clip technique is provided in this paper, which could be an useful rescue clipping technique when encountered accidental ICA rupture in the lateral wall.

Conflict of interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

References

[1] K. Kazumata, N. Nakayama, T. Nakamura, H. Kamiyama, S. Terasaka, K. Houkin, Changing treatment strategy from clipping to radial artery graft bypass and parent artery sacrifice in patients with ruptured blister-like internal carotid artery aneurysms, Neurosurgery 10 (Suppl. 1) (2014) 66–72 (discussion 73).
[2] R. Chen, A. Xiao, H. Li, L. Ma, S. Lin, C. You, Blood blister-like aneurysms in Tibetans: a retrospective observational study, Clin. Neurol. Neurosurg. 156 (2017) 18–23.
[3] A.P. Mitha, R.F. Spetzler, Blister-like aneurysms: an enigma of cerebrovascular surgery, World Neurosurg. 74 (2010) 444–445.
[4] H. Shimizu, Y. Matsumoto, T. Tominaga, Non-saccular aneurysms of the supraclinoid internal carotid artery trunk causing subarachnoid hemorrhage: acute surgical treatments and review of literatures, Neurosurg. Rev. 33 (2) (2010) 205–216.
[5] J. Park, Maintenance of cerebral blood flow during microsuture repair of the superior wall of the intracranial internal carotid artery, World Neurosurg. 80 (3–4) (2013) (436.e1-5).