



Endovascular Middle meningeal artery embolization for treatment of recurrent & spontaneous subdural hematoma

KEYWORDS

Shakir Hussain

Consultant and Head, Department of Neuro-intervention, Max Superspeciality Hospital, Saket, Delhi

Ravi Anadure

Senior Advisor (Neurology), Command Hospital Air Force (CHAF), Bangalore

Rohitash Sharma

Consultant Neurology, Department of Neurology, Max Superspeciality Hospital, Saket, Delhi

Introduction

Cerebral DSA as a means to evaluate and manage patients with extradural (EDH) or subdural hematoma (SDH) is seldom done as surgery is still the mainstay of treatment. However, certain vascular malformations like, dural arteriovenous fistulas (DAVF) and aneurysms are treated via endovascular approach. Recently there have been few case reports where endovascular treatment has helped patients of chronic & recurrent SDH where conventional surgical techniques have failed. [1,2] We report a similar case of a young man with spontaneous recurrent bilateral SDH which was treated by middle meningeal artery (MMA) embolization

Case Report

A 19 years old male presented with history of an episode of moderate to severe grade headache about two months ago. There was no history of trauma, loss of consciousness or any focal deficit. An MRI brain was done which revealed a sub acute SDH in the left frontoparietal region without significant mass effect (Figure 1). He was managed conservatively. After 15 days he had an episode of severe headache associated with vomiting. An MRI brain revealed a right fronto-parietal SDH with mass effect (Figure 2). He underwent evacuation of the hematoma through a right frontal burr hole. He had a satisfactory recovery post-operatively and was symptom free. After one month he had another episode of severe headache and an MRI brain revealed a fresh right frontal SDH (Figure 3).

A cerebral DSA was done to evaluate the cause of recurrent SDH. The angiography revealed prominent bilateral MMAs (diameter more than the superficial temporal arteries). On selective injection of the MMAs there was prominent vascular blush along the course of the vessels with dural hyperemia (Figure 4). Embolization of bilateral MMA was done using Poly Vinyl Alcohol (Boston scientific, Natick, Massachusetts, USA) particles of 40-150 microns. Post embolization selective injections revealed normal bilateral middle meningeal circulation without the abnormal vascular blush (Figure 5). He underwent a right frontal mini-craniotomy with hematoma evacuation. Post operative CT head revealed evacuation of the hematoma with minimal air in the subdural space without any mass effect (Fig-6). He made an uneventful recovery.

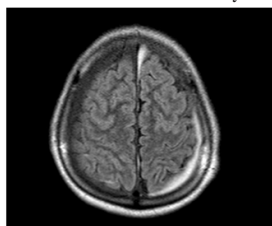


Fig-1: Thin left frontal spontaneous SDH

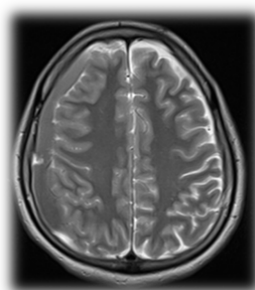


Fig-2: Right fronto-parietal SDH

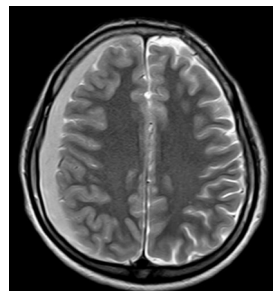


Fig-3: Recurrent right sided SDH

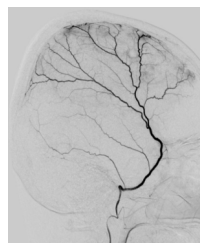


Fig-4: Selective MMA injection- prominent vascular blush



Fig-4: Selective MMA injection- with prominent dural hyperemia

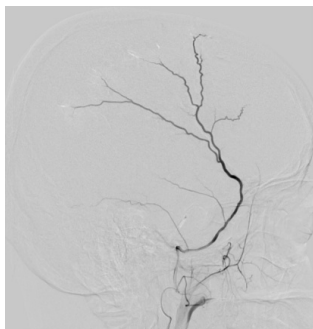


Fig -5 : Post PVA embolization MMA injection with no blush or hyperemia

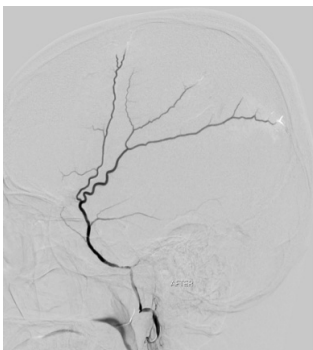


Fig -5 : Post PVA embolization MMA injection with no blush or hyperemia

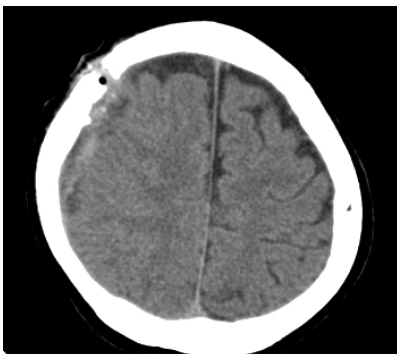


Fig-6 : Post-op CT head – Right frontal mini-craniotomy & SDH evacuation

Discussion

Chronic SDH is a surgically managed condition with a good outcome in almost all the cases. However recurrence rates of up to 10% have been reported in literature [3]. Recurrent spontaneous SDH may result from a coagulation disorder or a vascular anomaly such as an aneurysm or DAVF. The expansion or recurrence of a chronic SDH is postulated to occur from the inflammation and bleeding from the outer membrane of the hematoma. Nagahori et al [4], in their histological studies demonstrated the presence of inflammatory infiltrate and macro capillaries in between the outer membrane of the hematoma and the dura. The vascular structures in between the dural and the outer membrane of the hematoma are seen to arise from the branches of the middle meningeal artery as shown by Tanaka et al [5]. Super selective angiography of the middle meningeal artery in cases of recurrent chronic SDH has been reported in literature which revealed an abnormal vascular blush along the course of the artery (macro capillaries).[6] In these cases embolization of the middle meningeal artery was performed to prevent expansion or recurrence of the hematoma. S Hirai et al [7] in their report of two cases with recurrent SDH, who were on anticoagulation, have described the usefulness of MMA

embolization as a method to prevent recurrence or hematoma expansion. MMA embolization has also been useful in patients of EDH in whom there was evidence of contrast leakage on angiography. It may also benefit patients of acute EDH who are being managed conservatively and are at risk of sudden deterioration. An angiography followed by prophylactic embolization (in which contrast extravasation is detected) would prevent hematoma expansion and the need for surgery[8]. In the present case based on the similarly reported studies, we noted the abnormal dural hyperemia on the bilateral MMA injections. Embolization and subsequent surgical evacuation of the clot resulted in complete cure of the patient with no recurrence noted in the one year follow up period.

Conclusion

Although chronic SDH remains mainly a surgically treated condition, an angiography and subsequent embolization of the abnormal vasculature may prevent recurrent hematoma formation. DSA and endovascular embolization should be considered in spontaneous & recurrent hematomas.

References:

1. Mandai S, Sakurai M, Matsomoto Y. Middle meningeal artery embolization for refractory chronic subdural hematoma. *J.Neurosurgery* 2000;93:686-8.
2. Takahashi K, Muraoka K, Sugiura T, et al. Middle meningeal artery embolization for refractory chronic subdural hematoma: 3 case reports. *No Shinkei Geka.* 2002;30(5):535-9.
3. Robinson RG. Chronic subdural hematoma: surgical management in 133 patients. *J Neurosurgery* 1984;61:263-8.
4. Nagahori T, Nishijima M, Takaku A. Histological study of the outer membrane of chronic subdural hematoma; possible mechanisms for expansion of hematoma cavity. *No Shinkei Geka.* 1993;21:697-701.
5. Tanaka T, Fujimoto S, Saito K, et al. Histological study of operated cases of chronic subdural hematoma in adults: relationship between dura mater and outer membrane. *No Shinkei Geka.* 1997;25:701-5.
6. Tanaka T, Fujimoto S, Saitoh K, et al. Superselective angiographic findings of ipsilateral middle meningeal artery of chronic subdural hematoma in adults. *No Shinkei Geka.* 1998;26:339-47.
7. Hirai S, Ono J, Odaki M, et al. Embolization of middle meningeal artery for refractory chronic subdural hematoma; usefulness for patients under anticoagulant therapy. *Interventional Neuroradiology* 2004;10(2):101-4.
8. Suzuki S, Endo M, Kurata A et al. Efficacy of endovascular surgery for the treatment of acute epidural hematomas. *AJNR* 2004;25:1177-80.