



CASE STUDY ON MIDDLE MENINGEAL ARTERY EMBOLIZATION FOR CHRONIC SUBDURAL HEMATOMA

Neurosurgery

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ABSTRACT

Background: Chronic subdural hematoma is a debilitating condition in which blood is collected between the dura mater and arachnoid over a period of time. Over many years, various treatment plans have been developed against recurrent chronic subdural hematoma but no consensus has been established. Recent literature reviews and case reports have introduced the minimally invasive treatment modality called the middle meningeal artery embolization.

Case Report: In this case study, we discuss a case of chronic subdural hematoma that were treated by embolizing the Middle meningeal artery. The presentation of the patient, the procedure and treatment outcome have been discussed in this study.

Conclusion: This case report thus describes the effectiveness of this minimally invasive procedure over other conventional procedures.

KEYWORDS

Middle meningeal artery, chronic subdural hematoma, embolization, trauma

INTRODUCTION

Chronic subdural hematoma (cSDH) is an extremely common condition we come across. It is a long-standing collection of blood between the outer layer of the dura mater (outermost layer of meninges) and the skull [1]. It takes weeks to build up and is usually caused due to an injury to the head. It often presents with no symptoms and is found incidentally on CT scans, however, symptoms can range from a mild headache to loss of consciousness. For many years, asymptomatic cases have been treated either conservatively, i.e with medical management and through follow-up scans to monitor the growth of the hematoma. In the case of symptomatic patients, emergency surgical evacuation procedures are done to remove the bleeding and stabilize the patients. These however are found to be associated with a high chance of recurrence, complications and failure rate [2,3,4]. Recent studies have shown the role of a minimally invasive procedure called Middle meningeal artery embolization, which is being performed effectively on patients with a chronic subdural hematoma and has shown great results [1-6].

Case Presentation

A 70-year-old male, known case of post right VP shunt done for normal pressure hydrocephalus, Parkinson's disease, seizure disorder, type 2 diabetes mellitus and systemic hypertension came with complaints of sudden onset of difficulty in walking, weakness in bilateral lower limbs and slurred speech for a month, worsening in the last 10 days. On examination the patient was conscious, oriented, vitals were stable, cardiovascular, respiratory, and per abdomen examinations were normal. Central nervous system examination showed a decrease in lower limb power (4/5, based on MMRC grading), tone, bulk, and reflexes were normal. MRI scan of the brain showed, (Refer figure 1)

1. Small acute infarct in the left temporal lobe.
2. Thin subdural hematomas along bilateral frontotemporal convexities with a maximum thickness of 6mm noted.
3. Chronic small vessel ischemic changes in pons as well as bilateral periventricular frontoparietal white matter.

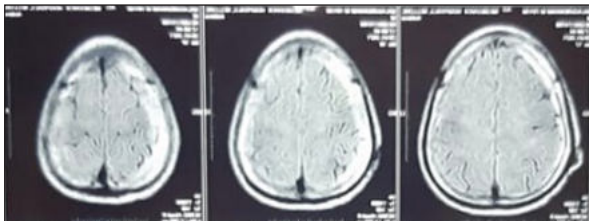


Figure 1: MRI Brain Demonstrating Thin Subdural Hematomas Along Bilateral Frontotemporal Convexities.

The patient was admitted and all routine laboratory investigations were done and found to be in normal range. Patients bleeding time was 2'20 mins, clotting time: 5'20 mins, prothrombin time: 11.90, INR :

1.07, APPT: 31.2. In view of the chronic subdural haematoma, bilateral middle meningeal artery embolization was planned after getting fitness for the procedure.

The procedure was done under local anesthesia. Diagnostic angiography was done via right femoral artery access by percutaneous seldinger's technique and the bilateral middle meningeal artery was embolized with 300-500 PVA particles. Hemostasis was obtained (Refer figure 2). Post- surgery patient's condition was stable. No surgical complications were noted. Patient was followed up after 2 weeks and found to be improving.

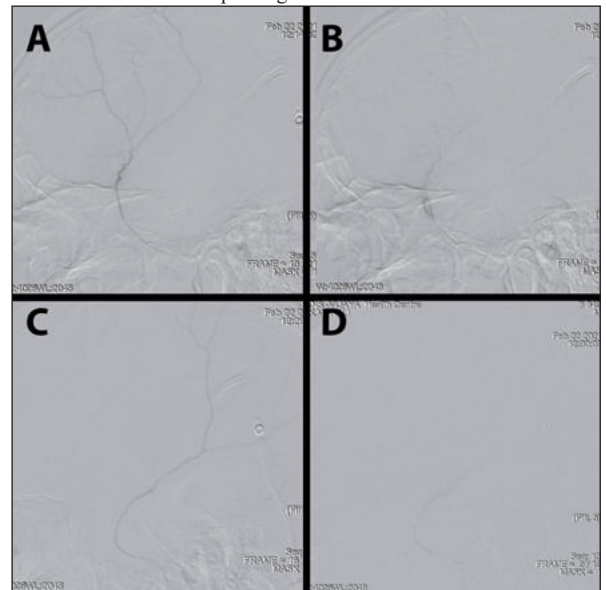


Figure 2: Figure A- Left middle meningeal artery pre embolisation, Figure B- Left middle meningeal artery post embolisation, Figure C - Right middle meningeal artery pre embolisation, Figure D - Right middle meningeal artery post embolisation.

DISCUSSION

The commonest cause of chronic subdural hematoma is trauma, thus by theory, it was believed that the disruption of the bridging veins, led to the collection of blood [4]. Due to bleeding from the veins there is an accumulation of blood and the SDH starts forming by separating the layers of the dura mater [7]. This stimulates a healing process which leads to increased proliferation of dural layer cells causing hematoma growth and a membrane around the cSDH that is derived from the dural cells. This inflammatory process produces angiogenic factors that lead to new blood vessel formation (neovascularization) [2,3,6].

These fragile new vessels leak, and this repeated bleeding leads to further growth of the subdural hematoma. Since the membrane of the hematoma and the dural layer is supplied by the middle meningeal artery, embolizing this artery will stop the blood supply to it and eventually lead to resorption of the collected blood [1]. Thus the embolization of the MMA is found to help patients with chronic SDH as the root cause of the pathology is arterial in nature. This is supported by any other systematic reviews and case studies [1,4,5,6].

Embolization of the middle meningeal artery is found to have many advantages when compared to open evacuation surgeries [2]. Lesser side effects and post operation complications, decrease in failure rate and complete resolution of hematoma were noticed as this procedure does not involve any incision, opening up the skull, general anesthesia, and holding back the regular blood thinners that the patient may be taking [3]. The mortality rate is also found to be lesser with Middle meningeal artery embolization [1].

Even though conventional methods such as burr hole and craniotomy are widely used, these are associated with a higher chance of complications, the most common being recurrence of hematoma. This is because these evacuation procedures are only limited to temporary recovery by relieving the mass effect caused by the hematoma. The underlying pathology of chronic SDH is not taken care of by these surgeries and hence post- procedure bleeding may continue in certain cases and hematoma may recollect [2,4]. These conventional surgeries will also require the resumption of the blood thinners, a few days after the surgery which can lead to further bleeding and hematoma formation [4].

Limitations

Although our case study describes that embolization of the middle meningeal artery has a better outcome in treating chronic subdural hematomas when compared to open surgical procedures, it has certain limitations. Middle meningeal artery embolization cannot be done for neurologically unstable patients, it can only be done prophylactically to reduce the recurrence rate once the patient is stable.

CONCLUSION

In this case study we explained the pathophysiology of a chronic subdural hematoma and the role of middle meningeal artery embolization in its treatment regime. Based on this case report, we conclude by saying that, middle meningeal embolization has shown great promise in the treatment for Chronic Subdural Hematoma as it is minimally invasive and potentially safer compared with the conventional surgical procedures.

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