Case Report
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Endovascular Treatment of Cerebral Aneurysm: Report of five cases and review of the literature

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In spite of latest modern medical development, subarachnoid hemorrhage due to aneurysm rupture remains devastating neurological problem with highest mortality rate. Unfortunately, classic surgical treatment of aneurysm carries out its own damage due to additional surgical access trauma especially in posterior circulation. For several years open surgery with clipping aneurysm`s neck was gold standard for the treatment of aneurysm. Over the two decades endovascular approach has taken over as an alternative treatment option. In this article we represent five cases with ruptured cerebral aneurysm and treated with endovascular coiling.

Keywords: intracranial aneurysm, subarachnoid hemorrhage, endovascular coiling

Introduction

Intracranial aneurysms are relatively common disease. Because of improvement of imaging techniques, asymptomatic aneurysms are being detected more frequently even in small size. [1] Despite of current medical, endovascular and surgical management subarachnoid hemorrhage, due to cerebral aneurysm rupture continues to have high rates of morbidity and mortality for patients. Unfortunately, most of the patients being diagnosed with aneurysms have complications and rupture is one of the catastrophic complications of the cerebral aneurysm. Endovascular therapy with few access complications has increasingly become an alternative option for treatment of ruptured aneurysms. [2] Improving device industries give us precious opportunity to treat aneurysm and avoid additional procedural trauma especially in injured brain.

Case reports

From November 2016 to January 2017 five patients were admitted to our hospital with headache lasting at least two or three days.

First female patient had mild headache with nausea, without episode of vomiting and with mild nuchal rigidity according to Hunt Hass classification grade-I. CT scan without contrast material injection demonstrates grade-I subarachnoid hemorrhage according to Fisher classification.

Two of the patients (both male) had mild to moderate headache with nausea, episode of vomiting and with full nuchal rigidity. Both of them were alert and oriented, with no neurological deficit according to Hunt Hass classification grade-II. CT scan without contrast material injection demonstrates grade-II subarachnoid hemorrhage according to Fisher classification.

Fourth patient's symptoms were a little bit awkward because the main symptom was severe nausea and multiple episodes of vomiting. Only mild headache with no nuchal rigidity was persisted. So the patient was misdiagnosed as food poisoning and came to our hospital only after five days. CT scan without contrast material injection demonstrates grade-II subarachnoid hemorrhage according to Fisher classification.

Last patient had severe headache with nausea and episode of vomiting. Full nuchal rigidity existed. She was confused and lethargic. Left side hemiparesis existed. Severity of patient was grade-III according to Hunt Hass classification. CT scan without

contrast material injection demonstrates grade-III subarachnoid hemorrhage according Fisher classification.

All patients underwent CT angiography and results were next: - In first case left middle cerebral artery, bifurcation saccular aneurysm. Two patients had anterior communicant artery aneurysm. Forth patient had internal carotid artery saccular aneurysm located in cavernous segment. And last patient had basilar tip aneurysm. All aneurysms were saccular in shape and with narrow neck. After neurosurgeon consultation all patient were thought as a good candidate for endovascular coiling. General anesthesia with endotracheal intubation and femoral approach was performed for all patients. Five or six F guiding catheters were used as support catheter. Pre-embolization angiograms were taken to figure out aneurysmal neck and relationship with nearby arterial branches. After micro-catheterization of the aneurysms 3D coiling was used for complete embolization. (Fig. 1) Control angiogram demonstrates no thrombosis in parent arteries and aneurysm occlusion. In one patient we had thromboembolic complication, embolic occlusion of right middle cerebral arteries superior branch, which is easily removed by intracranial stent retrieval device (Fig. 2). After the procedure, all patients were taken to intensive care unit to continue medical therapy for vascular vasospasm. Tree "H" therapy was used (Hypertension, Hemo-delusion, hypervolemia) as standard protocol. All patients were discharged after five to ten days without neurologic problems.

Discussion

Cerebral aneurysm and subarachnoid hemorrhage is one of the most dangerous entities among cerebral hemorrhage. It has the highest mortality rate about 65 %, where most death occurs in early clinical course. According to research about 10% of patients with aneurysmal subarachnoid hemorrhage (SAH) die before reaching medical attention, 25% die within 24 hours, and 40-49% die within 3 months.

The Fisher grading system is a radiologic classification based on amount of blood seen on non-contrasted CT scan within first five days of SAH. It has been used in clinical practice since 1980 with some changes and modifications. Based on this grading system we can predict the risk of cerebral vasospasm and general outcome of patients [3].

Although radiologic classification plays an important role in clinical practice but clinical classification remains as a leading tool to predict prognosis and outcome in patients with SAH. The Hunt and Hess scale is widely used for categorizing severity of SAH, was developed in 1968 as a clinical grading system based on symptoms of patient. [4] A higher grade predicts a poor outcome and lower likelihood of survival.

There are two type of treatment for patient with cerebral aneurysm and subarachnoid hemorrhage – endovascular coiling with or without balloon or stent assistance and open surgery with aneurysmal neck clipping.

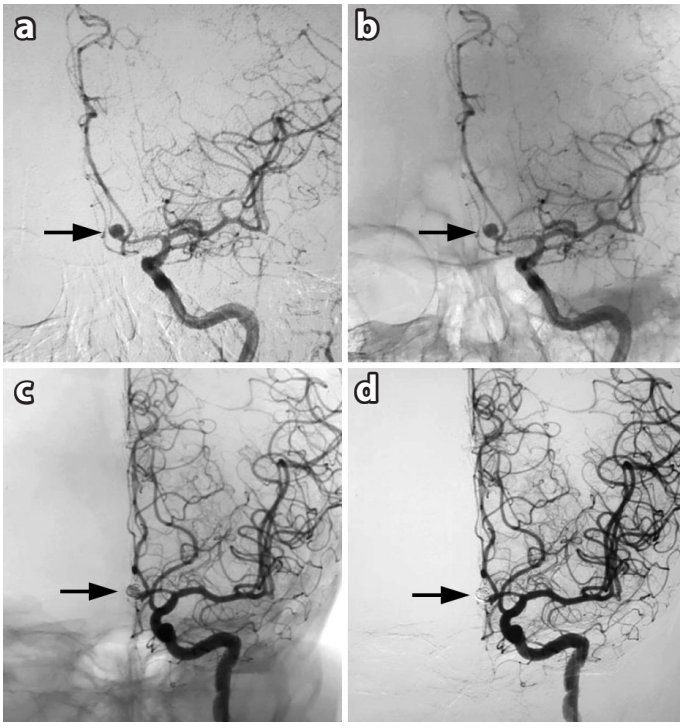

Figure 1.
Female patient with anterior communican artery aneurysm (arrow). Before (a, b) and after (c, d) embolization

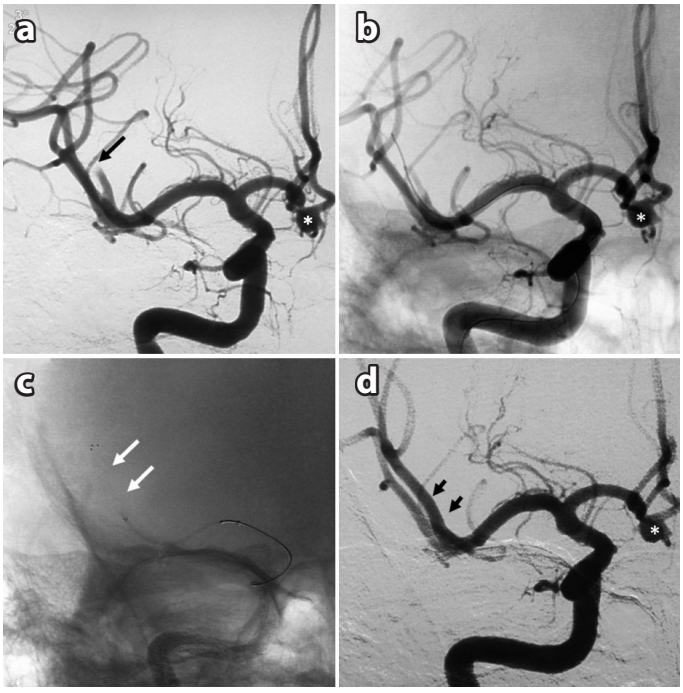

Figure 2.
a, b - Another female patient with anterior communicant artery aneurysm (asterisk). Small amount of thrombus in superior branch of right middle cerebral artery (long black arrow). **c -** Stent retrieval device inserted at same vessel (white arrows). **d -** Opened superior branch after thrombus extraction (small black arrows).

Open surgery has been broadly used during the last six-seven decades and it focuses on isolation of the vulnerable thin wall aneurysm from arterial circulation by clipping neck of the aneurysm.

Endovascular coiling is less invasive method which has been available for 20 years and getting better technical success with improving device industry. It focuses on filing of thin-walled aneurysmal cavity and excludes it from arterial flow while maintaining the normal patency of the parent artery and adjacent branches. Every year new coils come up with advanced stent and balloon development and their access devices. Because endovascular coiling has been increasingly used and taken over open surgery it became new topic for debate among physicians: - Surgical clipping versus endovascular coiling. [5,6] Not taking into account small researches there are several prospective, randomize, multicenter trails showing us their results. It has demonstrated that patient with intracranial aneurysm and subarachnoid hemorrhage, where both treatments are suitable, the outcome in terms of survival free of disability at 1 year is significantly better with endovascular coiling. [7,8].

Conclusion

Endovascular coil treatment of ruptured cerebral aneurysms are associated with significantly fewer complications and better outcomes than surgical clipping.

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