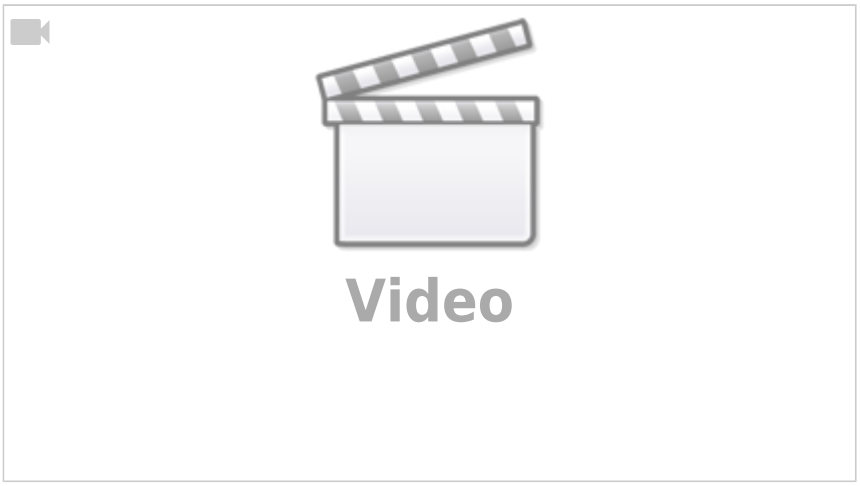
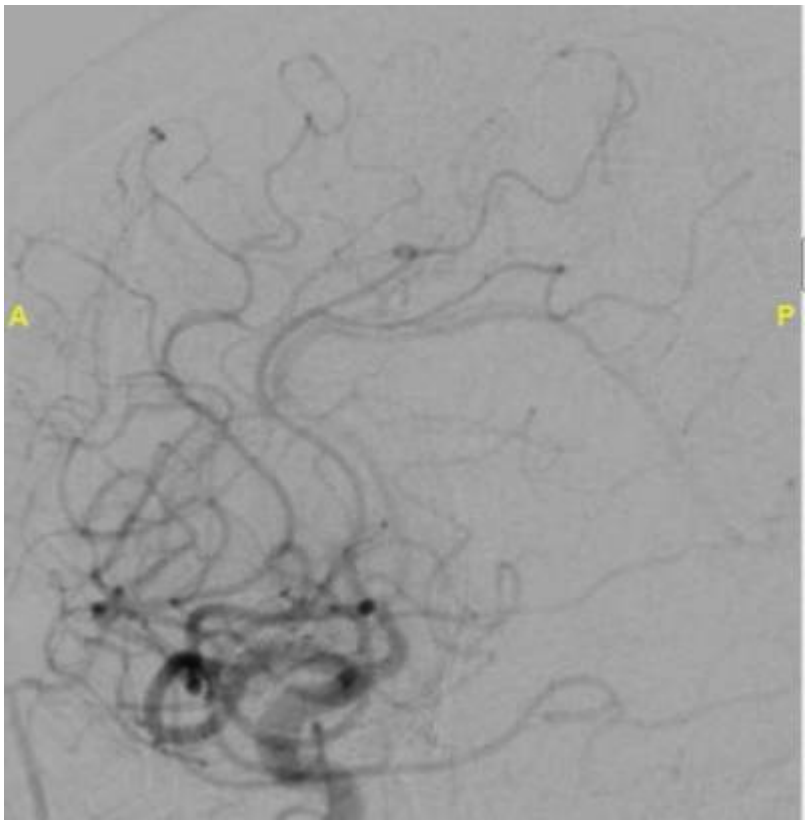
Middle cerebral artery M4 segment aneurysm





Middle cerebral artery aneurysms, are mainly found in the proximal and bifurcation tracts and only in the 1.1-1.7% of cases they are located in the M4 segment of the middle cerebral artery [1) 2) 3)].

Etiology

Generally, these aneurysms are secondary to traumatic brain injury and inflammatory or infectious diseases and only rarely they have idiopathic origin [4)].

At present, only nine cases of ruptured cortical middle cerebral artery aneurysms have been described in literature [5) 6) 7) 8) 9) 10)].

The patients are all males, except the case of Ricci et al. [11]. The average age of the reported patients is 40 years. The size of the aneurysms is between 1 mm and 10 mm and, in most cases, they are saccular intracranial aneurysms or fusiform morphology. In five patients, the aneurysms present infectious etiology. Usually, they occur with ICH, sometimes associated with subarachnoid hemorrhage (SAH).

Treatment

The endovascular treatment (EVT) has been performed in four cases, while the surgical treatment has been performed in three cases (two of trapping and one of clipping). In one patient, the infectious aneurysm has resolved spontaneously after antibiotic therapy. In all treatments performed, the patients have improved the neurologic symptoms and no residual aneurysms have been observed in the subsequent neuroradiology follow-up [12]. Although surgery remains the main choice in the M4 aneurysms, because of the extremely distal location of them over the motor/somatosensory cortices, [13] Lv et al. [14] propose the use of the EVT in all types of the M4 aneurysms, especially after the surgery, when it is impossible to locate the small ruptured aneurysm.

The main difficulty of the surgery is the precise surgical localization of the small M4 aneurysms [15]. An inaccurate localization of these vascular lesions may result in larger craniotomies and unnecessary arachnoid and pial dissections with possible resultant permanent neurological injuries [16].

In cases of aneurysms or arteriovenous malformations located at the sylvian point or at the posterior superior aspect of the insula, especially in dominant hemisphere, to reduce the dissection and open easily sylvian fissure, a logical path would follow the angular artery in the sylvian fissure cutting the arachnoid fibers and retracting only the tissues which are necessary to gain more exposure of the lesion [17].

Case reports

2022

An aneurysm of the distal M4 segment of the left middle cerebral artery (MCA) 1 week following blunt traumatic brain injury with skull fractures. The aneurysm was excised without complications. Traumatic intracerebral aneurysms are relatively more common in childhood. They commonly occur in the first 21 days post-trauma but can also occur in the late period. We, therefore, recommend that CTA or direct cerebral angiography should be performed within the first 3 weeks to exclude TICA and in all patients with sudden deterioration in the early postoperative period. Considering the high mortality rate associated with conservative management, surgical and/or endovascular management should be performed once the diagnosis is made. [18].

A case of a ruptured dissecting pseudoaneurysm in the distal Middle cerebral artery (distal M3/proximal M4) prefrontal division in an healthy young patient (<60 years) successfully treated with a Pipeline Embolization Device. The PED was chosen both as the only vessel sparing option in the young patient as well as for its potential as a vessel sacrifice tool if the pseudoaneurysm was felt to

be incompletely treated, which in this case was not necessary-though would have leveraged the thrombogenicity of the device as a therapeutic advantage [19].

2017

A 53-year-old female was admitted with a sudden severe headache, nausea, vomiting, and a slight left hemiparesis. The computed tomography (CT) scan showed subarachnoid hemorrhage (SAH) in the left sylvian fissure and intracerebral hemorrhage (ICH) in the left posterior parietal area. The CT angiography (CTA) reconstructed with 3D imaging showed a small saccular aneurysm in the M4 segment in proximity of the angular area. A left parieto-temporal craniotomy was performed, the aneurysm was clipped and the ICH evacuated. The motor deficit was progressively recovered. At 3-month follow-up examination, the patient was asymptomatic and feeling well.

Surgery is the best choice for the treatment of ruptured M4 aneurysms with ICH in the opinion of Ricci et al., because it allows to evacuate the hematoma and to exclude the aneurysm from the intracranial circulation. In addition, we suggest both the use of the neuronavigation technique and of the indocyanine green videoangiography (ICGV) for the aneurismal surgery [20].

2007

A 41-year-old man presented with an infarction manifesting as left-sided weakness and dysarthria. Magnetic resonance angiography revealed a subacute stage infarction in the right MCA territory and complete occlusion of the right ICA. Angiography demonstrated aneurysmal dilatation of the M4 segment of the right MCA. Surgery was performed to prevent hemorrhage from the aneurysm. The aneurysm was proximally clipped guided by Navigation-CT angiography and flow to the distal MCA was restored by superficial temporal artery-middle cerebral artery (STA-MCA) anastomosis [21].

2005

A 20-year-old man with an intracerebral haemorrhage due to a ruptured aneurysm, which arose from a penetrating artery of the distal middle cerebral artery (MCA; M4 segment). Excision of the aneurysm was successfully achieved via a right pterional approach. The follow-up angiogram demonstrated filling of the parent vessel and no residual aneurysm. This report illustrates the angiographical finding of a penetrating artery aneurysm of the distal MCA and summarizes the previous reports to discuss their pathological and clinical characteristics [22].

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