Case Report

Transient third cranial nerve palsy after pipeline shield treatment of a ruptured anterior cerebral artery dissecting aneurysm: Case report

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INTRODUCTION

Intracranial dissecting aneurysms (IDAs) account for 3% of all intracranial aneurysms (IAs) and are usually located in the posterior circulation (PCirc). Subarachnoid hemorrhage (SAH) is one of the frequent presenting patterns of this pathology, but it is not usually related to third cranial nerve (CN) palsies. Endovascular therapy (EVT) has proved to be a successful treatment on account of its high occlusion and low morbidity and mortality rates. We report the case of a male patient with a ruptured anterior cerebral artery (ACA) dissecting aneurysm treated with a flow-diverting device (FDD), who had a post procedural transient isolated third CN palsy.
CLINICAL PRESENTATION

History and physical examination

A 49-year-old man with a medical history of hypertension complained of a 3-day history of thunderclap headache after sexual intercourse, followed by vomiting episodes and a generalized tonic-clonic seizure. Besides nuchal rigidity, the physical examination was unremarkable.

Imaging

A computed tomography (CT) of the head revealed a left frontoparietal SAH and a hyperdensity in the proximal segment (A1) of the left ACA [Figure 1 and Panel-A]. A CT angiography (CTA) of the head showed proximal stenosis and post stenotic dilation of the left A1-segment [Figure 1 and Panel-B]. A cerebral digital subtraction angiography demonstrated an IDA of the left A1-segment [Figure 2]. The patient was diagnosed with a Hunt and Hess Grade-2, WFNS Grade-1, and modified Fisher Grade-3 aneurysmal SAH secondary to a left A1 IDA rupture.

Treatment

A decision was made to proceed with urgent EVT of the aneurysm. The patient received loading doses of dual antiplatelet therapy (DAPT) for 48 h (acetylsalicylic acid 300 mg/day and clopidogrel 300 mg/day) and then was taken to the neuroangiography suite. After induction of general anesthesia, intraoperative infusion of tirofiban (0.16 mcg/kg/min) was initiated. Before A3 segment microcatheterization with PhenomTM 027 microcatheter (Medtronic Inc., Irvine, California, USA) in Avigo™ Hydrophilic Guidewire (Medtronic Inc., Irvine, California, USA) A Pipeline Flex Embolization Device with Shield Technology (Pipeline Shield; Medtronic Inc., Irvine, California, USA) was strategically deployed, from the A2-segment to A1-segment of the left ACA. Post procedure angiography showed adequate permeability of the FDD [Figure 3].

Post procedural care

The patient was transferred to the neurointensive care unit. Tirofiban infusion was continued for the next 24 h, and the DAPT was instated to a maintenance dose (acetylsalicylic acid 100 mg/day and clopidogrel 75 mg/day). Twelve hours after the end of the procedure, the patient complained of intermittent binocular diplopia. On examination, there was evidence of preserved visual acuity for both eyes; mild left-eye ptosis; a non-reactive dilated left pupil; left superior, medial, inferior recti, and inferior oblique muscle paresis [Figure 4]. A head CTA and brain MRI ruled out ischemic or hemorrhagic lesions and confirmed adequate positioning of the FDD. The condition of the patient improved during the next 72 h with empiric steroid therapy. Two weeks after the procedure, the third CN palsy had entirely resolved. On the 1-month follow-up angiography, there was complete exclusion of the IDA [Figure 5].

DISCUSSION

IDAs

IDAs account for 3% of all IAs, with a yearly incidence rate of 1–1.5 per 100,000 people.[1,7] They commonly affect the PCirc, and those found in the anterior circulation (ACirc) are predominantly located in the middle cerebral artery.[5] In a meta-analysis evaluating 91 patients with IDAs of the ACA, the majority (73%) presented with ischemia, while SAH accounted for only 10% of the cases.[4] A negative prognosis has been reported for unsecured ruptured IDAs secondary to high rates of rebleeding (71.4%).[7]
Treatment of IDAs

Surgical therapy and EVT have proved to be successful for the treatment of IDAs. However, EVT has become the treatment of choice on account of its high occlusion and lower morbidity and mortality rates. FDDs have been widely used for the treatment of IDAs. The Pipeline Embolization Device (PED; Medtronic Inc.) was the first FDD used for this purpose. The safety and efficacy of the PED have been repeatedly demonstrated. Although unusual, post procedural ischemic stroke is the most common neurological complication after aneurysm treatment with FDDs, with estimated rates ranging between 3% and 6%. As an attempt to reduce this ischemic risk, novel FDDs with reduced thrombogenicity have been designed (e.g. the Pipeline Shield). Nevertheless, antiplatelet therapy is still required to prevent thromboembolic complications associated with FDDs. Therefore, ruptured IAs may pose a significant challenge because of the risk of peri-procedural hemorrhage. Different antiplatelet regimens have been reported in this scenario. Samaniego et al. evaluated the safety of treating ruptured IAs with FDDs using periprocedural tirofiban infusion and a loading dose of DAPT (acetylsalicylic acid and clopidogrel), reporting a low overall symptomatic hemorrhage rate (3.3%).

Regarding EVT for ruptured IDAs, the evidence is predominantly based on case series of PCirc lesions. Chan et al. conducted a single-center retrospective review of
eight patients with IDAs of the PCirc treated with the PED, reporting no major procedure-related complications (hemorrhagic or ischemic complications). The authors concluded that the PED is a feasible treatment option for ruptured IDAs in the acute phase.

Third CN Palsy

Third CN palsies are rare in patients with ACA aneurysms, and various etiologic hypotheses have been established for this condition. As there is no close anatomic relationship between these structures that could clearly explain this symptomatology, hemotoxicity, ischemia, and increased intracranial pressure might play a more feasible role.

To the best of our knowledge, the patient described in this report is the first documented case of a transient isolated incomplete third CN palsy after successful Pipeline Shield treatment of an ACA IDA without evidence of peri-procedural hemorrhagic or ischemic events. This complication might be a consequence of the inflammatory response generated by the deployment of the FDD or the hemotoxicity exerted by the SAH. However, the precise underlying pathophysiological mechanisms remain uncertain and are yet to be investigated.

CONCLUSION

An FDD efficiently is a suitable alternative for adequately treating a ruptured IDA of the ACirc with high occlusion and lower morbidity and mortality rates especially PED. Infrequent complications after the deployment of the device, such as de novo third CN palsy, may occur and need to be further investigated.

Declarations of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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