Pericallosal artery aneurysm case series

2021

From June 2017 to June 2020, among 2141 patients with IAs in our institute, 47 had PAAs (2.2%). Thirty-one patients (mean age 57.65 ± 9.97 years) with 32 PAAs (20 unruptured and 12 ruptured) were included in the final analysis. Comparing with unruptured PAAs, ruptured PAAs had significantly higher aspect ratio (AR), mean normalized wall shear stress (NWSS), and mean oscillatory shear index (OSI) values than the unruptured PAAs (all $P < 0.05$) in univariate analyses. Multivariable analysis showed that a high mean OSI was an independent risk factor for PAA rupture (OR = 6.45, 95% CI 1.37-30.32, $P = 0.018$). Conclusion: This preliminary study indicates that there are morphological and hemodynamic differences between ruptured and unruptured PAAs. In particular, a high mean OSI is an independent risk factor for PAA rupture. Further research with a larger sample size is warranted in the future [1)].

2020

The retrospective study aims to compare treatment results of ruptured and unruptured pericallosal artery aneurysms (PAAs) regarding the patient outcome and aneurysm recurrence after endovascular treatment (EVT) and neurosurgical treatment (NT). A total of 67 patients with PAA were admitted to our hospital, 44 patients with subarachnoidal hemorrhage (SAH) due to a ruptured PAA, and 23 patients with unruptured PAA. The radiographic features of PAA were collected from pre-treatment digital subtraction angiography. In addition, demographic, clinical, and radiographic parameters of all patients were recorded. The outcome was measured based on the modified Rankin scale (mRS) at 6 months after admission (favorable mRS score, 0-2 vs unfavorable mRS score, 3-6). Overall 46 patients underwent EVT and 21 patients NT. Six months after discharge 24 patients with SAH had a favorable outcome (mRS 0-2) and 16 patients an unfavorable outcome (mRS 3-6). The mortality rate of patients with SAH was 9.1% (4/44). Overall aneurysm recurrence was treated in 13 % of patients in the EVT cohort (6/46), whereas patients treated with NT had no recurrence. All patients with unruptured PAA had a favorable outcome. EVT and NT of PAA show comparable good results, although aneurysm recurrence occurs more often after EVT. [2)].

A total of 40 patients with 45 PAAs and 348 patients with 392 anterior circulation IAs at other locations were recruited. The clinical and radiological data for these patients were retrospectively reviewed. The differences in the morphological parameters, including the aneurysm diameter, neck width, height, width, parent artery diameter, inflow angle, aspect ratio (AR), size ratio (SR), and aneurysm diameter/width ratio, between PAAs and other IA groups were compared.

Results: Of the 45 PAAs, 22 (48.9%) had ruptured. The proportion of ruptured aneurysms was greater for PAAs than for anterior circulation IAs at other locations. For both ruptured and unruptured anterior circulation IAs, PAAs had the highest AR and SR among all IA groups and had the largest inflow angle.

Conclusion: The morphological characteristics of PAAs are unique. Compared with other anterior circulation IAs, PAAs have significantly increased ARs, SRs, and inflow angles, which, ultimately,

promote their high propensity toward rupture [3]

2019

Distal anterior cerebral artery aneurysms are rare, accounting for 1-9% of all intracranial aneurysms. Previous systematic reviews have highlighted that given the markedly increased incidence of major endovascular intervention complications, microsurgical clipping is the more attractive treatment option with generally excellent clinical outcomes. Subcallosal distal anterior cerebral artery aneurysms constitute a rare subset of these aneurysms, requiring special anatomic considerations-particularly with regard to the approach. The aim of this study was to review the technical nuances of microsurgical treatment of subcallosal distal anterior cerebral artery aneurysms, including a review of contemporary techniques through the presentation of a micro neurosurgical operative video. This is a retrospective case series and intraoperative microsurgical videos review. Three subcallosal DACA aneurysms were identified via retrospective query of our institutional neurosurgical database from December 2017 to May 2018. Two were female; median age was 74 years (range 70-83); all 3 underwent bifrontal craniotomy via bicoronal skin incision for aneurysm clipping. Aneurysms were located in left pericallosal artery-callosomarginal artery junction, bifurcation of Azygos anterior cerebral artery A2, and pericallosal artery related with azygos A2, and the anterior interhemispheric approach was used in all 3 operations. No acute stroke, hemorrhage, or major complications occurred, and all patients remained neurologically intact at the time of last follow-up (median 3 months, range 1-6). Although DACA aneurysms are rare, they represent an important variant for cerebrovascular neurosurgeons where microsurgical clipping can have better angiographic outcomes than endovascular treatment. Detail-oriented anterior interhemispheric arachnoid dissection through bifrontal craniotomy with its lower margin sitting at the superior orbital rim maximizes safe and effective clipping of subcallosal DACA aneurysms [4].

2018

performed a retrospective review of our institutional database from July 2013 through July 2016 and identified 7 subjects with a pericallosal artery aneurysm treated with the Pipeline embolization device (ev3 Neurovascular, Medtronic, Dublin, Ireland) and at least 1 follow-up angiogram. Technical feasibility, procedural complication, angiographic results, and clinical outcome were evaluated. RESULTS:

Placement of the Pipeline embolization device was successful in all cases without evidence of procedural complication. Five out of 7 subjects showed a complete aneurysm occlusion at 6- to 12-mo follow-up angiogram. The 2 subjects with persistent aneurysm filling showed decreased aneurysm sac volume on follow-up angiograms (96% and 60%). There was no evidence of in-implant stenosis or intimal hyperplasia. No thromboembolic or hemorrhagic complications were seen during the follow-up period. Only 1 patient had a transient change in Modified Rankin scale score from baseline as a result of different unrelated procedure. CONCLUSION:

Our preliminary results demonstrate feasibility of the use of flow diverter stent for treatment of aneurysms of the pericallosal artery with rate of aneurysm occlusion comparable to literature and without evidence of increased procedural or short-term morbidity. A long-term and larger cohort study is needed to validate our findings [5].

Nine cases of pericallosal artery aneurysms detected by digital subtraction angiography (DSA) were reviewed by Sun et al., from the Department of Neurosurgery, Rizhao Peoples Hospital Affiliated to Jining Medical University, and Department of Neurosurgery, Donggang District People's Hospital, Shandong Province, China. The clinical manifestation, brain imaging characteristics, and optimal treatment methods were summarized.

Patients with spontaneous aneurysm had good clinical outcomes after endovascular coiling or microsurgical clipping treatment. There were no any neurological function deficits in five patients. One patient suffered from permanent neurological function deficits. Patients with traumatic aneurysm pericallosal had relatively poor outcomes, including two patients showing disturbed consciousness and the paralysis of the lower limbs with slow recovery, and one patient was dead after the surgery.

Spontaneous subarachnoid hemorrhage and interhemispheric fissure hematoma suggest spontaneously pericallosal aneurysm, while traumatic corpus callosum hematoma as well the accompanying embryo of intraventricular hemorrhage suggest traumatic pericallosal aneurysm. Endovascular embolization is the primary surgical treatment for pericallosal aneurysm, while patients with pericallosal aneurysm are not suitable for surgical treatment. Microsurgical clipping treatment may be a choice. However, both of these treatment strategies have high risk [6].

2017

A total of 32 patients with ruptured PAA were admitted to our hospital between 1999 and 2014, added to our prospective database, and analyzed retrospectively. The outcome was measured based on the modified Rankin Scale (mRS) at 6 months after ictus (favorable mRS score, 0-2 vs. unfavorable mRS score, 3-6).

Results: Only 16 (50%) patients had a good clinical status at admission (World Federation of Neurological Surgeons Grading System [WFNS] grades I-III), whereas 12 patients (37.5%) were comatose (WFNS grade V). In 18 patients (56%), intracerebral hemorrhage was confirmed, in 18 patients (56%) cerebrospinal fluid drainage was required immediately after admission, and in 5 cases (16%) decompressive craniectomy was performed. There were 17 patients (53.1%) who achieved a favorable outcome (mRS score 0-2) at follow-up. The unfavorable outcome was associated with smoking, cerebral infarction, and worse admission status after multiple logistic regression analyses.

Conclusions: Poor admission status, cerebral infarction, and smoking seem to be crucial factors for unfavorable outcomes after SAH from PAA [7].

2015

In a retrospective study, 28 patients (8 men and 20 women) treated for a PAA between 2002 and 2012, among the 2430 patients who underwent the treatment of an intracranial aneurysm in the same period. Fifteen patients harbored a ruptured aneurysm while 13 benefited from a prophylactic treatment. The mean age at diagnosis was 52 years (range 37 to 75 SD: ±5) in patients with ruptured aneurysm and 54.2 years (range 35 to 66 SD: ±5) in patients with unruptured aneurysm. Endovascular treatment has been performed in 9 patients while 19 patients underwent a microsurgical treatment. Clinical outcome has been assessed using the modified Rankin scale (mRS)

at 3 months. Long-term imaging follow-up included a CT angiography at 36 months for clipped aneurysms and MR angiography at 6, 18 and 36 months for coiled aneurysms.

The median follow-up was 3.4 years (range 2.8 to 4.2). The mRS was≤2 in all patients with unruptured aneurysms. In patients with ruptured aneurysm, the mRS was ≤2 at 3 months in 13 patients (87%). Persistent cognitive disorders were noted in 8 patients with ruptured aneurysm, 2 of them were considered as possibly related to the treatment. Aneurysm recurrence has been depicted in 4 patients (at 6 months in 3 patients and 1 year in 1 patient) requiring further treatment in all cases; all of them had an aneurysm remnant on immediate conventional angiography. No recurrence was noted in patients without remnant on immediate post-treatment angiography.

Both endovascular and microsurgical treatment are challenged in this location. Multidisciplinary discussion is essential to optimize the management of patients with PAA [8].

2013

30 consecutive patients with ruptured pericallosal artery aneurysms including those with intracerebral hematoma. Twenty-seven cases of ruptured pericallosal artery aneurysms were successfully embolized with coiling whereas three failures required surgery. Four patients experienced periprocedural complications including thromboembolic event in two and hematoma enlargement after coiling in two. A maximum aneurysm diameter of <3 mm was most strongly associated with failure of endovascular coiling. Of the 27 coil-treated aneurysms, immediate angiographic results showed complete aneurysm occlusion in 19 cases, neck remnant in 6, and residual aneurysm in 2. One patient had a major aneurysm recurrence that was uneventfully reembolized. Sixteen of our 30 patients had good outcomes (modified Rankin scale [mRS] 0-2), 7 had moderate disability (mRS 3), and 4 had severe disability (mRS 4-5) at 3 months after treatment. The management strategy for coiling as the first-intention treatment for ruptured pericallosal artery aneurysms has the potential to become an acceptable alternative to surgical clipping for selected cases, although a larger study population and longer follow-up periods are needed before definitive conclusions can be drawn.

The maximum diameters of our failed cases were < 3 mm while all 22 aneurysms with a maximum diameter ≥ 3 mm were successfully embolized. Therefore, morphologically, they consider the lower limit on pericallosal artery aneurysm diameters difficult to treat by endovascular coiling to be < 3mm since the failure rate was significantly higher than for larger aneurysms.

The overall complication rate was 13.3% (4/30 cases) and independent activities of daily living (mRS 0–2) were achieved in 53.3% (16/30). Two cases experienced thromboembolic complications with one resulting in a moderate permanent deficit and the other in a minor neurological deficit from which the patient fully recovered. Two patients developed hematoma enlargement probably because coil embolization was performed within 8 hours of onset under systemic heparinization. It is, therefore, important to intentionally postpone endovascular coiling in patients with associated ICH until 8 hours after the onset, or to minimize heparinization for patients requiring coil embolization within 8 hours. This may lower the risk of hemorrhagic complications [9].

Parent vessel trapping with Onyx 18/34 offers a simple, safe, and effective means of achieving obliteration of distal challenging aneurysms reported in 3 cases [10].

2012

4 cases treating wide-neck pericallosal artery aneurysms at the bifurcation with Y-configuration stent placement is feasible and effective. This technique may be considered as a therapeutic option for wide-neck aneurysms that pose a difficult technical challenge [11].

2011

32 patients presenting with SAH due to pericallosal aneurysm treated with an endovascular approach were more likely to have a good modified Rankin scale (mRS) (mRS 0-2 vs 3-6) (p=0.028), to make a complete recovery (mRS=0) (p=0.017) and were less likely to die (mRS=6) (p=0.026). Patients with electively treated pericallosal aneurysms did not have statistically significant differences in outcome between surgical and endovascular cohorts. Differences in secondary endpoints did not reach significance. Patients with ruptured pericallosal aneurysms fare better with endovascular therapy, with better chance of complete recovery. Surgical and endovascular treatments of unruptured pericallosal aneurysms have similar results and outcome [12].

2007

Nguyen et al., examined data of 25 patients that were stored in a prospectively collected database for pericallosal artery aneurysms in patients who underwent coil placement between 1992 and 2005. Hemorrhagic and thromboembolic complications as well as clinical and angiographic outcomes were reviewed. Angiographically documented recurrences were classified as minor or major. These lesions were compared with a historical cohort of non-pericallosal artery aneurysms in patients who underwent coil therapy between 1992 and 2002. The known risk factors for recurrence and procedure-related hemorrhagic complications were evaluated in both groups to assess baseline imbalances.

During a 13-year period, 25 pericallosal artery aneurysms were treated with coils in 25 patients. The non-pericallosal artery lesion group included 488 aneurysms of which 344 underwent follow-up imaging. Procedure-related perforations were more frequent for pericallosal artery aneurysms than those in other intradural locations (three of 25 compared with eight of 476, respectively; risk ratio 7.1, 95% confidence interval [CI] 2.1-22.5, p = 0.03). Follow-up imaging studies (obtained at a mean 28 months) were available for 19 patients with pericallosal artery aneurysms. The recurrence rate was not significantly higher in these patients (22.9/100 person-years of observation) than in those with non-pericallosal artery aneurysms (17.9/100 person-years of observation) (incidence rate ratio 1.3, 95% CI 0.6-2.4, p = 0.46).

Pericallosal artery aneurysms were associated with significantly higher periprocedural rupture than non-pericallosal artery lesions. No significant intergroup difference was found for aneurysm recurrence [13].

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