

ABSTRACT

BACKGROUND: Posterior inferior cerebellar artery (PICA) aneurysms are an uncommon, heterogeneous group of aneurysms with poorer neurological outcomes compared to other intracranial aneurysms. At first, as part A, we conducted a systematic review of the literature to evaluate the safety and efficacy of treatment strategies for PICA-aneurysms.

Subsequently, as part B, we performed a multicenter retrospective study to analyze the outcome in a large series of patients treated with contemporary microsurgical and endovascular techniques.

METHODS: For the meta-analysis, a systematic search of Medline, EMBASE, Scopus and Web of Science was done for studies published through November 2015. We included studies that described treatment of PICA-aneurysms with ≥ 10 patients. Random-effects meta-analysis was used to pool the following outcomes: complete occlusion, technical success, periprocedural morbidity/mortality, stroke rates, aneurysm recurrence/rebleed, CN-palsies rates, and long-term neurological morbidity/mortality. As the second part, aiming to report the current trends and results in treatment strategies for PICA-aneurysms, records of 94 patients treated for PICA-aneurysms between 2000 and 2015 at 3 large referral neurovascular centers were retrospectively reviewed.

RESULTS: In the meta-analysis, we included 29 studies with 796 PICA-aneurysms. When considering all ruptured PICA-aneurysms, complete occlusion rates were 97.1% (95%CI=94.5%-99.0%) in the surgical group and 84.3% (95%CI=73.8%-92.6%) in the endovascular group. Aneurysm recurrence occurred in 1.4% (95%CI=0.3%-3.3%) after surgery and in 6.9% (95%CI=3.6%-10.9%) after endovascular treatment. Overall neurological morbidity and mortality were 14.4% (95%CI=8.7%-21.2%) and 9.8% (95%CI=5.8%-14.8%) after surgery and 15.1% (95%CI=10.5%-20.2%) and 17.1% (95%CI=11.5%-23.7%) after endovascular treatment, respectively. When considering all unruptured PICA-aneurysms, complete occlusion rates were 92.9% (95%CI=79.5%-100%) in the surgical group and 75.7% (95%CI=45.4%-97.1%) in the endovascular group. Overall long-term good neurological outcome rates were 91.5% (95%CI=74.4%-100%) in the surgical series and 93.3% (95%CI=82.7%-99.5%) in the endovascular group. Analyzing the current results from 3 referral neurovascular centers, 83 patients met inclusion criteria and of these, 2 died before treatment leaving 81 treated patients (43 underwent endovascular and 38 surgical treatment). Among patients treated endovascularly, procedure-related complications occurred in 4 cases (11.8%). Six patients (19.4%) suffered from complications directly associated with surgery. Recurrences occurred in 3.2% of surgical and in 17.6% of endovascularly treated patients, requiring treatment. Patients with unruptured asymptomatic aneurysms had good outcomes. In the group of 67 ruptured aneurysms, 12 endovascularly (35.3%) and 11 surgically (35.5%) treated patients had Glasgow Outcome Scale (GOS) score 1-3. Of patients in poor neurological condition (Hunt & Hess (H&H) IV-V at admission), 65.2% suffered poor clinical outcomes. Fifty percent of patients with distal and 31.9% patients with proximal ruptured PICA-aneurysms suffered a poor neurological outcome.

CONCLUSION: Our meta-analysis as well as the current results from 3 referral neurovascular centers demonstrated that both treatment modalities are technically feasible with high rates of technical success and effective with sufficient long-term aneurysm occlusion rates. However, complications are not negligible. Outcomes were mostly impacted by clinical state at admission. Our data confirm that surgical treatment is associated with superior angiographic outcomes. These findings should be considered when deciding the best therapeutic strategy for treatment of PICA-aneurysms. Yet, therapy of PICA-aneurysms should be performed on a selective, case-by-case basis in order to maximize patient benefits and limit the risk of periprocedural complications also depending upon the specific expertise of one's department.

Key words: PICA, aneurysm, microsurgery, endovascular treatment, meta-analysis