# Incomplete clipping

Residual aneurysm neck and recurrent aneurysms after surgical clipping present a persistent risk of bleeding. Secondary coiling after incomplete clipping represents a strategy to occlude the residual aneurysm sac: feasibility, bleeding risk and outcome were evaluated through a systematic review of literature along with the series of two tertiary referral neurovascular centres.

Demographics, ruptured status, aneurysm morphology, topography, exclusion at surgery, the timing of secondary coiling, complications, occlusion rate, and outcome were analyzed. Percentage of incidence and 95% CI were calculated for all variables. T test was used for continue variables, whereas Fisher's test (two-sided) is for categorical ones. Overall, 102 patients (92 cases from literature and 10 cases from institutional series) were included. Mean age at diagnosis was 52.94 ± 12.17 years, and male/female ratio 0.5; 3/4 of aneurysms involved the anterior circulation, whereas ¼ the posterior circulation. An aneurysmal neck remnant was described in 58.43% of cases, an aneurysmal sac remnant in 29.21% and a regrowth in 12.36%. Residual aneurysm rupture was reported in 22% of cases. Complete/near-complete occlusion after secondary coiling was observed in 70% of cases, a partial in 25.56% and a failure in 4.44%. Only one case of perforation was reported. Complications were comparable to standard endovascular procedures. Aneurysms remnants after clipping are often observed in cases difficult anatomical locations. Their bleeding risk is not negligible. Secondary coiling is a rescue strategy to effectively and safely secure the aneurysm remnant. Only in a minority of cases, it is a staged treatment after 'remodelling' of the aneurysm neck [1].

## Management of residual and recurrent aneurysms after initial endovascular treatment

The individualized approach resulted in complete occlusion of 114 aneurysms (89.7%), with neck remnants and residual aneurysms detectable in 11 (8.7%) and 2 (1.6%) cases, respectively. Treatment morbidity was 11.9%, without significant differences between surgical (15.6%) and endovascular (9.3%) patients (P = .09). Recurrences from coil compaction were safely treated by re-embolization, whereas recurrences from aneurysmal regrowth may best be managed surgically when technically feasible [2].

1)
Della Pepa GM, Bianchi F, Scerrati A, Albanese A, Cotroneo E, Delitala A, Gigli R, La Rocca G, Marchese E, Pedicelli A, Puca A, Sabatino G, Olivi A, Sturiale CL. Secondary coiling after incomplete surgical clipping of cerebral aneurysms: a rescue strategy or a treatment option for complex cases? Institutional series and systematic review. Neurosurg Rev. 2019 Jun;42(2):337-350. doi: 10.1007/s10143-018-0950-4. Epub 2018 Feb 7. PMID: 29417290.
2)
Dorfer C, Gruber A, Standhardt H, Bavinzski G, Knosp E. Management of residual and recurrent aneurysms after initial endovascular treatment. Neurosurgery. 2012 Mar;70(3):537-53; discussion 553-4. doi: 10.1227/NEU.0b013e3182350da5. PMID: 21904266.