Intracranial aneurysm clipping outcome

Less invasive surgical approaches for intracranial aneurysm clipping may reduce length of stay, surgical morbidity, treatment cost, and improve patient outcomes.

The mechanisms underlying neurocognitive changes after surgical clipping of unruptured intracranial aneurysms (UIAs) are poorly understood.

Minimal structural damage visualized on T2-weighted images at 6 months as a result of factors such as pial/microvascular injury and excessive retraction during surgical manipulation could cause subtle but significant negative effects on postoperative neurocognitive function after surgical clipping of a UIA. However, this detrimental effect was small, and based on the group-rate analysis

Successful and meticulous surgical clipping of a UIA does not adversely affect postoperative cognitive function [1)].

Results of treatment after clipping and coiling do not differ in total for all patients, but differ depending on the presence of bleeding. Patients with bleeding aneurysms achieve better outcomes after coiling, and patients with non-bleeding aneurysms achieve better outcomes after clipping [2)].

Anterior communicating artery aneurysm outcome

Anterior communicating artery aneurysm outcome

Timing of surgery

Time from rupture to treatment is a crucial factor in determining outcome.

Practice of delayed surgery to avoid edematous brain has been replaced by early surgery to minimize risk from rebleeding and vasospasm. Mahaney et al. in their analysis of intraoperative hypothermia for aneurysm surgery trial (IHAST) data observed that patients operated early (day 0-2) or late (day 7-14) fared significantly better than those operated during intermediate phase (day 3-6). Change in surgical strategy has posed challenge to the anesthesiologists as increasing number of patients are operated during off-work hours in inadequately optimized state with less expert help.

Nieuwkamp et al., performed a retrospective observational study on the timing of intracranial aneurysm surgery in The Netherlands over a two-year period.

In eight hospitals they identified 1,500 patients with an aneurysmal subarachnoid hemorrhage. They were subjected to predefined inclusion criteria. They included all patients who were admitted and were conscious at any one time between admission and the end of the third day after the haemorrhage. We categorised the clinical condition on admission according the World Federation of Neurological Surgeons (WFNS) grading scale. Early aneurysm surgery was defined as operation performed within three days after onset of subarachnoid haemorrhage; intermediate surgery as performed on days four to seven, and late surgery as performed after day seven. Outcome was

classified as the proportion of patients with poor outcome (death or dependent) two to four months after onset of subarachnoid haemorrhage. We calculated crude odds ratios with late surgery as reference. We distinguished between management results (reconstructed intention to treat analysis) and surgical results (on treatment analysis). The results were adjusted for the major prognosticators for outcome after subarachnoid haemorrhage.

They included 411 patients. There were 276 patients in the early surgery group, 36 in the intermediate surgery group and 99 in the late surgery group. On admission 78% were in good neurological condition (WFNS I-III). MANAGEMENT

Overall, 93 patients (34%) operated on early had a poor outcome, 13 (36%) of those with intermediate surgery and 37 (37%) in the late surgery group had a poor outcome. For patients in good clinical condition on admission and planned for early surgery the adjusted odds ratio (OR) was 1.3 (95% CI 0.5 to 3.0). The adjusted OR for patients admitted in poor neurologicalcondition (WFNS IV-V) and planned for early surgery was 0.1 (95% CI 0.0 to 0.6). SURGICAL RESULTS: For patients in good clinical condition on admission who underwent early operation the adjusted OR was 1.1 (95% CI 0.4 to 3.2); it was 0.2 (95% CI 0.0 to 0.9) for patients admitted in poor clinical condition.

In this observational study they found no significant difference in outcome between early and late operation for patients in good clinical condition on admission. For patients in poor clinical condition on admission outcome was significantly better after early surgery. The optimal timing of surgery is not yet settled. Ideally, evidence on this issue should come from a randomised clinical trial. However, such a trial or even a prospective study are unlikely to be ever performed because of the rapid development of endovascular coiling [3)].

Awake clipping

Risk of ischemia during intracranial aneurysm surgery is significantly related to temporary clipping time and final clipping that might incorporate a perforator.

Abdulrauf et al. attempted to assess the potential added benefit to patient outcomes of “awake” neurological testing when compared with standard neurophysiological testing performed under general anesthesia. The procedure is performed after the induction of conscious sedation, and for the neurological testing, the patient is fully awake.

They conducted an institutional review board-approved prospective study of clipping unruptured intracranial aneurysms (UIAs) in 30 consecutive adult patients who underwent awake clipping. The end points were the incidence of stroke/cerebrovascular accident (CVA), death, discharge to a long-term facility, length of stay, and 30-day modified Rankin Scale score. All clinical and neurophysiological intraoperative monitoring data were recorded.

The median patient age was 52 years (range 27-63 years); 19 (63%) female and 11 (37%) male patients were included. Twenty-seven (90%) aneurysms were anterior, and 3 (10%) were posterior circulation aneurysms. Five (17%) had been coiled previously, 3 (10%) had been clipped previously, 2 (7%) were partially calcified, and 2 (7%) were fusiform aneurysms. Three patients developed synchronous clinical neurological and neurophysiological changes during temporary clipping with consequent removal of the temporary clip and reversal of those clinical and neurophysiological changes. Three patients developed asynchronous clinical neurological and neurophysiological changes. These 3 patients developed hemiparesis without changes in neurophysiological monitoring

results. One patient developed linked clinical neurological and neurophysiological changes during final clipping that were not reversed by reapplication of the clip, and the patient had a CVA. Four patients with internal carotid artery ophthalmic segment aneurysms underwent visual testing with final clipping, and 1 of these patients required repositioning of the clip. Three patients who required permanent occlusion of a vessel as part of their aneurysm treatment underwent a 10-minute intraoperative clinical respective-vessel test occlusion. The median length of stay was 3 days (range 1-5 days). The median modified Rankin Scale score was 1 (range 0-3). All of the patients were discharged to home from the hospital except for 1 who developed a CVA and was discharged to a rehabilitation facility. There were no deaths in this series.

The 3 patients who developed neurological deterioration without a concomitant neurophysiological finding during temporary clipping revealed a potential advantage of awake aneurysm surgery (i.e., in decreasing the risk of ischemic injury) [4].

1)
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