Unruptured intracranial aneurysm surgery

Complications

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Case series

2016

A study investigated the incidence and risk factors for the postoperative occurrence of subdural complications, such as a subdural hygroma and resultant chronic subdural hematoma (CSDH), following surgical clipping of an Unruptured intracranial aneurysm. The critical age affecting such occurrences and follow-up results were also examined.

The case series included 364 consecutive patients who underwent aneurysm clipping via a pterional or superciliary keyhole approach for an unruptured saccular aneurysm in the anterior cerebral circulation between 2007 and 2013. The subdural hygromas were identified based on CT scans 6-9 weeks after surgery, and the volumes were measured using volumetry studies. Until their complete resolution, all the subdural hygromas were followed using CT scans every 1-2 months. Meanwhile, the CSDHs were classified as nonoperative or operative lesions that were treated by bur-hole drainage. The age and sex of the patients, aneurysm location, history of a subarachnoid hemorrhage (SAH), and surgical approach (pterional vs superciliary) were all analyzed regarding the postoperative occurrence of a subdural hygroma or CSDH. The follow-up results of the subdural complications were also investigated. RESULTS Seventy patients (19.2%) developed a subdural hygroma or CSDH. The results of a multivariate analysis showed that advanced age ($p = 0.003$), male sex ($p < 0.001$), middle cerebral artery (MCA) aneurysm ($p = 0.045$), and multiple concomitant aneurysms at the MCA and anterior communicating artery (ACoA) ($p < 0.001$) were all significant risk factors of a subdural hygroma and CSDH. In addition, a receiver operating characteristic (ROC) curve analysis revealed a cut-off age of > 60 years, which achieved a 70% sensitivity and 69% specificity with regard to predicting such subdural complications. The female patients ≤ 60 years of age showed a negligible incidence of subdural complications for all aneurysm groups, whereas the male patients > 60 years of age showed the highest incidence of subdural complications at 50%-100%, according to the aneurysm location. The subdural hygromas detected 6-9 weeks postoperatively showed different follow-up results, according to the severity. The subdural hygromas that converted to a CSDH were larger in volume than the subdural hygromas that resolved spontaneously (28.4 ± 16.8 ml vs 59.6 ± 38.4 ml, $p = 0.003$). Conversion to a CSDH was observed in 31.3% (5 of 16), 64.3% (9 of 14), and 83.3% (5 of 6) of the patients with mild, moderate, and severe subdural hygromas, respectively.

Advanced age, male sex, and an aneurysm location requiring extensive arachnoid dissection (MCA aneurysms and multiple concomitant aneurysms at the MCA and ACoA) are all correlated with the occurrence of a subdural hygroma and CSDH after unruptured aneurysm surgery. The critical age affecting such an occurrence is 60 years [1].

2015

Between January 2000 and December 2006, 794 patients (unruptured, 58.0%) underwent clipping surgery for aneurysm of the anterior circulation.

Fifteen patients (1.9%) developed CSDH after clipping, which required evacuation. Among those, 13 had unruptured aneurysms (2.8%), a much higher percentage than for ruptured aneurysms (0.9%). On univariate statistical analysis, risk factors of CSDH were associated with advanced age (P = 0.0005), male gender (P = 0.04), and unruptured aneurysms (P = 0.02). Aneurysmal location was not related to the development of postoperative CSDH. Contralateral CSDH occurred in 3 patients, but no middle cerebral artery aneurysm developed contralateral CSDH. An increase in postoperative subdural fluid collection (SFC) during 1 week was a significant risk factor for CSDH (P = 0.001).

In addition to the classic risk factors, this study showed that clipping for unruptured aneurysms carries a higher risk for CSDH compared to ruptured aneurysms. We suggest that an increase of SFC during 1 week postoperatively can be a factor in predicting CSDH after clipping [2].

2013

From 713 consecutive patients who underwent clipping of unruptured anterior circulation aneurysms were reviewed, and risk factors correlated with CSDH were identified by multivariate regression analysis of demographic variables. Fifteen patients (2.1%) developed CSDH after the surgery. Advanced age (odds ratio [OR] 1.151, 95% confidence interval [CI] 1.051-1.261) and male gender (OR 3.167, 95% CI 1.028-9.751) were correlated with CSDH. Subsequently, all 713 patients were quadrichotomized on the basis of gender and age, with 70 years as the cut-off value for age. The frequency of CSDH in men <70 years of age was 1.3% and that in men ≥70 years of age was 15.1%, with risk of CSDH was significantly higher in the older men (OR 13.39; 95% CI: 3.42-52.44). The frequency of CSDH in women <70 years of age was 0.6% and that in women ≥70 years of age was 3.7%. As in men, the risk of CSDH was significantly higher in the older women (OR 6.69, 95% CI 1.10-40.73). The interval between the aneurysm clipping and CSDH development was 0.5-6 months, suggesting that clinical observation should be continued up to 6 months after surgery. Although prognosis for patients with a postoperative CSDH complication is generally favourable, the risk of CSDH should be taken into account when considering elective clipping of unruptured aneurysms in patients ≥70 years of age [3].

1)
Park J, Cho JH, Goh DH, Kang DH, Shin IH, Hamm IS. Postoperative subdural hygroma and chronic subdural hematoma after unruptured aneurysm surgery: age, sex, and aneurysm location as independent risk factors. J Neurosurg. 2016 Feb;124(2):310-317. Epub 2015 Aug 14. PubMed PMID: 26275003.
2)
Ohno T, Iihara K, Takahashi JC, Nakajima N, Satow T, Hishikawa T, Nagata I, Yamada K, Miyamoto S. Incidence and risk factors of chronic subdural hematoma after aneurysmal clipping. World Neurosurg. 2013 Nov;80(5):534-7. doi: 10.1016/j.wneu.2012.09.025. Epub 2012 Oct 13. PubMed PMID: 23072878.
3)
Inamasu J, Watabe T, Ganaha T, Yamada Y, Nakae S, Ohmi T, Imizu S, Kaito T, Ito K, Nishiyama Y, Hayashi T, Sano H, Kato Y, Hirose Y. Clinical characteristics and risk factors of chronic subdural haematoma associated with clipping of unruptured cerebral aneurysms. J Clin Neurosci. 2013

Aug;20(8):1095-8. doi: 10.1016/j.jocn.2012.09.024. Epub 2013 May 10. PubMed PMID: 23669172.