Timing of endovascular treatment for aneurysmal subarachnoid hemorrhage

An earlier approach may be relevant for the prevention of rebleeding and improvement of clinical outcome, but several disadvantages should be considered, such as an increased rate of periprocedural complications. Hence, a well-designed randomized controlled trial deems necessary to be able to define the optimal time of treatment. The possibility of treatment concomitant with the initial angiography should also be taken into account in this trial. This fact might represent a benefit favoring coiling over clipping in the prevention of rebleeding, and thus avoiding the inevitable delay necessary for the preparation for surgery [1].

Reviews

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To systematically review and meta-analyse the data on impact of timing of endovascular treatment in aneurysmal subarachnoid hemorrhage (SAH) to determine if earlier treatment is associated with improved clinical outcomes and reduced case fatality.

Rawal et al., searched MEDLINE, Cochrane database, EMBASE and Web of Science to identify studies for inclusion. The measures of effect utilised were unadjusted/adjusted ORs. Effect estimates were combined using random effects models for each outcome (poor outcome, case fatality); heterogeneity was assessed using the I2 index. Subgroup and sensitivity analyses were performed to account for heterogeneity and risk of bias.

16 studies met the inclusion criteria. Treatment <1 day was associated with a reduced odds of poor outcome compared with treatment >1 day (OR=0.40 (95% CI 0.28 to 0.56; I2=0%)) but not when compared with treatment at 1-3 days (OR=1.16 (95% CI 0.47 to 2.90; I2=81%)). Treatment at <2 days and at <3 days were associated with similar odds of poor outcome compared with later treatment (OR=1.20 (95% CI 0.70 to 2.05; I2=73%; OR=0.71 (95% CI 0.36 to 1.37; I2=71%)). Early treatment was associated with similar odds of case fatality compared with later treatment, regardless of how early/late treatment were defined (OR=1.80 (95% CI 0.88 to 3.67; I2=34%) for treatment <1 day vs days 1-3; OR=1.71 (95% CI 0.72 to 4.03; I2=54%) for treatment <2 days vs later; OR=0.90 (95% CI 0.31 to 2.68; I2=48%) for treatment <3 days vs later).

In only 1 of the analyses was there a statistically significant result, which favoured treatment <1 day. The inconsistent results and heterogeneity within most analyses highlight the lack of evidence for best timing of endovascular treatment in SAH patients [2].

Case series

Patients with intracranial aneurysms treated with embolization were divided into group A (n = 277), patients with ruptured aneurysms treated within 72 hours of SAH; group B (n = 138), patients with ruptured aneurysms treated beyond 72 hours; and group C (n = 93), patients with unruptured

aneurysms.

Embolization was successful in all but four patients (99.2%). The periprocedural complication rate was 36.2% in group B, significantly ($p < 0.05$) greater than that in group A (24.5%) or group C (11.8%). The rebleeding rate was 9.7% (6/62 patients) in groups A and B after embolization and only 0.3% (1/346 patients) in aneurysms with total or subtotal occlusion. Of these three groups of patients, 69.7% in group A, 58.7% in group B, and 76.3% in group C achieved Glasgow Outcome Scale (GOS) score of 5 or modified Rankin Scale (mRS) score of 0- to 1 at discharge. A significant difference ($p < 0.05$) existed in the clinical outcome between the three groups. The percentages of patients without deficits (GOS 5 or mRS 0-1) and slight disability (mRS 2) were 80.2% in group A, 81.2% in group B, and 96.7% in group C. The mortality rate was 4.3% (12/277 patients) in group A and 7.2% (10/138 patients) in group B with no significant ($p = 0.21$) difference. Follow-up was performed at 3 to 54 months (mean 23.2), and the recanalization rate was 28.6% (32/112 patients) in group A, 22.4% (11/49 patients) in group B, and 28.6% (16/56 patients) in group C, with no significant differences ($p = 0.15$). Hydrocephalus occurred in 30.5% (39/128 patients) in group B, which was significantly ($p < 0.01$) greater than that in group A (9.4%) or group C (2.2%).

Early embolization of ruptured cerebral aneurysms within 72 hours of rupture is safe and effective and can significantly decrease periprocedural complications compared with management beyond 72 hours. Timely management of cisternal and ventricular blood can reduce hydrocephalus incidence and improve prognosis [3].

A database of patients with aneurysmal subarachnoid hemorrhage was analyzed who were confirmed by CT, and underwent endovascular treatment between January 2005 and January 2012,. The patients were grouped into four cohorts according to the timing of treatment: ultra-early cohort (within 24 hours of onset which was confirmed by CT), early cohort (between 24 and 72 hours of onset which was confirmed by CT), intermediate cohort (between 4 and 10 days of onset which was confirmed by CT) and delayed cohort (after 11 days of onset which was confirmed by CT). Patient demographics, aneurysms features and clinical outcomes were analyzed to evaluate safety and efficacy for timing of endovascular treatment among four cohorts. In our series of 664 patients, 269 patients were grouped into ultra-early cohort, 62 patients in early cohort, 218 patients in intermediate cohort, and 115 patients in delayed cohort. The patient demographics, aneurysm characteristics and neurological conditions on admission among groups showed no statistical significance. As a result of the 9-month follow-up with 513 patients, good outcome (mRS<2) was achieved in 78% patients in “ultra-early” cohort compared with that of 57% in the “intermediate” group($p=0.000$), whereas other comparisons showed no statistical significance($p<0.05$) among the four groups. Dividing the patients with dichotomized mRS into “good outcome” group and “poor outcome” group (mRS<2) at the 9-month follow-up, the results showed lower Hunt-Hess scores ($p=0.000$) and smaller size of aneurysms ($p=.001$) which were correlated with the good outcome. Hypertension ($p=0.776$), age ($p=0.327$), sex ($p=0.551$) and location ($p=0.901$) showed no statistical significance between groups. Endovascular treatment of aneurysmal subarachnoid hemorrhage which was confirmed by CT within 72 hours achieved better outcomes than that confirmed after 72 hours, especially in those patients treated within 24 hours of onset in comparison with patients treated between 4 and 10 days [4].

1)

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2)

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3)

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4)

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