Barrow Ruptured Aneurysm Trial (BRAT)

https://clinicaltrials.gov/ct2/show/NCT01593267

The Barrow Ruptured Aneurysm Trial (BRAT) is a prospective, randomized trial in which treatment with clipping was compared to treatment with coil embolization. Patients were randomized to treatment on presentation with any nontraumatic subarachnoid hemorrhage (SAH).

There was no significant difference in clinical outcomes between the 2 assigned treatment groups as measured by mRS outcomes or deaths. Clinical outcomes in the patients with posterior circulation aneurysms were better in the coiling group at 1 year, but after 1 year this difference was no longer statistically significant. Rates of complete aneurysm obliteration and rates of retreatment favored patients who actually underwent clipping compared with those who underwent coiling [1].

In the subgroup of patients with saccular aneurysms enrolled in the BRAT, there was no significant difference between modified Rankin Scale outcomes at any follow-up time in patients with saccular aneurysms assigned to clipping compared with those assigned to coiling (intent-to-treat analysis). At the 6-year follow-up evaluation, rates of retreatment and complete aneurysm obliteration significantly favored patients who underwent clipping compared with those who underwent coiling. Clinical trial registration no.: NCT01593267 (clinicaltrials.gov) [2].

The 1-year results of International Subarachnoid Aneurysm Trial (ISAT) showed that for the treatment of ruptured aneurysms, coil embolization was superior to clip occlusion, but most of the trial patients had small aneurysms in the anterior circulation and were in good clinical condition. Therefore, evidence that the 1-year ISAT results apply to all patients with aneurysms or that the ISAT results could be replicated has been lacking. To address the issue of the broader applicability of the ISAT results, the Barrow Ruptured Aneurysm Trial (BRAT) used a prospective intent-to-treat design that randomized all patients admitted with a diagnosis of subarachnoid hemorrhage (SAH). The 1- and 3-year results have been published previously [3] [4].

Robert F. Spetzler et al. report the 6-year results of the Barrow Ruptured Aneurysm Trial (BRAT). This ongoing randomized trial, with the final goal of a 10-year follow-up, compares the safety and efficacy of surgical clip occlusion and endovascular coil embolization in patients presenting with aneurysmal subarachnoid hemorrhage (SAH).

The 1- and 3-year results of this trial have been previously reported.

In total, 500 patients with an SAH met the entry criteria and were enrolled in the study. Of these patients, 471 were randomly assigned to the treatments: 238 to surgical clipping and 233 to endovascular coiling. Six patients who died before treatment and 57 patients with nonaneurysmal SAHs were excluded, leaving a total of 408 patients who underwent clipping (209 assigned) or coiling (199 assigned). Whether to treat patients within the assigned group or to cross over patients to the other group was at the discretion of the treating physician; 38% (75/199) of the patients assigned to coiling were crossed over to clipping and 1.9% (4/209) assigned to clipping were crossed over to coiling. The outcome data were collected by a dedicated nurse practitioner. The primary outcome analysis was based on the assigned treatment group; poor outcome was defined as a modified Rankin Scale (mRS) score > 2 and was independently adjudicated. Six years after randomization, 336 (82%) of 408 patients who had been treated were available for examination.

On the basis of an mRS score of > 2, and similar to the results at the 3-year follow-up, no significant difference in outcomes (p = 0.24) was detected between the 2 treatment groups. Complete aneurysm obliteration at 6 years was achieved in 96% (111/116) of the clipping group and in 48% (23/48) of the coiling group (p < 0.0001). In the period between the 3- and 6-year follow-ups, 3 additional patients assigned to coiling and none assigned to clipping received retreatment, for overall retreatment rates of 4.6% (13/280) for clipping and 16.4% (21/128) for coiling (p < 0.0001).

When aneurysm location was considered, the 6-year results continued to match the previously reported results, with no difference in outcome for anterior circulation aneurysms at most time points. Of the anterior circulation aneurysms assigned to coiling treatment, 42% (70/168) were crossed over to clipping treatment. The outcomes for posterior circulation aneurysms continued to favor coiling. The randomization process was unexpectedly skewed, with 18 of 21 treated aneurysms of the posterior inferior cerebellar artery (PICA) being assigned to clipping, but even when posterior inferior cerebellar artery aneurysms (PICA aneurysms) were removed from the analysis, outcomes for the posterior circulation aneurysms still favored coiling.

Although BRAT was statistically underpowered to detect small differences, these results suggest little difference in outcome between the 2 treatments for anterior circulation aneurysms.

In contrast to ISAT, Spetzler et al. note that there appeared to be only a marginal difference in outcome between clipping and coiling for treating anterior circulation aneurysms as observed over a 6-year period. This was not the case for aneurysms in the posterior circulation, where there appeared to be a sustained benefit of coil embolization over surgical clipping. Consistent with the current literature, aneurysm obliteration rates in BRAT were lower for coiling than for clipping, but despite the fact that rehemorrhage rates were higher after coiling, no recurrent hemorrhages were known to have occurred in either treatment group 6 years after discharge. Sufficient questions remain regarding the relative benefits of the 2 treatment modalities to warrant further well-designed randomized trials. [5)].

A total of 471 patients who were part of the BRAT trial from 2003 to 2007 were retrospectively reviewed. All variables including demographic data, medical history, treatment, imaging, and functional outcomes were included as part of the trial. No additional variables were retrospectively collected.

Ultimately, 147 patients (31.2%) required a ventriculoperitoneal shunt (VPS) in this series. Age, dissecting aneurysm type, ruptured vertebrobasilar aneurysm, Fisher grade, Hunt and Hess grade, admission intraventricular hemorrhage, admission intraparenchymal hemorrhage, blood in the fourth ventricle on admission, perioperative ventriculostomy, and hemicraniectomy were significant risk factors (P < .05) associated with shunt-dependent hydrocephalus on univariate analysis. On multivariate analysis, intraventricular hemorrhage and intraparenchymal hemorrhage were independent risk factors for shunt dependency (P < .05). Clipping vs coiling treatment was not statistically associated with VPS after SAH on both univariate and multivariate analyses. Patients who did not receive a VPS at discharge had higher Glasgow Outcome Scale and Barthel Index scores and were more likely to be functionally independent and to return to work 72 months after surgery (P < .05).

There is no difference in shunt dependency after SAH among patients treated by endovascular or microsurgical means. Patients in whom shunt-dependent hydrocephalus does not develop after SAH tend to have improved long-term functional outcomes [6)].

Articles

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