Number Needed to Treat to Benefit and Harm for Endovascular Therapy in Acute Ischemic Stroke: Joint Outcome Table Analysis of the MR CLEAN Trial

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Background

The MR CLEAN study is the first trial of thrombectomy with 2nd-generation devices, and the first to demonstrate improved outcomes compared with medical therapy (including IV tPA). We sought to delineate the clinical relevance of treatment effects observed in MR CLEAN, using the size effect metrics of number needed to treat to benefit (NNTB), number needed to treat to harm (NNTH), benefit per hundred (BPH) treated, and harm per hundred (HPH) treated.

Methods

For all possible dichotomizations of the modified Rankin Scale of global disability (mRS), net NNTB was derived by taking the inverse of absolute risk difference, and net BPH by multiplying absolute risk difference by 100. For benefits and harms simultaneously across all 6 disability transitions on the mRS, NNTB, NNTH, BPH, and HPH estimates were derived using the: 1) Mann Whitney permutation test, 2) joint outcome table algorithmic specification and 3) joint outcome table specification by independent experts, including 3 stroke neurologists, 1 interventional neurologist, 2 interventional neuroradiologists, and 2 endovascular neurosurgeons.

Results

For the 6 different dichotomizations of the mRS, net NNT values ranged from 6-100 and net benefit per hundred ranged from 1-29. The prespecified secondary endpoint of MR CLEAN was mRS 0-2, alive and independent at 3 months. For this dichotomization, net NNTB was 7 and net benefit per hundred was 14. The prespecified primary endpoint of MR CLEAN was shift on mRS (less disability by 1 or more grades at 3 months). The Mann-Whitey permutation test indicated for such transitions across all levels of mRS disability, net NNTB was 3.4 and BPH 29. Expert specifications of the joint outcome table indicated a NNTB of 3.8, NNTH of 22.7, net NNTB 4.5, BPH of 27, HPH of 4.4, and net BPH of 22.

Conclusions

Among patients with large vessel acute ischemic stroke, the use of endovascular therapy will result in 1 additional nondisabled outcome among every 7 patients treated and 1 additional less disabled outcome for every 3-5 patients treated. Among 100 patients treated with endovascular therapy, 14 more will have a nondisabled outcome and 22-29 will have a less disabled outcome. The magnitude of the treatment effect observed in the MR CLEAN trial is substantial.

Disclosure

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