

Cerebral Embolic Protection Devices and Transcatheter Aortic Valve Implantation. Could Neurological Complications Be Avoided? A Meta-Analysis Of 4091 Patients

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Background:

Transcatheter aortic valve implantation (TAVI) has become an established treatment option for the treatment of aortic stenosis throughout the spectrum of surgical risk. Cerebral embolic protection devices (CEPDs) were developed to protect against embolization from the valve or vasculature during or post- surgery.

Aim:

To assess the effect of CEPDs used in TAVI procedures and the risk of stroke starting from day two following TAVI, as well as neurocognitive outcomes.

Methodology:

Six databases (PubMed, Scopus, Web of Science, Cochrane, Embase, and Ovid) were searched until 20 January 2023. Original randomised controlled trials (RCTs) were only included and critically appraised using the Cochrane risk of bias (ROB) tool. The risk ratio (RR) and mean difference (MD) with their corresponding 95% confidence interval (95% CI) were used as effect sizes according to the type of outcome. The analysis was performed via Review Manager (RevMan 5.4) and OpenMeta Analyst software.

Results:

The database search identified 1373 studies, and seven studies were finally included with 4091 patients who underwent TAVI with or without CEPDs. The ROB was low in all included studies. Following meta-analysis conduction, the results showed a significant risk of disabling stroke following 2-5 days postoperatively without cerebral protection devices (RR = 0.455, 95% CI: [0.214, 0.967]; P= 0.041)

but no significant associated risk following 30 days postoperatively (RR = 1.295; 95 CI: [0.373, 4.493]; P = 0.684). There was no significant risk of non-disabling stroke with 2-5 days or 30 days postoperative follow-up between both the cerebral protection group and controls (RR = 1.196; 95% CI: [0.738, 1.938]; P = 0.467), (RR = 0.939; 95% CI: [0.528, 1.671]; P = 0.831) respectively.

There was no significant difference regarding the overall Stroke incidence, major adverse cardiac and cerebrovascular events (MACCE) rate, mortality rate, acute kidney injuries, and major vascular complications. No significant heterogeneity was found between the pooled studies.

Conclusion:

Using the CEPDs in TAVI procedures can be effective in reducing the disabling stroke in the initial phase postoperatively. CEPDs also have a protective effect against mild cognitive impairment after TAVI on the MoCA scale.

Keywords:

Cerebral embolic protection; transcatheter valve implantation; neurological complications; systematic review; Meta-analysis.