Percutaneous replacement of the aortic valve causes silent brain infarcts in most patients, regardless of access route.

Cerebral embolism is a well-known risk in percutaneous replacement of the aortic valve. It has always been expected that the transapical approach (access to the aortic valve, through the left ventricular apex, through a small thoracotomy), compared to the transfemoral approach, would cause fewer cases of cerebral embolism, because this approach avoided manipulation of large catheters in the aortic arch and the crossing of the severely diseased native aortic valve.

Researchers from Quebec Heart and Lung Institute, Laval University reported that 68% of patients who had transcatheter aortic valve implantation (TAVI) developed new cerebral ischaemic lesions seen on diffusion-weighted magnetic resonance imaging (MRI) within days of the procedure. The vast majority of these lesions were small and there was no measurable impact on neurologic or cognitive function, although one patient in each group (3.3%) had a stroke within a day of the procedure. However, the transapical approach was not any safer than the transfemoral approach, with new lesions detected in 71% and 66% of patients, respectively (P = 0.78).

The researchers studied 60 inoperable or high-surgical-risk patients who had TAVI done for severe symptomatic aortic stenosis under a compassionate use programme at two Canadian institutions. The patients had cerebral diffusion-weighted MRI the day before the procedure and within six days after the procedure. The same Edwards valve was used in all cases, implanted with a transfemoral approach in 29 patients, and a transapical approach in 31. The procedure was not successful in one patient (1.6%) who had severe septal hypertrophy which protruded into the left ventricle outflow tract (this made stabilisation of the valvuloplasty balloon impossible).

68% of patients who had TAVI developed new cerebral ischaemic lesions seen on diffusion-weighted MRI within days of the procedure. 76% of patients with new lesions showed multiple lesions (median three, range up to 31). Most patients had lesions which were distributed in the central hemispheres and vascular territories of the brain, which the authors said strongly suggested that the lesions had an embolic origin. The number and size of lesions did not differ by method of approach, nor any other baseline or procedural factor (like large aortic plaques and amount of calcium in the valve).

Neurologic evaluation (National Institutes of Health Stroke Scale scores) of all patients after the procedure was not different from baseline scores (P = 1.0). There was no also difference between those with and without new cerebral ischemic lesions (P = 1.0). Cognitive assessment with the Mini-Mental State Exam also showed no difference from baseline (P = 0.14) and between those with and without new lesions (P = 0.90). However, the researchers said that it could not be ruled out that a more extensive neuro-cognitive evaluation might detect subtle effects of these silent lesions.

The authors proposed that the lack of difference (associated with the two approaches) suggested that cerebral complications have more to do with the actual procedure than the access route, although they said that the mechanisms of cerebral embolism were complex and probably multi-factorial. They speculated that the mechanical stress on the aortic valve (during balloon valvuloplasty and valve implantation) and gaseous embolism might be the mechanisms that cause cerebral embolism.

They suggested that further research was needed to reduce the risk, which included looking at improving the profile and reducing the size of valve replacement catheters, and evaluating protection systems for cerebral circulation during the procedure. They also said that careful flushing of the catheters before insertion and checking for air bubbles within the catheter may help reduce the risk in the meantime.

The main limitation of the study was that it was a non-randomised study, and the sample size was small. A larger trial is needed to confirm the findings.

Several authors reported being consultants for Edwards Lifesciences (the manufacturer of the valves used). SMA

Source: Rodés-Cabau J, et al. Cerebral embolism following transcatheter aortic valve implantation: Comparison of transfemoral and transapical approaches. J Am Coll Cardiol 2011; 57:18–28.