



## Editorial

## CT scan in minimally invasive surgery: A call to safety



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Minimally invasive mitral valve surgery (MIMVS) is in demand and is performed with increasing frequency and safety.

However minimally invasive skeptics still raise some concerns about potential higher incidence of post-operative stroke due to retrograde peripheral cannulation, uncontrolled clamping, and de-airing difficulties [1].

In order to reduce the potential hazard of retrograde embolization due to femoral cannulation, some surgeons tend to adopt alternative cannulation sites as such as direct cannulation of the ascending aorta. This would be of particular benefit when iliac and femoral platform is calcific.

Gaudino et al. [2] performed a comprehensive systematic review and meta-analysis on the role of pre-operative computed tomography (CT) screening in the prevention of peri-operative stroke. They pooled events rate (PER) for operative mortality, post-operative stroke (primary outcome), perioperative myocardial infarction and new onset renal failure from 57 studies.

Nineteen studies performed preoperative CT (CT group), 38 did not (Non-CT). PERs for post-operative stroke and new dialysis were significantly lower in the CT group (1.5% vs 2.2%, 0.8% vs 2.3%,  $p = 0.03$  and  $0.02$ , CT group vs Non-CT respectively). There was also a trend lower operative mortality in the CT-group (0.8% vs 1.6%,  $p = 0.05$ , CT group vs non-CT respectively).

Authors have to be commended for this brilliant analysis for many reasons.

It is the first solid single arm meta-analytic report that stresses the importance of CT screening in a minimally invasive mitral scenario. It was conducted in accordance to PRISMA statement and MOOSE guidelines; the Newcastle–Ottawa Quality Assessment Scale (NOS) for critical appraisal of eligible studies was used and studies with scores  $\geq 6$  were included. Subgroup analyses were used to compare the CT group and

Non-CT group. Meta-regression was used to assess the effect of several variables in the primary outcome (stroke). Heterogeneity was also deeply explored.

This meta-analysis allowed inclusion of 1371 patients (mean sample size 236.6 patients range 11–2.829) who would be difficult to accumulate prospectively for this particular topic.

The importance of preoperative CT scanning was also consolidated by the meta-regression analysis, where non CT-scan screening was associated with post-operative stroke (Beta = 0.45,  $p = 0.007$ ).

Long terms outcomes was also reported, and incidence rate for late mortality was significant lower in the CT group vs the non-CT group (0.7% vs 1.7%) at mean follow-up of 3 years (range 0.25–10.4 years).

This study has some flaws. There is a certain degree of clinical heterogeneity that may affect the result. Both minimally invasive and robotic approaches were included. Perhaps the most important limitation is that they analyzed all mitral etiologies as such as primary, secondary mitral regurgitation (MR) and also more complex scenario as mitral stenosis. It goes without saying that patients with secondary MR or stenosis have different risk profile than the one with primary/degenerative MR. Also, mitral valve replacement carries an increased risk for complications than repair. However, Authors overcome this issue by performing subgroup meta-analysis accounting for different baseline etiologies and surgical procedures (repair vs replacement).

It must be noticed that the population included was however relatively young (mean age 59.1 years, range 40–82.5) with also relatively preserved ejection fraction hence at lower risk for mitral surgery and for stroke. One may postulate that CT scan screening would be potentially more useful for higher-risk cohort that is more prone for complications.

Minimally invasive mitral can in fact be offered safely to patients at high-risk for surgery [3–7].

It must also be noticed that despite being statistically significant, the difference in terms of post-operative stroke between the two groups was only 0.7%.

In my humble opinion, the title of this meta-analysis is somewhat misleading: is certainly not the preoperative CT scan that reduces the incidence of perioperative neurological events, while is the change of operative approach in terms of cannulation site that is associated with reduced stroke event rate.

We live in an era where mitral percutaneous technologies are booming. Thereby the surgical community has to provide the best of surgical mitral care more than ever; such minimally invasive mitral best practice has to be the benchmark for comparison with the percutaneous mitral technologies.

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In conclusion this well conducted systematic review and meta-analysis carried out by the experienced group of Gaudino contributes to set the ground for further safety protocol in minimally invasive mitral surgery.

### Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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