

PCI of bystander coronary artery lesions should be performed before TAVI: pros and cons

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Pros: PCI pre-TAVI, better safe than sorry

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In stable patients, percutaneous coronary intervention (PCI) of severe lesions in the proximal coronary arteries before transcatheter aortic valve implantation (TAVI) has been the empirical approach for patients with severe aortic stenosis who are deemed candidates for percutaneous treatment. Despite the lack of evidence for this order at the dawning of TAVI, some reasons that are still valid supported such an approach. First, it was intuitively considered that if the coronary ostia were below the upper part of the prosthesis' stent frame, coronary access would be difficult. This was demonstrated to be true over the following years with several authors reporting a prolonged time for cannulation (from a median of 0/10" to 50/30" for left and right coronary arteries, respectively), or its impossibility (0.4 to 17% according to the device) in a non-negligible number of cases¹. Secondly, the mortality rate for ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI) cases following TAVI (~1/3 at 30 days) was higher than in alternative settings or in the general population, and this was in relationship to a low rate of utilising

an invasive approach (<1/3) likely due to anticipated challenging coronary cannulations².

Recent research has tried to provide new technical guidelines for coronary cannulation following TAVI³. However, the need for these bench test analyses is a consequence of the increased difficulty of post-TAVI coronary interventions which suggest that it is unreasonable to postpone the revascularisation that needs to be performed. And that is the other key question: does it really need to be done? For decades, coronary bypass grafts have been performed at the same time as surgical aortic valve replacements (SAVR) to avoid pump failure once the intervention was finished. Although complications with TAVI have decreased to a minimum, they still exist, and annular rupture, cardiac tamponade, or severe ventricular arrhythmias are likely to lead to worse outcomes due to extended ischaemia and pump failure if severe coronary disease remains untreated at this point. The TransCatheter Valve and Vessels Trial (ClinicalTrials.gov: NCT03424941) is aiming to explore the differences between SAVR and coronary bypass versus TAVI and fractional flow reserve (FFR)-guided PCI; in this nuance – incorporating physiology-guided PCI – we might find

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the key to this unresolved clinical question. Of course, coronary revascularisation makes sense before TAVI, but since ischaemia tests are not free from risk in the presence of severe aortic stenosis, we might be overtreating our patients. Conversely, the use of fractional flow reserve (FFR) or resting indices (such as quantitative flow ratio [QFR]) have been thoroughly investigated and demonstrated to be safe in patients with aortic stenosis⁴. Therefore, a more precise revascularisation performed before TAVI might be

Cons: PCI first provides no long-term benefit

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Patients with severe aortic stenosis (AS) often seek help for symptoms that are related to valve disease. Angina is the least common and, even when it does occur, coronary flow can appear normal.

It is the valve, however, that endangers the patient's survival, and it is this fact that should always drive the reasoning and therapeutic approach, especially considering that complex PCI in a patient scheduled for TAVI may be riskier (and more difficult) than the valve replacement itself. Therefore, before treating the coronary artery disease (CAD) occasionally found during the TAVI workup, one should bear in mind the following: first, performing TAVI before or after PCI yields comparable intraprocedural and in-hospital adverse events. This suggests that the presence of "high-risk" lesions with a large ischaemic burden (i.e., left main or 3-vessel disease) by no means compromises the TAVI procedure when coronary lesions are treated after TAVI, regardless of the valve type⁵. Second, performing PCI before TAVI increases the risk of stroke, bleeding and kidney injury compared to PCI performed after TAVI (ideally done as a combined procedure)⁵⁻⁷. Clinical outcomes indicate that the PCI-first strategy provides no long-term benefit⁵⁻⁷.

PCI is performed before TAVI because of the as yet unproven, but still widespread, concern about safety related to the acute ischaemic risk of leaving significant coronary stenosis untreated during valve implantation. There is also a misleading indication in the 2021 European Society of Cardiology/European Association for Cardio-Thoracic Surgeons (ESC/EACTS) Guidelines which recommends treatment of significant CAD before TAVI (IIa)⁸, as well as concerns related to coronary access after TAVI particularly among professionals with no TAVI experience. The need for low-volume centres to maintain a certain caseload is also a consideration.

PCI after TAVI may be better, and ideally should be performed in the same session. There is no need for a pre-TAVI hospital admission dedicated to the diagnosis and treatment of CAD. This helps avoid unnecessary hospital care, the repeated administration of contrast media (and renal toxicity), and repeat vascular access. TAVI performed after PCI implies the use of a dual antiplatelet therapy, a strategy that has been proven to be unfavourable.

the key to better outcomes while also minimising the risk of restenosis in the future.

All in all, reducing the need for coronary re-access after TAVI is, from every point of view, crucial for the life-long management of patients harbouring a TAVI device; let us focus our efforts there.

Conflict of interest statement

The authors have no conflicts of interest to declare.

Additionally, the removal of the aortic valve obstruction before PCI permits a more accurate diagnosis of the ischaemic potential of a given angiographic lesion by physiologic assessment, especially in asymptomatic patients.

TAVI promptly releases the left ventricular pressure overload, with immediate improvement of the cardiac contractility and hence the cardiac output. Procedures that include large ischaemic burdens, complex bifurcations, chronic total occlusions or that require debulking techniques are therefore better tolerated in case of hypotension and complications. This haemodynamic effect may have particular importance for organs with low ischaemic thresholds such as the brain and kidneys, which may be already hypoperfused in severe AS. This implies that any kind of cardiovascular intervention in the setting of hypoperfusion may increase the chances of haemodynamic, renal or cerebral ischaemic sufferance.

Our reasoning is in line with previous indirect observations^{6,7} and does not align with the current guideline recommendations. These recommendations are not evidence-based and are in clear conflict with the findings of the ISCHEMIA trial which are well fitted to stable and/or asymptomatic presentations of CAD that emerge from TAVI workup angiographies.

Last, but not least... is the possibility of monitoring severe adverse clinical events related to PCI occurring in patients undergoing TAVI, while events occurring in patients who undergo "preventive revascularisation" before TAVI, mostly in non-TAVI centres, are likely ignored. Therefore, there is a concrete risk that major adverse events of preventive PCI in lower-volume centres were largely under-reported, unpublished, and not censored.

To synthesise, a TAVI-first strategy in many patients offers advantages in terms of resource optimisation, better management of antithrombotic therapy, reliable coronary functional evaluation, more stable haemodynamics with better organ perfusion without jeopardising procedural success, and, in particular, allows adequate monitoring of clinical outcomes compared to procedures performed before TAVI without dedicated quality and safety controls⁹.

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