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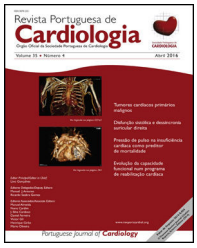

EDITORIAL COMMENT

Access routes for transcatheter aortic valve implantation – my way or the ''easiest'' way

Via de acesso para implantação valvular aórtica percutânea à minha maneira ou à «maneira» mais fácil

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The birth and subsequent expansion of interventional cardiology was based on the continued search for minimally invasive solutions that would enable patients with heart diseases to be treated in a safer and more accessible manner. The resilient development of transcatheter aortic valve implantation (TAVI) is one of the paradigmatic examples of this evolution. The 2017 European guidelines for valvular disease management indicate TAVI as the preferred choice in patients refused for surgery or considered to be at high risk (Society of Thoracic Surgeons (STS) or EuroSCORE II≥4% or logistic EuroSCORE I≥10%) and in patients selected by the heart team, with particular emphasis on elderly patients.[1] However, the increasing knowledge and experience of multidisciplinary teams, combined with technological innovation, already allows us to envisage a future where TAVI would be the first choice and not the alternative in most patients with aortic stenosis (AS). Clinical evidence seems to confirm this prediction; results from the PARTNER 3 and Evolut Low Risk studies show that TAVI was non-inferior or superior to surgical aortic valve replacement for composite endpoints including mortality and stroke in patients at low surgical risk.[2]

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Severe AS is a mechanical problem with seemingly simple treatment - the replacement of the diseased valve with a prosthetic one. Nevertheless, this solution depends on the existence of a normally functional and durable prosthetic aortic valve, implanted through a feasible route of access. Paradoxically, this has been performed the hard way for decades – a complete sternotomy, with extracorporeal circulation, open heart and general anesthesia. However, many patients were considered to be inoperable and TAVI emerged precisely to allow for a less invasive and a safer way to implant the prosthesis, so its no wonder that access approach is still a key element of the procedure planning and a source for research and innovation as well.

The ideal access route is the one that enables the implantation of the prosthesis in a controlled manner, with the least damage to the body, relying on local anesthesia, avoiding vascular complications, ischemic events and damage to the adjacent structures. This then promotes enhanced recovery, with shorter hospital stays and reduced costs. Transfemoral access is currently the approach that enables these conditions to be brought together more effectively, and has been used for coronary intervention for more than 40 years. However, transfemoral access is not possible in 15-20% of patients, by virtue of unfavorable anatomy due to tortuosity, reduced caliber or the presence of obstructive atherosclerotic disease of the aorto-ilio-femoral axis.[3] Several alternatives have been developed to address the

limitations of transfemoral TAVI, surgical ones, such as transapical, transaortic and transcarotid, and more recently, percutaneous such as transaxillary/subclavian and transcava.

Cláudio Guerreiro et al.,[4] present the results from their study on the treatment of patients with TAVI, differentiated according to access route and at 30 days and one year of follow-up. This is a registry-based study with data from the Portuguese TAVI Registry, which reported the Portuguese experience accurately from the beginning from the registry until 2018. The paper meets the goals of the registry, described by the authors, highlighting the importance of the national effort to collect data that will be useful in order to improve our daily practice and to provide for a better management of public resources in our country. It is also noteworthy that this was an independent initiative of a medical-scientific association, the Portuguese Association of Cardiovascular Intervention. The data from this registry will certainly be a valuable aid for those in government responsible for planning our healthcare, and I cannot see a better way to achieve a real strategy for the future than synergy between scientific/medical knowledge and political will power. Portuguese interventional cardiology has done its part.

In a little more than a decade, 2346 patients were treated in public and private Portuguese institutions. Over the first five years, the increase in the number of patients treated was poor, and is was only after the sixth year that it started to grow, enabling an appropriate learning curve to be established, which has contributed to better outcomes. There were many causes for this delay, but certainly these include financial restrictions. How many lives could have been saved? Nobody knows, but the question is even more pertinent when the world is faced with a pandemic leading the whole of civil society to economy. In 2016, Portugal conducted 42 TAVIs per million inhabitants, below the 48 average recently described in the EAPCI Atlas survey, which also includes Egypt and Turkey, and far from the >100 TAVIs per million inhabitants seen in France, Germany or Denmark.[5]

National registries also allow us to benchmark our performance as a medical community. Comparing the results presented by Cláudio Gerreiro et al. with those of neighboring Spain over the same period (2007-2018), we note that the treated populations were similar, with an average age of 81.2 years (vs. 81.1 years in Portugal), 53% were women (vs. 53%), 69% were New York Heart Association class III/IV (vs. 69%), STS score mortality risk was 5% (vs. 4.7%) and surgical contraindications were present in 25% (vs. 22%).[6] Regarding the procedure, the femoral approach was used in 89% (vs. 91%), balloon expandable valves were more frequently used representing 46% (vs. 31%), the pacemaker rate was 14% (vs. 19%) and immediate success rate was 95% (vs. 91%).[5] Average hospitalization length was eight days in both countries and mortality at 30 days was slightly higher in Spain at 5.7% (vs. 4.8%).[5] It is important to acknowledge the limitations of this type of comparison and to be very careful when drawing conclusions.

Researchers from the Portuguese TAVI Registry focused their study on different access routes. Transfemoral access was assumed to be the default one, although this has not always been clear. In the early years of TAVI development, the transapical route had its defenders, whose hope was that its greater invasiveness would be offset by the benefits of avoiding navigating the entire delivery system through the arterial vessels. There are no randomized studies comparing the transfemoral and transapical routes, but evidence from observational studies and post-hoc analyses of clinical trials showed that with transfemoral access there were fewer periprocedural complications, hospitalization was shorter, in-hospital mortality was significantly lower and costs were also lower.[7] This led to a loss of interest in the transapical route, which decreased over time from close to 18% of patients to 4%, as currently shown by French registries.[8]

Transapical access loss of popularity gave rise to the search for other alternative routes to transfemoral access, although they represent together only 3.3% of the Portuguese patients treated. The transaortic route was used the most in this group. This surgical route has some of the advantages of the transapical access (avoiding total sternotomy and cardiopulmonary bypass), but it is endovascular and does not require manipulation of the left ventricle. Its results have been even superior to those of the transapical access in observational studies.[9] Another alternative is the transcarotid route, which is an extrathoracic surgical access, is less invasive and has the advantage of avoiding general anesthesia and a quick recovery. Despite the fact that its use seems to be ''against nature'', the reported experience is favorable, including a stroke rate of 2.5% (similar to the transfemoral route).[10] In spite of these potential advantages, transcarotid access was not reported in this Portuguese experience.

In recent years, percutaneous alternatives have also emerged. The transaxillary/subclavian approach was surgical at first, but several centers have developed an exclusively percutaneous technique. Because its location is not subject to manual compression, the difficulty of this technique is to ensure there is a strategy in place to control potential bleeding complications. This is achieved by placing a balloon catheter inside the artery, ready to be used in case of failure of the closure system. This access can be mastered with the skills of interventional cardiology and initial observational evidence is favorable, which contributes to the growing interest in its use. We expect that it will be an alternative for a greater number of patients.[11] The other exclusively percutaneous route is the transcava one, in which the femoral vein is used for the primary access, crossing to the abdominal aorta through a targeted endovascular puncture and this iatrogenic cavo-aortic fistula closed with a device for patent ductus arteriosus closure at the end of the procedure. Despite being a complex intervention that requires rigorous planning using computed technology angiography, the number of centers that use it has increased. Portugal was one of the first countries in Europe to begin this experience with transcava access.

The results of this study, now published in the Portuguese Journal of Cardiology, corroborate current evidence. Nowadays, the transfemoral route should be preferred, and if this is not possible, each center must gather the necessary experience to have an alternative that should be the ''easiest'' for the operator and most importantly, the ''easiest'' for the patient.

Conflicts of interest

The author has no conflicts of interest to declare.

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