EuroIntervention
2024;20:970-971
DOI: 10.4244/EIJ-E-24-00034

Concomitant left atrial appendage occlusion in patients undergoing mitral transcatheter edge-to-edge repair: pros and cons

Fabian Nietlispach[1]*, MD, PhD; John G. Webb[2], MD; **Ole De Backer**[3]**, MD, PhD

**Corresponding author: Heart Center, Hirslanden Klinik Im Park, Seestrasse 220, Zurich 8027, Switzerland. E-mail: fabian.nietlispach@hirslanden.ch*
***Corresponding author: Interventional Cardiology, The Heart Center – Rigshospitalet, Inge Lehmanns Vej 7, Opgang 2, 2100, Copenhagen, Denmark. E-mail: ole.debacker@gmail.com*

Patients with mitral regurgitation (MR) undergoing mitral transcatheter edge-to-edge repair (M-TEER) might also present indications for left atrial appendage occlusion (LAAO). While concomitant interventions are common in cardiac surgery, their role in interventional cardiology remains less clear. In particular, concomitant M-TEER and LAAO has the advantage of reducing the lifelong bleeding risk while avoiding repeat interventions. However, this combined strategy introduces clinical and procedural complexities that necessitate a careful evaluation of its benefits and drawbacks. Notably, apart from the presence of atrial fibrillation (AF) in many patients undergoing M-TEER, determining the indication and suitability for LAAO requires a thorough assessment encompassing clinical factors (e.g., bleeding risk, residual determinants of cardioembolism), procedural considerations (e.g., precise location of transseptal puncture, procedural duration), and practical aspects (e.g., reimbursement). Based on current knowledge, it is not definitively clear whether concomitant LAAO should be performed in patients undergoing M-TEER.

Pros

Fabian Nietlispach, MD, PhD; John G. Webb, MD

In AF patients, LAAO offers a similar protection from cardioembolic events as direct oral anticoagulants (DOACs) but reduces the risk of non-procedural clinically relevant bleeding by 45% (95% confidence interval [CI]: 0.31-0.97)[1]. In the ROCKET AF trial, major bleeding occurred at a rate of 5.6%/year in patients on rivaroxaban[2]; hence with LAAO, one could anticipate an absolute risk reduction in major bleeding of 25% over a period of 10 years. The populations in the DOAC trials are comparable to patients undergoing M-TEER, with an average age >70 years, a vast majority of patients suffering from arterial hypertension and a high percentage of patients with kidney disease. The bleeding risk on DOACs is therefore most likely similar between the two study populations. On an individual basis, the bleeding risk can be estimated by the HAS-BLED score, where a score of 2 comprises an annual major bleeding risk of 4.1% and a score of 3 an annual risk of 5.8%.

The question is, why would you not offer your patient a significant lifelong reduction in bleeding risk by combining M-TEER with LAAO?

A concern could be that the combination of two procedures increases complications. This, however, was not confirmed in the largest study so far comparing M-TEER alone versus M-TEER in combination with LAAO[3].

M-TEER often requires a superior transseptal puncture – in most cases, the ideal transseptal puncture site for LAAO is inferior. In clinical practice, the large diameter iatrogenic atrial septal defect caused by M-TEER offers good manoeuvrability of the LAAO sheath, allowing LAAO to be performed safely.

Reduced flow in the left atrium after M-TEER, not infrequently, causes stasis, seen as "smoke" on a transoesophageal echocardiogram (TOE). The risk for device thrombus may be increased. If this occurs, it is probably not unreasonable to treat the patient with DOACs for an additional 4-6 weeks to allow re-endothelialisation of the LAAO device.

Another major advantage of LAAO in the elderly patient population with polymedication is the permanent stroke protection independent of medication compliance. In a real-world study following >60,000 patients on oral anticoagulation, more than half of the patients had less than 80% of days covered. In patients with a low $CHADS_2$-VASc score of 2-3, non-adherence for >6 months was associated with a >2-fold increased risk of stroke (hazard ratio [HR] 2.73, 95% CI: 1.76-4.23) and, not surprisingly, a reduction in bleeding (HR 0.68, 95% CI: 0.52-0.90)[4].

In summary, combining M-TEER with LAAO makes sense, not only because both are done from the left atrium but also from a medical and patient perspective. Surgical guidelines recommend left atrial appendage closure during mitral valve surgery – the same strategy may be applicable when choosing an interventional approach.

Conflict of interest statement

F. Nietlispach has acted as a consultant for Abbott and Edwards Lifesciences. J.G. Webb has been a consultant for Edwards Lifesciences and atHeart Medical; and has received research funding from Edwards Lifesciences, Boston Scientific, Medtronic, and Abbott.

Cons

Ole De Backer, MD, PhD

Performing concomitant cardiac interventions may seem an attractive option at first glance; however, a critical evaluation of both the advantages and disadvantages of such an approach is needed. The rationale to perform concomitant procedures during open heart surgery is evident, whereas catheter-based interventions may be better suited to a staged approach.

First of all, it can be questioned whether patients undergoing M-TEER are also the best candidates for transcatheter LAAO. The majority of patients undergoing M-TEER present with atrial fibrillation. However, it should be determined whether the left atrial appendage (LAA) is also the main source of thromboembolic events in these patients. Especially for patients with functional (secondary) MR, other sources of cardioembolic stroke should be considered. Moreover, prior studies have linked a reduced left ventricular systolic function with an increased risk of device-related thrombus in case of LAAO, which is one of the most feared complications of this procedure[5].

Next, it should be questioned whether combining M-TEER and LAAO truly makes sense if one is aiming for the best possible procedural and clinical outcome. Although combining M-TEER and LAAO, which both require left atrial (LA) access, can be easily achieved from a technical standpoint, there are some important disadvantages. The most significant one is that M-TEER requires a superior and posterior transseptal puncture which is less suited to transcatheter LAAO. Prior studies have shown that an inferior transseptal puncture is key to obtaining a successful LAAO[6]. Even though it would be possible to implant an LAAO device in most anatomies using the same transseptal puncture site as used for M-TEER, we nowadays know that implantation of an LAAO device with poor coaxial alignment (with the central LAA axis) is highly predictive of peridevice leaks[7]. Also, the changes in LA pressure and flow patterns following M-TEER should be taken into account, as these may impact the LAA size and shape and, ultimately, the selection of the LAAO device size. This is less of a concern in cases where LAAO is combined with a pulmonary vein isolation or transcatheter aortic valve implantation. Another disadvantage is that the overall procedural time will be prolonged[8], which may lead to an increased risk of thromboembolic events and renal dysfunction. Finally, there may be concern over what to do in case of LAAO device embolisation. Luckily, this complication has become rare in contemporary practice. However, in case of LAAO device embolisation after M-TEER, the device will be caught in the left atrium, which will make transcatheter device retrieval more complex, or even impossible in some cases. Finally, there may also be an economical aspect that should be considered, as performing two staged procedures is typically better reimbursed than performing concomitant procedures in most countries.

Clearly, large, prospective and adequately powered studies are needed to investigate the possible (dis)advantages of a concomitant versus staged M-TEER plus LAAO strategy. Currently, we are lacking evidence to support concomitant LAAO in patients undergoing M-TEER, and there are concerns about the procedural outcomes when both interventions are performed concomitantly.

Conflict of interest statement

O. De Backer has received institutional research grants and consulting fees from Abbott, Boston Scientific, and Eclipse Medical.

Authors' affiliations

1. Heart Center, Hirslanden Klinik Im Park, Zurich, Switzerland; 2. St. Paul's Hospital, University of British Columbia, Vancouver, BC, Canada; 3. Rigshospitalet, Copenhagen, Denmark

References

1. Osmancik P, Herman D, Neuzil P, Hala P, Taborsky M, Kala P, Poloczek M, Stasek J, Haman L, Branny M, Chovancik J, Cervinka P, Holy J, Kovarnik T, Zemanek D, Havranek S, Vancura V, Peichl P, Tousek P, Lekesova V, Jarkovsky J, Novackova M, Benesova K, Widimsky P, Reddy VY; PRAGUE-17 Trial Investigators. 4-Year Outcomes After Left Atrial Appendage Closure Versus Nonwarfarin Oral Anticoagulation for Atrial Fibrillation. *J Am Coll Cardiol.* 2022;79:1-14.

2. Patel MR, Mahaffey KW, Garg J, Pan G, Singer DE, Hacke W, Breithardt G, Halperin JL, Hankey GJ, Piccini JP, Becker RC, Nessel CC, Paolini JF, Berkowitz SD, Fox KA, Califf RM; ROCKET AF Investigators. Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. *N Engl J Med.* 2011;365:883-91.

3. Frazzetto M, Sanfilippo C, Costa G, Scandura S, Castania G, De Santis J, Sanfilippo M, Di Salvo ME, Uccello S, Rugiano G, Rizzo S, Barbera C, Tamburino C, Barbanti M, Grasso C. Safety and Effectiveness of Concomitant Mitral Transcatheter Edge-to-Edge Repair and Left Atrial Appendage Closure. *J Clin Med.* 2023;12:4742.

4. Yao X, Abraham NS, Alexander GC, Crown W, Montori VM, Sangaralingham LR, Gersh BJ, Shah ND, Noseworthy PA. Effect of Adherence to Oral Anticoagulants on Risk of Stroke and Major Bleeding Among Patients With Atrial Fibrillation. *J Am Heart Assoc.* 2016;5:e003074.

5. Simard TJ, Hibbert B, Alkhouli MA, Abraham NS, Holmes DR Jr. Device-related thrombus following left atrial appendage occlusion. *EuroIntervention.* 2022;18:224-32.

6. Fukutomi M, Fuchs A, Bieliauskas G, Wong I, Kofoed KF, Søndergaard L, De Backer O. Computed tomography-based selection of transseptal puncture site for percutaneous left atrial appendage closure. *EuroIntervention.* 2022;17:e1435-44.

7. De Backer O, Garot P. Residual leaks after transcatheter left atrial appendage closure: why and how to assess it? *Eur Heart J.* 2024;45:230-2.

8. Kuwata S, Taramasso M, Zuber M, Suetsch G, Attinger-Toller A, Wicki D, Maisano F, Nietlispach F. Feasibility of concomitant MitraClip and left atrial appendage occlusion. *EuroIntervention.* 2017;12:1940-5.