

Barriers for a wider use of left atrial appendage occlusion as an alternative to oral anticoagulation

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Introduction

For many years we haven't seen significant improvements in the treatment of hyperlipidemia, with ezetimibe rendering modest results over statin treatment and failure of cholesteryl ester transfer protein (CETP) inhibitors as torcetrapib, dalcetrapib and evacetrapib. Proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors finally offered good news in this field. The main caveat of these drugs is the price, up to \$14,000 /year in USA but not less than \$6,000 in Europe. The estimated incremental cost-effectiveness ratio (ICER; cost per quality-adjusted life-year QALY) over statin + ezetimibe treatment in heterozygous familial hypercholesterolemia has been calculated in \$503,000; ICER per QALY of this treatment on top of statin treatment in patients with atherosclerotic cardiovascular disease is \$414,000.¹

In any case, these are values far from the accepted willingness-to-pay thresholds. For PCSK9 inhibitor therapy to reach an ICER of \$100,000 per QALY, the annual cost of drug treatment should be \$4,536; if the aim is the most used ICER of \$50,000 per QALY, the annual cost should drop to \$2,261. Despite these data, you could bet on that these drugs are the next blockbusters. Maybe they need some adjustments in price, but some of their advantages (1 single dose every 2-4weeks!) overcome many of their limitations.

A clear question arises: why a cheaper, effective, treatment as left atrial appendage closure (LAAC) for non-valvular atrial fibrillation (NVAF) couldn't reach a broader use? The cost of the device for LAAC + procedure itself in Germany is estimated in €9,136,² slightly superior to 1-year treatment with PCSK9 inhibitors.¹ The figures are similar in USA: the cost for LAAC procedure + 2 transesophageal echocardiograms is \$16,109.³

Barriers for a widespread use of LAAC

In 2012, the Scientific Initiative Committee of the European Heart Rhythm Association (EHRA) conducted a survey in 36 centers to assess clinical practice in relation to the use of LAAC.⁴ Although it was conducted before the availability of relevant results of LAAC, some interesting conclusions were drawn. The main barriers described by the participants in the survey (67% of whom were already performing LAAC procedures) are discussed herein.

Technical difficulty of the procedure

Although subjective issues can hardly be analyzed, this is one the limitations that should improve over time. Also, it could be explained by the fact that this procedure is performed by a wide variety of specialists, not only by electrophysiologists and interventional cardiologists. The wider use of different transeptal procedures, as atrial fibrillation ablation techniques, mitral valve procedures, perivalvular leak closure, ... may help in solving this potential

problem. Nevertheless, it was considered the less important obstacle in the EHRA survey.⁴

Risk of complications

This is a key obstacle that has stopped the widespread use of these techniques for many years. The first data available from a randomized trial (PROTECT AF⁵) on the safety and efficacy of the LAAC procedure with the Watchman® device (Boston Scientific) showed a procedure-related rate of complications of 7.7%. The main components of this safety endpoint are pericardial effusion (and cardiac tamponade), procedure related stroke (less than 1%) and device thrombosis. Further analysis⁶ demonstrated a "learning curve" effect: first half of the PROTECT AF patients showed almost a double rate of complications than the second half; patients from CAP registry,⁶ from centers and operators with extended experience, showed a 3.7% complications rate.

The LAAC procedure has been successfully performed using the Amplatzer Cardiac Plug (ACP®) and its second version, Amulet®, devices (St Jude Medical). The complication rate⁷ is quite similar to that described for the Watchman®. In this case, the embolization rate seems to be slightly superior (2%). Careful procedures and some tips⁸ can help in shortening the time span of the learning curves.

Limited efficacy data for stroke prevention

It should be remarked that this was the second main obstacle perceived by operators in 2012, before the PROTECT AF long-term,⁹ PREVAIL¹⁰ and ASAP¹¹ results were published. All of them confirmed the superiority of LAAC procedure over warfarin treatment. In 2012, the last update of the Clinical Guidelines on Atrial Fibrillation of the European Society of Cardiology (ESC)¹² was also published. The indication for the LAAC was established as Class IIb, Level of Evidence B (supporting evidence^{5,6}): it "may be considered in patients with a high stroke risk and contraindications for long-term oral anticoagulation". This indication has been broadly contested as, thus

far, no evidence was available on the efficacy of LAAC for that kind of patients. It was one year after when the ASAP study¹¹ demonstrated the safety and efficacy of LAAC in patients with a contraindication for oral anticoagulation (OAC). The new version of the ESC Clinical Guidelines on Atrial Fibrillation is awaited at the upcoming ESC 2016 Meeting at Rome and changes in this field are expected.

By this time, at least 4 novel oral anticoagulants (NOAC) have been approved for the treatment of NVAF. Apixaban seems to offer the best results versus warfarin with a hazard ratio (HR) 0.79, 0.33% absolute risk reduction (ARR), in the primary efficacy outcome and a HR 0.69, 0.96% ARR, in the rate of major bleeding.¹³ Also, apixaban is the only NOAC that has been tested in patients in whom vitamin K antagonist therapy was “unsuitable”.¹⁴ The study was prematurely terminated because apixaban was clearly superior to aspirin in terms of efficacy (HR 0.45) with a slight increase in major bleeding (HR 1.13). It should be emphasized that most of the patients included don't want to take vitamin K antagonists (37%), have a low CHADS2 score <1 (21%) or were unable or considered unlikely to assess the INR measurements at the requested intervals (43%). Only 3% of the patients have had a serious bleeding while in OAC therapy. No information on the HAS-BLED score of the patients is supplied. The comparison with similar studies of LAAC devices is, then, difficult, as the profile of the patients seems to be quite different.

Despite all the available evidence, many physicians still cast doubts on LAAC efficacy and prefer the use of NOACs in this kind of patients. It is expected that the doubts will disappear with the upcoming results of ongoing trials as Left Atrial Appendage Closure (with Watchman® or Amulet®) vs. Novel Anticoagulation Agents in Atrial Fibrillation (PRAGUE-17 - NCT02426944), Prevention of Stroke by Left Atrial Appendage Closure in Atrial Fibrillation Patients After Intracerebral Hemorrhage (comparing Amulet® with (N)OAC - NCT02830152), and Evaluation of Watchman® Left Atrial Appendage Occlusion Device in Patients With Atrial Fibrillation Versus Rivaroxaban (NCT02549963).

Price / reimbursement issues

This was acknowledged as the main obstacle for a widespread LAAC use in the EHRA survey.⁴ However, it should be the weaker argument against LAAC. Different studies have demonstrated the cost-effectiveness of the LAAC procedure for NVAF.^{2,3,15} What's more, all of them have demonstrated its superiority over the NOACs. Previous analysis demonstrated that NOACs are cost-effective as compared with Warfarin,¹⁶ although some authors¹⁷ sustain that only apixaban is really cost-effective below the threshold of \$50,000 (ICER per QALY gained, \$25,816). The ICER per QALY gained of LAAC over warfarin has been calculated as low as \$3,432.¹⁵ A very interesting study³ determined the time to cost-effectiveness and the dominance (less cost with more efficacy) of the different treatments for NVAF. The main results are:

- As compared with warfarin, LAAC is cost-effective at 7years (\$42,99 per QALY).
- As compared with warfarin, NOACs are cost-effective at 16years (\$48,446/QALY).
- LAAC is dominant over NOACs at 5 years and warfarin at 10years.
- At 10 years, LAAC provide more QALYs than warfarin and NOACs.
- The same group of investigators performed a similar analysis² in patients with absolute contraindications to warfarin. The selected

comparators for the LAAC were aspirin plus clopidogrel¹⁸ and apixaban.¹⁴ The results were parallel to the previous:

- At 5years, LAAC is cost effective compared with aspirin + clopidogrel with an ICER of €16,971.
- At 5years, LAAC is cost effective compared with apixaban at 7years with an ICER of €9,040.
- LAAC is dominant over both aspirin + clopidogrel and apixaban at 8years.

Conclusion

Left atrial appendage closure is a well-established procedure. Data from randomized trials and observational studies support its efficacy over oral anticoagulation treatment in the management of patients with non-valvular atrial fibrillation. Upcoming results from studies comparing this procedure directly with novel oral anticoagulants should strengthen its value. Cost-effectiveness analyses render very favorable results for this procedure, saving costs with higher efficacy.

PS: While the paper was being processed, the ESC 2016 update of guidelines for the management was released.¹⁹ Unexpectedly, the recommendation for LACC remained in a class IIb, level of evidence B (LAA occlusion may be considered for stroke prevention in patients with AF and contra-indications for long-term anticoagulant treatment (e.g. those with a previous life-threatening bleed without a reversible cause)).

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Conflicts of interest

Author declares there are no conflicts of interest.

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