



EDITORIAL COMMENT

The use of intravascular ultrasound in Portugal: Japan is a long way away[☆]



Utilização do IVUS em Portugal. O Japão está muito longe

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The article by Guerreiro et al.¹ published in the current issue of the *Journal*, based on the Portuguese Registry on Interventional Cardiology, is the first to report data on the use of intravascular ultrasound (IVUS) in Portugal. There is growing evidence from observational studies,² randomized controlled trials³ and meta-analyses^{4,5} that percutaneous coronary intervention (PCI) guided by intravascular imaging, especially IVUS, improves not only the immediate procedural result but also clinical outcomes. However, the uptake of intracoronary imaging is limited in clinical practice and varies greatly between different geographical regions. A joint survey by the European Association of Percutaneous Cardiovascular Interventions and the Japanese Association of Cardiovascular Interventions and Therapeutics⁶ reveals an enormous difference between Europe and Japan in the use of IVUS, with only 10.4% of European operators using IVUS in more than 15% of cases, as opposed to 96.6% of operators in Japan. Japan is, indeed, a long way away. The rate of use of IVUS in Portugal rose from 0.1% of angioplasties in 2003 to 3.6% in 2009. However, between 2010 and 2016, the overall number of PCIs increased but the number using IVUS changed little, meaning that the percentage of angioplasties in which IVUS was used actually fell.

In the largest observational study on IVUS-guided PCI, which included 8583 patients, the all-comer ADAPT-DES, a

marked benefit was seen in patients with acute coronary syndromes (ACS) and complex lesions,² while a meta-analysis of 20 studies showed that IVUS guidance was associated with benefits in terms of mortality and major adverse cardiovascular events (MACE), particularly in patients with ACS and complex lesions (left main disease, chronic total occlusions and long lesions).⁷ There is extensive evidence from non-randomized studies on IVUS-guided PCI of the left main. In the largest published study, a propensity score-matched analysis of 1670 patients with left main lesions treated with drug-eluting stents (DES), the use of IVUS was associated with a reduction in MACE (cardiac death, myocardial infarction or target lesion revascularization) at three years (11.3% vs. 16.4%, $p=0.04$).⁸ Larger and more fully expanded stents, more frequent post-dilatation and the use of a single stent were all associated with the use of IVUS, which was an independent predictor of fewer MACE, mainly in distal left main lesions (hazard ratio 0.54 [95% confidence interval 0.34–0.90]).⁸ The MAIN-COMPARE observational study also showed a tendency for lower mortality with IVUS-guided left main interventions.⁹

The result of Guerreiro et al.'s study are in agreement with those in the literature, with IVUS being used most often in multivessel disease and more complex lesions. Even so, it was used in only 19.5% of left main interventions. So we are indeed very far from Japan, but does this difference necessarily mean that our results are worse? Only a prospective analysis of the outcomes in the national registry could answer this question.

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If the clinical value of IVUS is undisputed, why is it underused in Portugal? One key reason seems to be the time needed to perform the examination. However, with a well-trained team of technicians and nurses such as we have in our catheterization laboratory, this should not be a concern. Another important factor is the cost of IVUS catheters. In countries in which PCI procedures are reimbursed according to predefined material requirements, IVUS is not reimbursed, which may contribute to the low rate of use of this imaging methods. However, in Portugal reimbursement is based not on material but on diagnosis-related groups, which again should not constitute a reason for the low rate of IVUS use. In a study focusing on the cost-effectiveness of IVUS in the setting of PCI with DES, it was found to be cost-effective, particularly in cases with a greater risk of restenosis.¹⁰ The training required to qualify staff to acquire and interpret intracoronary images is probably another factor affecting the uptake of IVUS. Medical societies and associations such as the Portuguese Association of Cardiovascular Intervention (APIC) have made considerable efforts to introduce and disseminate the technique, but even so, rates of use have not risen. We may have to await the advent of a new generation of interventional cardiologists whose training enables them to use intracoronary imaging, especially optical coherence tomography (OCT), to a greater extent, taking advantage of its greater resolution in a world in which imaging is paramount. The number of PCIs guided by intracoronary imaging (IVUS or OCT) has in fact increased overall. It should be borne in mind that the use of IVUS can reduce the risk of contrast nephropathy in patients with chronic kidney disease, in whom OCT should not be used.

There may be lessons to be learned from intracoronary imaging even in cases in which the technique is not actually used. Do operators experienced in IVUS use larger and longer stents, post-dilate more frequently, and choose better landing zones, than those whose work is exclusively angiography-guided? This question has yet to be studied, but it would make for interesting research. Intracoronary imaging has changed the practice of interventional cardiology. It should not be forgotten that in the 1990s, IVUS was instrumental in the adoption of dual antiplatelet therapy with aspirin and ticlopidine, a landmark in the history of interventional cardiology.

Conflicts of interest

The author has no conflicts of interest to declare.

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