

Angiography coregistration: time to fight clinician inertia



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Time is a constant concern. No matter how fast we move, we are always in an eternal fight against the clock. Even in our catheterisation laboratories, the timetable is witness to the daily challenge between operators and the ever-growing list of scheduled procedures.

Furthermore, procedural complexity is increasing. Nowadays, operators have a wide array of supporting tools – ranging from coronary physiology to intracoronary imaging – to quantify and characterise epicardial and microvascular disease. In an ideal world, we would use all of them to provide the best-in-class, top-notch procedural results for our patients. But, let's be honest. In the real world, this is not possible. Every device has a cost, both in terms of financial resources and time consumption, and these factors influence our selection.

In particular, time has been one of the main limitations to the diffusion of intracoronary imaging, despite the clear benefits of imaging guidance (whether it is intravascular ultrasound [IVUS] or optical coherence tomography [OCT]) both for immediate procedural results and long-term outcomes¹, especially in complex lesions.

Thus, it is mandatory that, when we decide to invest time and perform an imaging-guided procedure, we do our best to obtain

the maximum amount of information from this technology and make the procedure as cost-effective as possible.

From this perspective, it is disappointing to realise that angiography coregistration (ACR) is still limited to a very small niche of centres. This technology automatically correlates each frame of an intracoronary imaging run (e.g., OCT) to a specific point of the coronary artery on angiography and provides an automated, precise and smooth transition between the two modalities. ACR can be applied to all kinds of intravascular imaging and coronary physiology, but OCT is the setting where it finds its best application, as the fast pullback of the OCT catheter prevents any real-time localisation of the OCT image during acquisition (different from IVUS, or a pressure wire pullback)².

Without ACR, operators must rely on common relevant markers (like a stent or a side branch) and perform a sort of “manual coregistration”. Obviously, accuracy is limited with this method, and it may impair the advantages provided by the high spatial resolution of OCT. In particular, inaccurate stent landing and geographical miss are relevant risks when anatomical markers are not clear upon angiography. Therefore, ACR can fill a huge gap.

In this issue of AsiaIntervention, Kadavil and colleagues publish the results of the iOPTICO study³. In this all-comer registry, the

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investigators found that ACR-OCT guidance triggered a change in treatment strategy in 89% of procedures, compared to standard coronary angiography. The study protocol planned a stepwise approach to the procedure, with the operator being asked to provide a treatment plan after being exposed to standard angiography, OCT and ACR-OCT. Thus, the operators were also able to assess the impact of ACR implementation over plain OCT, which allowed for an additional 34% change in treatment strategy.

Article, see page 124

The obvious price to pay for using intracoronary imaging (besides the financial cost) was an increase in procedural time. Such a finding is not a surprise. The interesting point, however, is that ACR provided an additional layer of valuable information, without a significant increase in time (only +3.5 minutes compared to OCT). Considering that in normal practice ACR assessment is usually performed simultaneously with OCT (with no need for a separation of the two modalities – these were performed separately in the study for research purposes only), this may even result in a reduction of the total procedure time, as the machine dispenses with the “manual coregistration” of the operator, which otherwise costs valuable minutes. This is an affordable price to pay, considering the clear advantages in terms of reduction in complications (and related interventions), or future adverse events. Undoubtedly, a plain OCT-guided procedure may still obtain a good final result, but it may come at the price of additional stents (in case of detection of geographical miss) and a higher workload for the operator.

Nevertheless, a remark should be made about the study. Although ACR is a powerful tool, OCT should always remain the main reference. Decisions on device size, length and landing zone should be based on OCT measurements. Changing the stent length or even stent strategy, when moving from ACR to OCT, is, in our experience an uncommon practice and limited to very select cases. In these cases, the changes should probably, in part, be attributed to the judgement of the operators, who were looking for a reliable marker for stent landing on angiography. We should also avoid the risk of falling back into old habits. Angiography should bend to intracoronary imaging, not the opposite. Similarly, it seems strange that in 15% of cases, ACR made the operator decide to perform lesion preparation, instead of a direct stenting strategy decided with OCT. These decisions seem like remnants of an angiography-oriented decision-making process, which the operators were probably not entirely able to abandon. When you decide on an imaging-guided procedure, and you decide to invest time and money in it, you should follow the imaging guidance to the very end.

Indeed, this is probably the major limit of current coregistration: it is not translational. ACR data are real-time, but they refer to a specific angiography, and they do not translate to subsequent angiographic acquisitions. So, in the end, the operator will still need to perform a visual comparison between the reference view (with the OCT pullback and ACR) and the current working view. And, obviously, he will use markers with which he is familiar, a side branch, a curve, or something reliable as a marker.

The ideal development of ACR would be fusion imaging, which may be able to display the precise point-by-point intracoronary imaging findings on live angiography. This could provide an even easier, streamlined process during stent implantation. It could be useful, for example, in so-called “ostium nailing” in which precise landing of the stent, based only on angiography, is currently a matter of luck.

Future iterations of these technologies may provide significant support to all operators. Indeed, as shown by the OPTICO-Integration study⁴, refinements in treatment strategies provided by ACR compared to a previously defined strategy were independent from operator expertise. This is a crucial aspect: ACR is not merely a tutorial for beginners, who may not know how to apply imaging in the context of angiography, but a valuable tool which provides the advantage of process streamlining and improved accuracy at the same time.

So, if we want to use intracoronary imaging (and we should), we should trust the whole process. But first, we should probably fight our own inertia and eliminate old and outdated habits.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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