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EDITORIAL

A clear-sighted view is what is needed in a rough sea

Tom Adriaenssens[1,2]*, MD, PhD; Pascal Frederiks[1], MD

Corresponding author: Department of Cardiovascular Medicine, University Hospitals Leuven, Herestraat 49, 3000, Leuven, Belgium. E-mail: Tom.adriaenssens@uzleuven.be

In this issue of EuroIntervention, Lee et al report on a subanalysis of the acute coronary syndrome (ACS) patients in the OCCUPI Trial[1,2].

Article, see page e1269

OCCUPI, a 1,600-patient randomised controlled trial (RCT) from 2024, demonstrated a net clinical benefit of using an optical coherence tomography (OCT) over an angiography-only guided percutaneous coronary intervention (PCI) strategy in complex coronary artery disease (mainly long and bifurcation lesions). The results reinforced the most recent European Society of Cardiology guidelines, resulting in a Class I, Level of Evidence A recommendation on intracoronary (IC) imaging guidance for PCI in patients with complex coronary lesions[3].

Characteristic of a piece of robust, clinical, scientific work, the current analysis contributes important additional information to the existing knowledge and offers ideas for valuable future research in the field.

First, in line with the overall findings of the OCCUPI Trial, the clinical benefit of OCT guidance in complex coronary lesions is shown to extend to patients with an ACS. ACS patients comprised just more than half of the total OCCUPI study population. Remarkably, the net clinical benefit of OCT over angiography guidance seems to be more pronounced in the ACS subgroup compared to the chronic coronary syndrome (CCS) counterpart, although there was no significant interaction. This appears to confirm earlier experience that there is likely to be no penalty associated with the manipulation of OCT catheters and image acquisition in a typically thrombotic acute coronary lesion. It also fits with observations across different studies that with increasing risk and complexity of the clinical and/or anatomical profile of the patient, a more pronounced benefit of intracoronary imaging-guided PCI is seen[4].

Taken together, compared to the total population in the OCCUPI Trial, the effect of OCT guidance on the primary endpoint – a composite of cardiac death, myocardial infarction (MI), stent thrombosis, and ischaemia-driven target vessel revascularisation – was largely driven by a benefit in the ACS subpopulation (4.9% in the OCT-guided group vs 9.5% in the angiography-guided group, hazard ratio [HR] 0.50, 95% confidence interval [CI]: 0.29-0.87; p-value=0.011). In contrast, there was no significant difference in the primary endpoint among CCS patients (4.4% in the OCT group vs 5.4% in the angiography-guided group, HR 0.80, 95% CI: 0.43-1.50; p-value=0.479).

Over the last three decades, advancements in diagnostic tools for coronary artery disease, drug-eluting stent technology, and antiplatelet drug regimens have achieved a remarkably high standard. For the patient with low clinical and anatomical complexity, interventions are accompanied by very low adverse event rates in the short as well as in the long term, making it very difficult for any innovation in the treatment cascade to prove a clinically meaningful benefit in RCTs.

However, on the other side of the spectrum, there is a large cohort of patients with complex lesion anatomy, often with additional risk factors and an increased bleeding as well as thrombotic risk. These patients have a much higher events rate, both acutely and at longer-term follow-up. Unsurprisingly, the incremental technical improvements that can be offered with advanced imaging technology have a better chance of proving their value in clinical studies.

It is interesting to try to understand the underlying mechanisms behind these apparent differences between OCT and angiography guidance, on one hand, and the ACS and CCS populations on the other. With respect to baseline complex lesion characteristics, the CCS subpopulation of the study had a higher proportion of long and bifurcation lesions, which is also reflected in a longer procedural time and contrast volume administered per patient.

The most important difference is observed in the incidence of myocardial infarction. There is a statistically significant difference in the incidence of myocardial infarction in the ACS subpopulation (3.6% in the OCT-guided group vs 6.9% in the angiography-guided group, HR 0.53, 95% CI: 0.28-0.99; p-value=0.041). In contrast, such a difference is not observed in the CCS subgroup (3.6% in the OCT-guided group vs 3.3% in the angiography-guided group, HR 1.09, 95% CI: 0.52-2.28; p-value=0.828). Although perhaps a chance finding, the markedly higher rate of MI in the angio-guided ACS group might reflect a particularly higher risk of new acute events in ACS patients not undergoing additional intravascular imaging.

Indeed, in both the ACS and the CCS subgroups, there is also a trend towards a higher number of spontaneous myocardial infarctions in the angiography-guided group, mostly target vessel related. Without additional intracoronary imaging information on the individual index cases and the subsequent procedures of the adverse events, reasons for this difference remain speculative, but a better lesion coverage and decreased incidence of stent failure (due to a more optimised result in the OCT group) are the most plausible explanation. Interestingly, in the CCS group, the higher number of spontaneous target vessel myocardial infarctions is completely counterbalanced by a higher number of periprocedural myocardial infarctions in the OCT-guided group. This is probably related to the higher rates of high-pressure balloon post-dilatation in the imaging-guided group, in the process of realising the stent optimisation protocol. In contrast, in the ACS group, lower numbers of periprocedural myocardial infarctions are seen in the OCT-guided group; together with the lower number of spontaneous myocardial infarctions, this explains the statistically significant reduction in overall myocardial infarctions in the OCT-guided group. Therefore, there must be a mechanism explaining the lower incidence of periprocedural myocardial infarction in the OCT-guided arm of the ACS subpopulation. A lower incidence of "missed culprit lesion", as the authors suggest, might be possible. More appropriate lesion coverage, avoiding landing the stent in a lipid pool, which is known to be associated with an increased risk of periprocedural MI and the development of edge restenosis, might be an alternative explanation.

It will take dedicated studies including careful prestent lesion assessment and precise identification of the culprit lesion in the ACS population to provide an answer to these questions.

Finally, taking into account the growing body of evidence in favour of intracoronary imaging-guided PCI in complex lesions, supported by strong recommendations in the recent guidelines, a substantial increase in the global uptake of this technology, used in the appropriate setting, is to be expected. It will be hard to defend managing a coronary catheterisation laboratory programme including the treatment of complex cases or training IC fellows while completely ignoring the proven added value of IC imaging technology. Hopefully, this rise in the adoption of the technology will be balanced by better reimbursement in healthcare systems and lower catheter prices, as the additional cost for the procedure has been a major barrier for the adoption of the technology. As a community, we will need to convene to a commonly accepted protocol for stent sizing and optimisation (especially with the assessment of stent expansion, the differences between protocols in RCTs confuses many operators).

Operators performing OCT-guided complex cases will need to pay particular attention to the total contrast volume used. Across the different studies, contrast volume use is generally 50% higher in the OCT-guided arm compared to the angiography-guided arm. This has not led to an increased incidence of contrast-induced nephropathy in any of the large randomised trials, maybe because patients with severe chronic kidney disease (CKD) were excluded per protocol. In daily catheterisation laboratory life, however, many of the patients with CKD would especially benefit from an OCT-guided procedure, as they often express a complex lesion anatomy or an ACS presentation. Operators will need to train themselves to restrict contrast medium administration (in the diagnostic angiogram first, then later by combining OCT with angiography runs, and by avoiding inadvertent contrast administration spent on low-quality OCT acquisitions).

Lastly, some strategic considerations are related to the patients in whom the operator is not able to achieve an optimal result, the so-called suboptimisation cases. From this report and several others before, we know that OCT suboptimisation is associated with worse clinical outcome. To what extent must the operator try to achieve an optimal result and when is the right time to listen to the warning voice behind our shoulder, whispering the old interventional cardiologist's wisdom: "the better is the enemy of the good" ? At this moment, no clear recommendations can be made in terms of what to do once a suboptimal IC imaging result is accepted. Is a stricter follow-up, e.g., including a control angiography or coronary computed tomography scan, advisable? What about prolonged or more intensive dual antiplatelet therapy to accommodate for an increased risk of myocardial infarction? There are enough puzzling issues left to be explored. Knowledge knows no end.

Authors' affiliations

1. Department of Cardiovascular Medicine, University Hospitals Leuven, Leuven, Belgium; 2. Department of Cardiovascular Sciences, Catholic University Leuven, Leuven, Belgium

Conflict of interest statement

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