Radcliffe ACC 2022 Late-breaker Coverage: ACC 22: FFR vs. IVUS-guided PCI in Intermediate Coronary Artery Stenosis: The FLAVOUR Trial

- Hi everyone, I'm B.K. Koo from Seoul National University Hospital, Seoul, Korea. Today I'd like to share the results or the take-home message of the recently performed randomised clinical trial, the FLAVOUR Trial.

Background to the Study

So, the background of this study is that we know that the prognosis of patients with coronary artery disease is determined by multiple factors, not simply by one or two factors. And those multiple factors are degree of luminal narrowing, plaque burden, plaque characteristics, physiologic significance, and also the appropriateness of revascularisation procedure. So, for that, we all know that there are several limitations of invasive angiography, and that's the reason why, in the cath lab, we frequently use the adjunctive tools, such as fractional flow reserve or the intravascular ultrasound. However, these two commonly-used tools investigate and present a different aspect of coronary artery disease and different strengths and weaknesses. So, we need to have an answer for the question about which approach can bring better clinical and patient-reported outcomes. That's the reason why we designed and performed this randomised clinical study.

Study design

This study, the FLAVOUR trial, is an investigator-initiated, prospective randomised, multinational trial. And the purpose of the study was to compare the efficacy of FFR-guided PCI strategy with intravascular ultrasound-guided PCI strategy, in patients with coronary artery disease. For that, the primary endpoint of our study was that patient-oriented composite outcome, which was a composite of death from any cause, any MI and any revascularisation at two years after the index procedure. And when we performed the sample size calculation according to the non-inferiority margin of 2.5% and 90% power, we need 1700 patients. Basically, we enrolled 1,700 patients and randomised 1,682 patients. Those were randomised into the FFR-guided PCI group and IVUS-guided PCI group. And we also have criteria for PCI and also the optimisation. Indications for PCI in the FFR group was that the standard criteria 0.8 or less and for IVUS, criteria for PCI was that the lumen area was three or less square millimetres or in case of three, between MLA three and four and plaque burden of 70% or more. Those are the basic schemes of our study.

Key findings

For the key findings of our study, as this was a randomised study, there was no difference in baseline characteristics, patient-level characteristics, between the FFR arm and the IVUS arm. And the mean FFR value in the FFR group was 0.83 and mean lumen area in the IVUS arm was 3.4 square millimeters, which means that they both are meeting the criteria for intermediate stenosis due to the different PCI criteria. Target vessel PCI rate was significantly lower in the FFR-guided PCI arm, which was 33%. In the IVUS-guided PCI arm, target vessel PCI rate was 58%. So, accordingly, more patients received antiplatelet agent, including dual antiplatelet therapy. The primary outcome, which was a two year POCO rate, the event rate was 8.5% in the IVUS group and 8.1% in the FFR group. The absolute difference was -0.4% and the range of the 95% confidence interval was within the pre-specified noninferiority margin of 2.5%. This was the same with the per-protocol analysis, in which the difference in risk was -0.5% and still the upper range of 95% confidence interval was 2.3%,

below the margin of 2.5%. And we also analysed the patient-reported outcome using Seattle Angina Questionnaires. There were no differences between the FFR-guided PCI group and IVUS-guided PCI group in terms of the patient-reported outcomes in all SAQ scores. Basically, clinical outcomes and patient-oriented outcomes, there was no difference. What was interesting in our analysis was that the implication of optimal PCI on patient outcome. According to the pre-specified criteria, optimal PCI achieved 50% in FFR-guided PCI group and 55% in IVUS-guided PCI group. What was interesting was that there was no difference in the outcomes in the medical treatment group in both arms but when we compare the outcomes of the optimal and PCI group between FFR- and IVUS-guided PCI, we found that the best outcome was achieved in those who had an optimal PCI criteria by the IVUS. This is an interesting finding and needs further investigation.

Impact on clinical practice

I can summarise the key results of our study as: in patients who have an intermediate degree of stenosis, in comparison with the IVUS-guided PCI, FFR-guided PCI was noninferior, with respect to a clinical endpoint and FFR-guided PCI was associated with a low rate of stent implantation, without the difference in patient-reported outcomes between the two strategies. The clinical implication of this study will be that there are several recent papers showing that the physiology may not be as good as an angio or the image may be better, vulnerability concept may be better, but our study supports that still the physiology-based decision and revascularisation should be the standard practice in patients with the intermediate coronary stenosis.

Next steps

We plan several pre-defined and post-hoc analysis. First thing is that the cost issue and clinical and socio-economical impact should be analysed between these two different strategies. We will run a cost-effective analysis using our data and also further analyse the impact of PCI optimisation by IVUS and FFR. And what we also have interest in is to define the prognosis determinants in the medical treatment group or the deferral PCI group, in FFR and IVUS groups, to define whether there is a way to improve the patients who are under medical treatment. And what will be also interesting is that we are running an angio-derived FFR core lab and also an intravascular ultrasound-derived core lab to perform the image-based physiological assessment. And it will be very interesting, the implication in terms of prognosis of those image-based, novel physiological assessments in the near future.

Take-home messages

What I have learned from this trial is that this trial is teaching me that the physiology-based PCI should still be the standard in patients with intermediate coronary artery stenosis. However, we found some signals that the benefit of IVUS-guided PCI optimisation. We have to work more for the role of imaging in PCI optimisation. In the end, I would say that the further studies are definitely needed to investigate the role of vulnerability and novel-image based physiological assessment in the treatment decision and optimisation.