

Perspective on QFR®, a novel physiological assessment based on imaging

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How do you see the evolution and place of physiology in routine practice?

"I think that during the first 20 years of interventional cardiology, we have focused only on the angiographical aspect of the vessels and the lesions. We totally ignored the physiological aspect.

Then came FFR with clinical studies: a major change was on the way to interpret the results of a diagnostic catheterization:

When a patient presents with an acute coronary syndrome, or deep dynamic changes on the ST segment, the patient must undoubtedly be treated immediately.

On the other hand, when we have a patient with mild atheroma, the lesion

angiographically obstructing less than 30% of the vessel lumen, the lesion is thus not significant, and we do not perform PCI.

What should we do if the patient is presenting with chest pain, showing an ECG with normal ST waves, and the coronary angiography is showing an intermediate lesion? Especially when we do not have a scintigraphy nor stress echocardiography.

The physiology information we get from FFR and now with QFR®, helps us to better triage the patients who require an interventional procedure and the patients who only require oral medication."

What do you think of the QFR® concept?

"Here at Clinique Pasteur, we now have the possibility to quantify the

physiological consequences of a narrowed vessel on myocardial perfusion, using the QFR®.

The main advantage is that we can do that during diagnostic angiography, without placing a wire in a distal vessel.

When a wire is positioned distally within a vessel, there is always a risk induced to dissect a mild atheroma plaque. Since no wire is required to compute QFR®, the risk of endothelium trauma disappears.

This is certainly a major change in the physiological evaluation of the coronary stenosis."

What do think of the robustness of the tool?

"We have some data reporting equivalence between QFR® and FFR



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results. Today, we need a larger study, a randomized control trial.

When we look at our experience, I think that the results are really reproducible.

We computed QFR® on some patients, both during diagnostic angiography, and a few days later at the beginning of the PCI procedure. Interestingly, we got exactly the same result."

What do you think about the interfacing between the QFR® and GE IGS imaging system?

"I think that the interaction between the MEDIS QFR® and the GE system works well.

Of course, our experience helps us to find the correct projections required to compute QFR®. For example, when we have an intermediate lesion on a RAO cranial view, we would find the correct second projection by switching to a view that is nearly orthogonal.

It is true that with this integration*, it is easier to identify the precise views that we need to calculate the QFR®. This is critical to make the best

possible calculation and to get an accurate value for the QFR®."

What will be the place of physiological assessment in the coming years ?

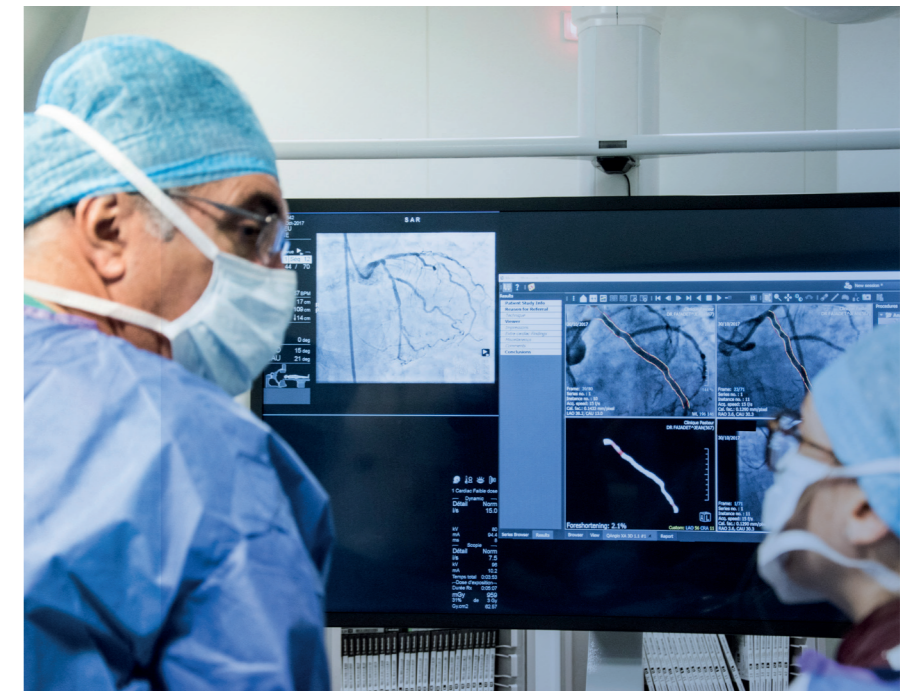
"The difficulty is that, as interventional cardiologists, we've been taught, and we are also used to the fact that everything is based on angiography. We had to change the

way we were assessing the lesions because of new evidences presented.

The objective is not to replace angiography with physiology, but to base our patient selection for revascularization or medical treatment, on both criteria.

The right place of physiological assessment should be during catheterization.

In other words, what we can expect in the future, is that all patients who will undergo diagnostic catheterization in the cathlab will leave the cathlab with a precise and accurate diagnostic and treatment plan." □



*Between QFR® and IGS.

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Perspective of the radiographer

Philippe Vareille,
Clinique Pasteur, Toulouse (France)



Can you please introduce yourself and your role at clinique Pasteur ?

"My name is Philippe Vareille, I have been a radiographer for 23 years at Clinique Pasteur. My role is to provide technical support on imaging systems. I am also running the QCA calculations and creating the patient reports on all PCI's in the cathlabs. During the day, I also help installing the patients and during the night shifts, I am called upon to replace the nurses when they get scrubbed."

How have you been involved in QFR®?

"We've been contacted to participate in a training session on QFR® in Buc (GE Healthcare, European GE Healthcare and global Image Guided Systems Headquarter located close to Versailles, France). I was curious to see which

noninvasive technique, alternative to FFR, was possible. I see an obvious interest as we obtain the same result and we find this really interesting for the patient, the doctor and all the stakeholders.

We were trained for two days by Medis and GE. The content of the training was very clear and precise. We learnt how the application is working and how the IGS imaging system is interfaced to the Medis QFR® software, because we had access to a real system."

What was your first impression?

"We're used to introducing a guide inside the artery and making measurements; this is concrete. Understanding the QFR® concept and algorithm was not obvious at the early stage. I did not understand that a pressure ratio can be derived only from

imaging! The software is easy to use, and upon training completion and user certification, the process is much more fluent. By doing more cases, we can work much faster; this is a question of training and experience."

Would you mind describing the team work during QFR®?

"This is a team work with the cardiologist, since he/she is the one who makes the imaging projections. He/she chooses a first angulation where the stenosis is well visible, showing no superimposition with other arteries. Using the graphical information on the large display monitor, he/she moves the gantry without emitting x-rays to find the optimal second angulation. The second angulation can then be done, and I can start the QFR® calculation. The

cardiologist can either follow my computation on the large display monitor, or treat another artery in case of a multi-vessel disease.

We regularly do QFR® computation on diagnostic angiography. We do our usual diagnostic, and during the exam, if the doctor wishes we can also run a QFR® on the right coronary or the left main for intermediate or limit lesions.

Since we're called to cover other tasks, it happens we are asked to also run a QFR® once the exam is completed. As the cardiologist has done six or seven angulations on the left coronary, we always find two of them which will suit the computation."

What are critical elements to compute a precise QFR® value?

"We're looking to get well injected angulations along the coronary artery. Then, we make sure the same artery is selected on both views to ensure a precise 3D reconstruction of the vessel. The contouring of the vessels is automatically defined by the software, and we fine-tune them to get as close as possible to the actual anatomy, according to what we see. This is of importance as we are attentive on the contours at the proximal and distal sides, as well as at the stenosis; this is similar to QCA. The last step is to select the start and end of the injected contrast so that the software receives flow velocity information."

Does it replace QCA?

"At Pasteur, from what I remember, we've always done QCAs. We do a QCA before and after each dilation. This might replace QCA in the sense that it provides the required information, but the procedure takes longer than when using only one angulation to compute QCA; therefore, I would keep QCA in the first line when looking only at the stenosis length and diameter.

In my opinion, what is interesting is to get this information along with the QFR® computation. Once the two angulations have been selected, and the contouring defined on the two views, we can see the 3D model. The 3D model follows the IGS Imaging system, which makes it easier to find the optimal view of the vessel without pushing the x-ray pedal.

I can tell that QFR® is a good solution since it is noninvasive and thus helps avoid coronary complications. When we do a FFR calculation on a stenosis which is about 20 or 30% of the lumen, we use a guidewire, which can touch the plaque and potentially cause a plaque rupture. We then need to dilate while it can be avoided when doing QFR® measurement."



"Since we have been working in the new cathlabs, we have been doing many interesting and different technical things, such as QFR® or image fusion. This is really of great interest."

P. Vareille

What is your confidence level with the tool?

"The reconstruction itself has been very easy thanks to our QCA knowledge and practice. We can also do post-PCI analyses which can also be very interesting. I am very comfortable with the software, and - if needed - I provide feedback to Medis and GE team and get the appropriate support in return."

Would you recommend that your peers get trained and practice QFR®?

"I do think the QFR® solution can be very useful to reconstruct a vessel in three dimensions. This is above all beneficial to the patient since it is a non invasive technique. We do nothing more than an angiography!"

What is your experience being involved with technology ?

"We always enjoy using new technologies such as QFR®. This is very interesting, our role is evolving. Since we have been working in the new cathlabs, we have been doing many interesting and different technical things, such as QFR® or image fusion. This is really of great interest." □

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