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Radial access for percutaneous coronary procedures – what is it, why has it become popular, when is it beneficial and what are the advantages and disadvantages?

Selective coronary angiography was originally performed through open brachial arteriotomy. Thereafter, the percutaneous Seldinger technique and the use of preformed Judkins-type catheters popularized the femoral approach. More recently, after the first report of a successful coronary angiography by transradial approach in 1989,¹ the radial artery – punctured at the level of the lateral part of the wrist where it is easily palpable – has been increasingly employed as an alternative access site for percutaneous coronary procedures, diagnostic and interventional. The radial approach has become popular in recent years because of the fact that haemostasis is very simple. It can be achieved with a simple pressure band around the wrist that can be placed right after the procedure. Moreover, it is also user-friendly for patients and hospital personnel, due to the fact that patients can move more freely and post-operative care is much simpler.

The main clinical advantage offered by the transradial approach is represented by the very low (<1%) incidence of relevant vascular access site complications and bleedings,² which, on the contrary, occur in about 3–7% of patients undergoing procedures through the femoral route.³ Studies suggest that this may even translate into reduced mortality in the long term,^{4,5} mainly in high-risk patients such as those with an acute myocardial infarction undergoing primary percutaneous coronary intervention.

The main disadvantage of the radial approach for coronary diagnostic and interventional procedures is a higher incidence of procedural failure, leading to crossover to the femoral route.^{2,3} This failure can be attributed to several reasons.

A common reason is the failure to puncture the radial artery or to cannulate it. This can be overcome by experience and by good selection of patients, mainly in the early phase of the

procedural learning curve. The first patients in whom a radial approach may be attempted should have a clearly palpable pulse of the radial artery at the level of the wrist. Only later in the learning curve should more complex patients, with scanty radial pulse, be attempted. In general, care should be taken to puncture the radial artery properly. The patient should be relaxed (eventual use of anxiolytics is acceptable before the start of the procedure). The hand of the patient should be fixed so that the wrist is completely rotated with the palmar part exposed upwards, without the possibility to turn inwards (where it would go naturally if it was not fixed). Furthermore, the operator should be at ease, and he/she should try to puncture the radial artery at the first attempt.

A second reason for radial approach failure is related to the occurrence of spasm, during or after insertion of the sheath or of the catheter. This can be prevented by advising the patient that he/she will feel some discomfort during insertion of these tools (if the patient is not prepared, he/she is likely to react abruptly). Intra-arterial administration of spasmolytic medications, such as verapamil, is also beneficial.

A third reason for failure is related to anatomical variations present along the course of the radial artery. In particular, three common anatomical variants are frequently encountered: recurrent high take-off radial artery, radial loop and radial tortuosity.⁶ These anatomical variations usually cause resistance in the advancement of wires or catheters. In general, if resistance is felt, it is important to acquire an angiographic sequence as soon as possible to understand the reason for this resistance. This can determine whether spasm (where management with additional spasmolytic medications or downsizing of the catheter can be recommended), or anatomical variants are responsible. If challenging anatomical structures

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are encountered, careful review of the angiogram is essential to understand the course of the radial artery. Solutions, such as a hydrophilic wire or even a coronary guidewire, can be considered to navigate the complex anatomy and to then further advance the catheter up to the thorax of the patient.

In conclusion, the radial approach has the potential to revolutionize interventional cardiology, leading to a dramatic reduction in vascular access site complications. However, specific skills particular to this approach are needed; good knowledge of the vascular anatomy of the arm is especially crucial to perform this procedure safely.

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