Hybrid coronary revascularization: a task for the true heart team!

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Keywords: Hybrid coronary revascularization • Heart team • PCI • Multi-vessel coronary disease

Ever since the concept of integrated hybrid coronary revascularization was first introduced in the mid-1990s [1], it has sparked much debate among the cardiovascular community. Hybrid coronary revascularization for multivessel coronary disease is defined as, ideally, combining the proven long-term survival benefit of surgical left internal mammary artery (LIMA) to left anterior descending (LAD) grafting with percutaneous coronary intervention (PCI) to non-LAD territories. While there is overwhelming consensus that LIMA to LAD grafting should be performed in a minimally invasive, sternum-sparing and off-pump minimally invasive direct coronary artery bypass (MIDCAB) procedure, the timing of the respective revascularization modalities remains controversial.

Performing PCI first has the advantage of ‘paving the way’ for subsequent minimally invasive surgical revascularization. However, in this case, PCI would have to be performed in the presence of unprotected anteroseptal myocardium and a LAD stenosis, which would probably be considered the culprit lesion in many cases. Furthermore, following successful PCI of lesions in the right coronary artery (RCA) or circumflex artery (CFX), surgery would have to be performed under combined platelet inhibition therapy. Also, reversing heparin by systemic protamin application towards the end of the surgical procedure carries the inherent risk of stent thrombosis.

If LIMA to LAD MIDCAB were performed first, PCI could subsequently be performed under the protection of a revascularized anteroseptal myocardial wall. However, the surgeon needs to be aware of possible critical ischaemia in non-LAD regions during surgery. Also, failed secondary PCI might lead to a more complex, technically challenging repeat surgical procedure. In a successful staged procedure of primary LIMA to LAD grafting followed by PCI, angiographic quality control of the surgical graft may be counted as an advantage.

Clearly, both scenarios of staged hybrid coronary revascularization remain suboptimal, with inherent advantages and disadvantages. Nonetheless, the vast majority of studies pertaining to this topic are designed in a staged fashion [2]. Performing revascularization of multivessel disease in a single-stage hybrid procedure as described by Adams et al. [3] in the current issue of this journal may overcome most of the above-mentioned limitations even though this strategy imposes physicians with its own logistical challenges. Ideally, such procedures should be carried out in a modern fully equipped hybrid operating theatre providing treatment the full armamentarium of therapeutic options on physicians. Performing LIMA to LAD MIDCAB first and PCI second immediately following surgery allows for angiographic patency control of the surgical graft. Also, PCI to the remaining lesions can then safely be performed under the protection of revascularized LAD territory. Whether or not the da Vinci system is necessary for LIMA harvest can be debated. However, as it allows for atraumatic take-down of the artery along its full length and as the alternative would be the use of a rib-spreading retractor without the possibility of mobilizing the proximal portion of the graft, it appears to be the best option at present. This is in spite of high maintenance and operational cost.

Planning, indication and performance of the procedure as well as post-procedural care should best be carried out by a dedicated interdisciplinary heart team consisting of institutionalized interventional cardiologists and cardiac surgeons in close collaboration. Due to the complexity of this type of procedure, it is probably best performed at specialized heart centres with extensive experience of all involved specialties in treating patients with advanced coronary artery disease. Combining the expertise and skill sets of both cardiac surgery and interventional cardiology will provide an adequate...
background for optimal patient care. Discussion of cases within this interdisciplinary team should allow for optimized and tailor-made treatment strategies according to the individual patient's anatomy and risk profile.

REFERENCES

