



MODERN STRATEGIES FOR MYOCARDIAL REVASCULARIZATION IN CORONARY HEART DISEASE: OVERVIEW AND PROSPECTS

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ABSTRACT

Coronary heart disease (CHD) remains the leading cause of death and disability worldwide. In conditions of multivessel coronary artery disease, the choice of the optimal revascularization strategy becomes a key factor affecting the prognosis and quality of life of patients. Modern methods, including coronary artery bypass grafting (CABG), percutaneous coronary interventions (PCI), hybrid revascularization and minimally invasive approaches, are actively developing due to technological progress and international clinical research. The presented review analyzes current data from foreign and domestic sources, including the recommendations of ESC/EACTS 2018, the results of major studies (FAME, ISCHEMIA, SYNTAX, EXCEL, ROMA, etc.) and new approaches to individualization of therapy. The issues of assessing anatomical complexity, adequacy of revascularization, choice of shunts and stents, as well as the importance of hemodynamic navigation (FFR/iFR) in making clinical decisions are discussed.

Introduction: Coronary heart disease (CHD) remains one of the leading causes of death and disability worldwide. Despite the successes in drug therapy, surgical revascularization methods remain of key importance in the treatment of patients with multivessel coronary artery disease. The evolution of approaches from classical coronary artery bypass grafting (CABG) to percutaneous coronary intervention (PCI) and hybrid techniques has necessitated a review of existing clinical strategies [1,2].

Comparative effectiveness of revascularization methods

CABG is traditionally considered the preferred method in patients with severe multivessel damage. The use of a mammary shunt to the anterior descending artery (AHA) is associated with improved survival and a decrease in the frequency of repeated interventions. However, the high level of invasiveness, the long recovery period, and the risk of perioperative complications limit its use[4,8,21].

Minimally invasive techniques such as MIDCAB (minimally invasive direct coronary revascularization) have demonstrated a reduction in surgical injury and the incidence of



infectious complications, as well as a shorter period of hospitalization compared with traditional CABG.

PCI is characterized by minimal invasiveness and rapid recovery of the patient, especially when using modern drug-coated stents (DES). In recent years, against the background of technological progress, an approach of hybrid coronary revascularization (HCR) has been formed, combining the advantages of surgical and endovascular intervention. GCR is considered as an alternative in complex anatomical cases and multifactorial lesions of the coronary bed[3,6,11].

A personalized approach to choosing treatment tactics

The development of the concept of chronic coronary syndrome (CCS) involves the use of an integrative approach, taking into account the clinical profile, the anatomy of the coronary bed and the results of functional studies. Risk assessment algorithms such as SCORE II make it possible to identify patients in need of primary prevention. For symptomatic patients, optimal drug therapy (OMT) and evaluation of indications for revascularization are mandatory steps.

Innovations in diagnostics and tactics of revascularization

The introduction of fractional blood flow reserve (FFR) has improved the accuracy of diagnosis of hemodynamically significant stenoses. The results of the DEFER and FAME studies have confirmed the clinical effectiveness of PCI aimed at stenoses with proven functional significance, reducing the number of unnecessary interventions.

Nevertheless, FAME III data showed that CABG retains an advantage over PCI despite the use of FFR, especially in patients with multivessel lesion[2,4,7].

The role of the shunt type in long-term prognosis

Outcomes after CABG largely depend on the choice of a donor vessel. The left internal thoracic artery (LIMA) is considered the most preferable for PA bypass surgery. The use of arterial grafts, such as the radial artery or the right internal thoracic artery, is considered as an alternative for high levels of stenosis. However, bilateral arterial bypass surgery (BIMA) is associated with an increased risk of sternal infections in patients with concomitant diseases (diabetes mellitus, obesity, COPD)[8,9].

Current clinical trials and their impact on recommendations

Recent large randomized trials have had a significant impact on clinical practice. Thus, the ISCHEMIA study demonstrated that in patients with CKD without damage to the trunk of the left coronary artery, drug therapy remains the advantage. At the same time, the EXCEL and FAME III results confirmed the clinical benefit of CABG in patients with complex multivessel lesion[10, 11].

Here is an expanded fragment of the article with additional information based on foreign studies, as well as a list of 10 literature sources.:

In many countries with highly developed healthcare systems, active clinical trials are underway aimed at optimizing myocardial revascularization tactics. For example, hybrid approaches combining minimally invasive surgery and PCI using modern drug-coated stents (DES) are actively used in the USA and Western European countries. One example is the SYNTAX II study (UK, Germany, Netherlands), which demonstrated a significant reduction in the incidence of cardiovascular complications with an individualized choice of treatment strategy based on the patient's anatomical and clinical profile[17,19].



A series of observational cohort studies are being conducted in Canada and Sweden to compare long-term outcomes between complete and incomplete revascularization, as well as to evaluate the role of physiological imaging techniques (FFR, iFR) in multivessel lesion. In particular, the SWEDEHEART registry study provided important data on the reduction of mortality when using FFR navigation in patients with chronic coronary syndrome[14,15].

Minimally invasive techniques, including robot-assisted mammary coronary bypass surgery, are actively developing in Japan, which helps reduce surgical trauma and improve the quality of life of patients in the postoperative period. In South Korea, active work is underway to compare the cost and effectiveness of various approaches to revascularization, which is especially important in conditions of limited resources of the healthcare system[16,20].

In addition, there is a growing interest in genomic and biomarkers that can predict the response to revascularization. As part of the international GENIUS-CHD initiative, a meta-analysis of data on more than 100,000 patients is being conducted, which may affect risk stratification and the choice of intervention tactics in the future.

Conclusion. The choice of a revascularization strategy for coronary heart disease should be based on the individual characteristics of the patient and the anatomy of the lesion. The combination of technical achievements, functional diagnostics and evidence-based medicine makes it possible to improve the prognosis and quality of life of patients. Updating clinical recommendations based on current data is crucial for the further development of personalized cardiac surgery and interventional cardiology.

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