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OPTIMAL STRATEGY FOR COMPLETE REVASCULARIZATION VERSUS PERCUTANEOUS CORONARY INTERVENTION OF ONLY THE AFFECTED VESSEL IN PATIENTS WITH ACUTE CORONARY SYNDROME WITHOUT ST-SEGMENT ELEVATION: A CURRENT REVIEW

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Abstract: Acute non-ST-segment elevation coronary syndrome (ST-ACS) is one of the most common forms of acute coronary syndrome and is characterized by significant clinical and anatomical heterogeneity. A significant proportion of patients have multivessel lesions of the coronary arteries, which creates a difficult problem in choosing the optimal strategy for revascularization. Culprit-only PCI has been sufficiently demonstrated in patients with ST-elevation myocardial infarction (STEMI), the optimal management in patients with ST-elevation ACS remains a matter of debate. This review is devoted to the current data on complete and incomplete revascularization in ACS ST with multivessel lesion, as well as to the assessment of the optimal time and extent of intervention. Current studies and meta-analyses suggest a potential benefit of complete revascularization associated with a reduced risk of recurrent infarction, revascularization, and possibly all-cause mortality. However, much of the evidence base is based on observational studies and meta-analyses, and the final strategy should be determined individually, taking into account the clinical condition, coronary anatomy, hemodynamic stability, risk of bleeding, and likelihood of complications. Patients with cardiogenic shock, severe comorbidities, and complex coronary lesions require special attention. Thus, the current concept of treatment for ST ACS is gradually shifting from a routine culprit-only strategy to individualized total revascularization, but the question of the most optimal time to perform it requires further study in large randomized trials.

Keywords: acute coronary syndrome without ST-segment elevation, myocardial infarction, multivessel lesion, complete revascularization, culprit-only PCI, PCI

Introduction. Non-ST-elevation acute coronary syndrome (ST-ACS) is a clinical spectrum that includes non-ST-elevation myocardial infarction and unstable angina. Despite significant advances in diagnosis and treatment, ST-acute ACS remains an important cause of hospitalization, recurrent ischemic events, and cardiovascular mortality. A significant proportion of patients with ACS have hemodynamically significant stenosis of more than one coronary artery. In such cases, the interventional cardiologist faces a fundamental question: whether PCI should be limited to only the infarction-associated or culprit vessel, or whether it is necessary to strive for complete revascularization with the elimination of all significant ischemic lesions. compared to culprit-only PCI. However, the transfer of this strategy to patients with ST ACS is not straightforward.The pathophysiological and clinical features of ST ACS differ significantly from STI STEMI. The patient may lack an unambiguously identifiable culprit artery, and the clinical picture is often due to a combination of unstable atherosclerotic plaque, multiple stenosis, microvascular dysfunction, and other mechanisms of ischemia. Therefore, the question of which lesions really require intervention remains a matter of principle.

The purpose of this review is to evaluate the current data on complete revascularization compared to PCI of the affected vessel only in patients with ST ACS and multivessel lesion, as well as to determine the most rational strategy for choosing the volume and time of revascularization.

1. Substantiation of complete revascularization in ACSBS ST

The main argument in favor of complete revascularization is the possibility of eliminating not only the direct cause of an acute coronary event, but also other potentially dangerous atherosclerotic lesions. In patients with multivessel disease, the remaining stenosis can be a source of recurrent ischemia, myocardial infarction, and the need for re-intervention. However, it is important to distinguish between anatomically complete and functionally complete revascularization. The mere presence of stenosis on a coronary angiography does not always mean that it needs immediate stenting. In complex cases, intravascular ultrasound (IVUS), optical coherence tomography (OCT), as well as methods of physiological assessment of coronary blood flow can be used.

2. Evidence for total revascularization

The most recent data on this issue are provided by a systematic review and meta-analysis published in 2025. Compared with culprit-only PCI, the total revascularization strategy was associated with a reduction in all-cause mortality, recurrent myocardial infarction, combined cardiovascular events, and revascularization. In particular, the risk of all-cause mortality was lower with complete revascularization (RR 0.66; 95% CI 0.55–0.79) and the risk of recurrent infarction was also significantly lower (RR 0.57; 95% CI 0.43–0.76). Revascularization was less common with the full strategy (RR 0.60; 95% CI 0.54–0.66).These results suggest a potentially significant clinical advantage of complete revascularization in patients with ST ACS and multivessel lesion[1-3].However, the results should be interpreted with caution. The meta-analysis combined studies with different designs, patient selection criteria, and approaches to determining complete revascularization. Therefore, the association between complete revascularization and improved prognosis does not necessarily mean that there is a direct causal relationship in all clinical situations.

3. Full Revascularization: Immediate or Staged Strategy?

One of the key unresolved issues is the optimal time to treat non-culprit lesions.

Conventionally, three strategies can be distinguished:

1. **Culprit-only PCI** – intervention only on infarction-related arteries.
2. **Immediate complete revascularization** – treatment of all significant lesions during a single procedure.
3. **Staged complete revascularization** – initial treatment of the culprit vessel followed by intervention on other significant lesions after a certain period of time.

Each of these approaches has potential advantages and disadvantages.Immediate complete revascularization avoids readmission and re-procedure, but increases the duration of the

intervention, the volume of the contrast agent, and the potential burden on the kidneys and myocardium[4]. The staged strategy allows you to first stabilize the patient and assess the clinical response to the primary intervention, and then decide whether to treat the remaining lesions. The disadvantage is the need for re-intervention and the potential risk of an ischemic event during the waiting period. A current review of PCI strategies for myocardial infarction and multivessel lesions emphasizes that there is no one-size-fits-all strategy. The choice between culprit-only, immediate, and staged total revascularization should be determined by the patient's clinical condition and coronary anatomy.[5]

4. The role of physiological assessment and intravascular imaging

One of the main challenges of complete revascularization is determining which lesions are truly clinically significant. Therefore, in patients with a stable condition and ambiguous anatomy, it is advisable to consider a physiological assessment of the lesion. IVUS and OCT allow for a more accurate assessment of atherosclerotic plaque morphology, vessel size, degree of calcification, and optimal stent implantation. This is especially true in complex lesions, including bifurcations, lesions of the left coronary artery trunk, and pronounced calcifications[6-7].Therefore, a modern strategy for complete revascularization should be based not only on the number of detected stenoses, but also on their clinical and functional significance.

5. High-risk patients: cardiogenic shock and severe hemodynamic instability

A special category is made up of patients with ST ACS complicated by cardiogenic shock.In this group, the potential benefits of complete revascularization must be weighed against the increased risk of complications. Additional intervention increases the duration of the procedure and the volume of the contrast agent, and may also contribute to the development of acute kidney injury and other complications. The decision to intervene on the remaining vessels should be made after assessing the clinical situation and potential benefit. The current consensus on primary PCI, updated in 2026, emphasizes the need to adapt the procedural strategy for ACS to new data and technological capabilities of interventional cardiology[7]. The results of studies in favor of complete revascularization should not be automatically extended to patients with cardiogenic shock and marked hemodynamic instability.

6. Potential advantages and disadvantages of strategies

Strategy	Potential benefits	Potential drawbacks
Culprit-only PCI	Shorter procedure, less contrast, less immediate procedural load	Persistence of significant non-culprit lesions, risk of recurrent ischemia and revascularization

Immediate full revascularization	Elimination of most significant lesions in one procedure, reducing the risk of re-intervention	Longer procedure, more contrast, potentially higher risk of complications
Staged complete revascularization	Ability to stabilize the patient and then choose the optimal tactics	Repeat procedure, risk of events between interventions

7. What can be considered the optimal strategy today?

Based on current data, the following approach seems to be the most rational. In patients with ST ACS and multivessel lesion who are in a stable condition, complete revascularization should be considered, since the accumulated data indicate a reduced risk of recurrent infarction and revascularization compared to culprit-only PCI. Full revascularization does not have to occur in a single procedure. In a significant proportion of patients, a staged strategy may be more rational, especially when there is a complex anatomy, a large volume of contrast media, or an increased risk of kidney damage. In patients with cardiogenic shock and severe hemodynamic instability, the strategy should be individualized as much as possible, and the extension of the intervention beyond the culprit artery requires a particularly cautious approach.

Conclusion

Current evidence suggests that in patients with ST ACS and multivessel disease, a complete revascularization strategy may be associated with more favorable clinical outcomes compared to PCI of the affected vessel alone. The most convincing benefits are observed in terms of reducing the risk of recurrent infarction and revascularization, and data from a 2025 meta-analysis also indicate a potential reduction in all-cause mortality[1]. The SSbST is less straightforward than for STEMI, and the optimal time for complete revascularization—immediate or staged—remains definitively uncertain. A current strategy should take into account not only the anatomical number of affected vessels, but also the functional significance of the stenosis, the clinical condition of the patient, the presence of cardiogenic shock, the complexity of coronary anatomy, and the risk of procedural complications Interventions need to be determined individually.

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