

Key insights from the study:

"Intraoperative invasive coronary angiography after coronary artery bypass grafting"

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Study overview and method

Coronary artery bypass grafting (CABG) remains a cornerstone in the treatment of coronary artery disease (CAD). Despite procedural refinements, immediate intraoperative quality control of grafts has been underutilized, largely due to infrastructural and financial barriers associated with fixed angiography systems in hybrid ORs. Berger et al. demonstrate the transformative potential of intraoperative invasive coronary angiography (ICA) using a mobile C-arm system, specifically the Ziehm Vision RFD Hybrid Edition^{2,3}, to improve surgical outcomes in cardiac surgery.

The study prospectively evaluated 18 patients undergoing CABG between August 2020 and December 2021 for the feasibility and clinical impact of intraoperative ICA performed with a mobile C-arm. The Ziehm Vision RFD Hybrid Edition, equipped with a 21 cm x 21 cm CMOS flat-panel detector and advanced cardiac imaging capabilities, enabled high-resolution angiographic assessment of graft patency, stenosis, and kinking. ICA results were compared with transit time flow measurement (TTFM), with each graft's flow and pulsatility index measured after cardiopulmonary bypass and before protamine administration.

Main findings

The study underscores the superiority of ICA over TTFM in assessing graft quality. ICA was rated as much better in 93% of cases and equal in the remaining 7%, according to the surgeons' evaluations. Importantly, ICA influenced clinical or surgical decision-making in 17% of patients, leading to interventions such as graft revision or additional bypass grafting. These findings align with prior research emphasizing the critical role of intraoperative imaging in reducing postoperative complications (Desai et al., 2005; Gaudino et al., 2021).

The findings highlight the significant clinical value of mobile C-arm systems in cardiac surgery, supporting the growing trend towards mobile solutions. These systems offer hospitals the flexibility to perform advanced cardiac interventions without the need for costly and space-intensive fixed installations, thus expanding access to high-quality intraoperative imaging and supporting the broader adoption of intraoperative ICA.

Clinical advantages of a mobile angiography device in cardiology

The study demonstrates that mobile angiography devices, such as the Ziehm Vision RFD Hybrid Edition, provide high-resolution visualization of bypass grafts and native coronary arteries, comparable to fixed angiography systems in hybrid ORs. The 21 cm x 21 cm detector enables precise positioning during coronary angiograms, supporting optimal projections for left heart catheterizations. The system's advanced imaging chain and dedicated cardiac programs facilitate immediate and reliable assessment of graft patency and function, directly impacting intraoperative and postoperative decision-making.

Expanding access to intraoperative ICA: overcoming barriers with mobile C-arm solutions

A key insight from the study is that ORs with fixed angiography systems are not widely available in all hospitals or regions, and even where present, they are often in high demand. This has limited the adoption of intraoperative ICA, despite its clinical benefits. Mobile C-arm systems, such as the Ziehm Vision RFD Hybrid Edition, address this gap by enabling hospitals without hybrid rooms to perform advanced cardiac interventions in existing ORs. This approach offers a cost-effective solution with a rapid return on investment, allowing institutions to expand their clinical capabilities without

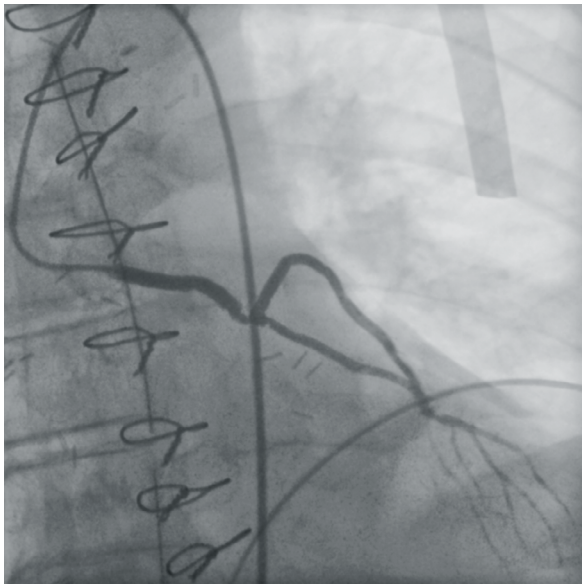


Fig. 1: Bypass graft revision and additional bypass grafting because of significant T-graft stenosis and graft LITA to left anterior descending occlusion.

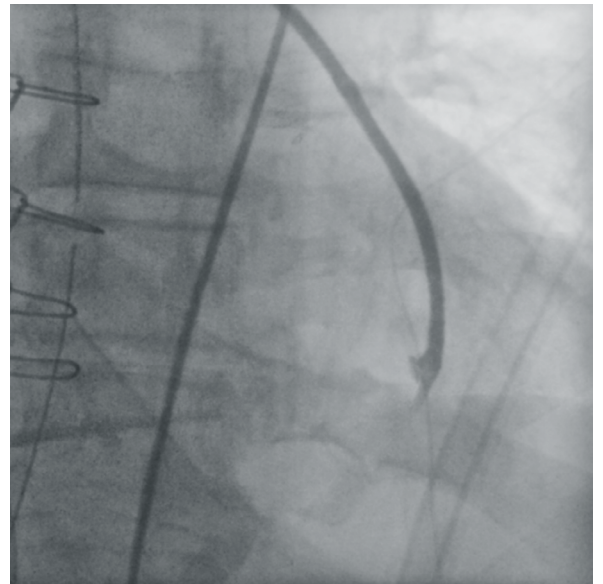


Fig. 2: Bypass graft revision and additional bypass grafting because of graft occlusion of a saphenous vein graft to the obtuse marginal 2.

significant infrastructural changes. Furthermore, even hospitals with existing hybrid rooms can benefit from additional mobile setups, increasing procedural capacity and flexibility.

Implications for clinical practice

The integration of mobile C-arm systems into CABG procedures represents a paradigm shift in intraoperative quality control. As demonstrated in the study, intraoperative angiography enables superior graft assessment and timely interventions, with the potential to reduce post-operative myocardial injury and improve both short- and long-term patient outcomes. The Ziehm Vision RFD Hybrid Edition worked reliably and provided consistently high image quality, supporting its role as an effective solution for high-volume cardiac surgery departments and the expanding interventional cardiology market.

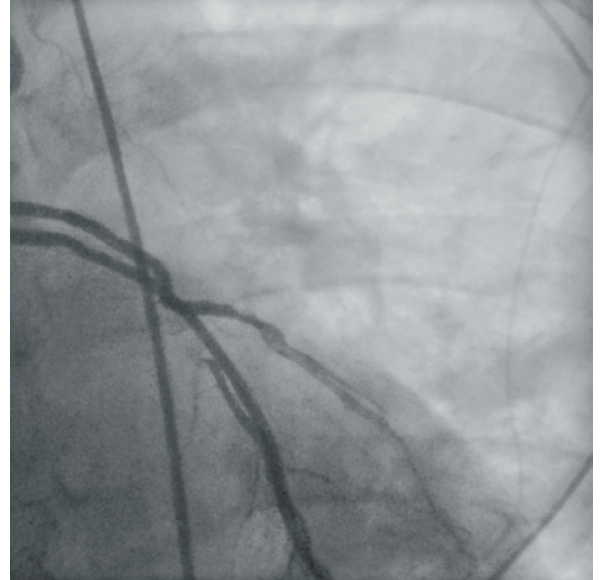


Fig. 3: Satisfactory T-graft angiogram



The Ziehm Vision RFD Hybrid Edition worked reliably and provided in all cases a good image quality, enabling safe and reliable assessment of graft patency and function contributing to improved decision-making during the procedures.

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¹ Full paper is available here. Thoracic and Cardiovascular Surgeon © 2024. Thieme. All rights reserved. <https://www.thieme-connect.com/products/ejournals/abstract/10.1055/s-0044-1791960>

² Ziehm Vision RFD Hybrid Edition, CMOS, flat-panel, 21 cm x 21 cm, 25 kW.

³ Ziehm Vision RFD Hybrid Edition represents a group of optional hardware and software that creates an option package on the device named Ziehm Vision RFD.

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