European Journal of Cardio-Thoracic Surgery 2025, 67(2), ezaf046
https://doi.org/10.1093/ejcts/ezaf046 Advance Access publication 17 February 2025

INVITED COMMENTARY

MYOCARDIAL REVASCULARIZATION

Cite this article as: Mennander A. Abstinence from repeat revascularization may suggest poor outcome. Eur J Cardiothorac Surg 2025; doi:10.1093/ejcts/ezaf046.

Abstinence from repeat revascularization may suggest poor outcome

Ari Mennander [a,b,*]

[a]Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland
[b]Tampere University Hospital, Heart Hospital, Tampere, Finland

* Corresponding author. Tampere University Hospital, Heart Hospital, SDSKIR, Elämänaukio 1, PL 2000 Tampere, Finland. Tel: +358 505979998; e-mail: ari.mennander@pshp.fi; ari.mennander@sydansairaala.fi (A. Mennander).

Received 9 February 2025; accepted 13 February 2025

Keywords: Coronary artery bypass grafting • Diabetes mellitus • Repeat revascularization

Though diabetes mellitus (DM) is a chronic disease and a risk factor for coronary artery disease, the long-term outcome of patients with DM after coronary artery bypass grafting (CABG) is unclear. DM impacts not only the coronary arteries of the heart but also the intramyocardial arteries. Despite successful surgery and revascularization of the main coronary artery regions during CABG, ongoing intramyocardial arteriosclerosis may eventually lead to reduced outflow in revascularized coronary artery regions [1, 2].

In the current study by Barili *et al.* [3], the outcome of patients with and without DM is compared after CABG. This is an observational cohort investigation merging 2 multicentre studies conducted in 2002–2004 and 2007–2008 on isolated CABG on almost 11 000 patients encompassing 3545 patients with DM. The primary outcome was a composite Major Adverse Cardiac and Cerebrovascular Event (MACCE). The analyses were adjusted for baseline differences using propensity scores for inverse probability of treatment weight.

DM did not affect short-term mortality and repeat revascularization but was associated with lower incidence of 30-day MACCE, myocardial infarction and stroke. At 10 years of follow-up, patients with DM experienced increased risk of MACCE, mortality, stroke and myocardial infarction as compared to those without DM. Interestingly, there was no association of repeat revascularization and myocardial infarction during follow-up.

The main message of the well-written manuscript is the association between long-term outcomes with DM after CABG. The presented results are delicious to digest. The relatively moderate number of repeat revascularization in patients with or without DM may be flattering to surgeons. Decision-making for CABG seems justified for many patients with DM, though the chronic nature of the disease also signifies an ongoing increased risk of MACCE, mortality, stroke and myocardial infarction. Indeed, in a previous study, repeat revascularization was more frequent after percutaneous coronary intervention (PCI) versus CABG irrespective of DM, whereas mortality, myocardial ischaemia and repeat revascularization were higher in patients with DM undergoing PCI versus CABG as compared to those without DM during a median follow-up of 11.8 years [4].

Statistically, the proportional hazards assumption was not met in the current study [3]. The outcome curves for MACCE and mortality seem to diverge considerably but only after the early postoperative period. This is reflected in the surprisingly better early outcome of MACCE, myocardial infarction and stroke in patients with DM as compared with those without. There seems to be 2 different time windows of the impact of diabetes on outcome, the perioperative phase and the long-term follow-up time. A plausible explanation may be related to the retrospective nature of the study, including only the patients who underwent CABG. The 1-year outcome after CABG in patients with versus without DM should not differ [5, 6]. In general, a reverse myocardial perfusion pattern after myocardial ischaemia may be expected in patients with or without DM after successful CABG [6]. It would be interesting to compare the results of this study to those obtained after PCI in patients with and without DM and to balance the results with the time of onset of DM.

Many matters are worth discussing when comparing patients with and without DM. As an entity of many chronic diseases, DM may not be considered similar in every patient. Different oral and insulin medications, least to mention medication compliance of any treatment, and periods of hypo- and hyperglycaemia, may interfere with outcome. The selection and number of bypass grafts of arterial and venous origin may differ in patients. Due to the ongoing disease nature of DM, repeat revascularization may not have been considered technically feasible in some patients despite ongoing myocardial ischaemia and infarction; decreased number of repeat revascularization may, unfortunately, also signify increased mortality in the comorbid patient with, e.g. DM.

The clinical presence and significance of ongoing intramyocardial arteriosclerosis in patients with DM deserves further attention. The patients included in this study [3] were treated some 20 years ago, and current treatment protocols may differ substantially including medication. Meanwhile, the clinical data confirms the impact of DM on long-term outcome after CABG.

© The Author(s) 2025. Published by Oxford University Press on behalf of the European Association for Cardio-Thoracic Surgery.
This is an Open Access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted reuse, distribution, and reproduction in any medium, provided the original work is properly cited.

FUNDING

None declared.

Conflict of interest: none declared.

REFERENCES

[1] von Bibra H, St John Sutton M. Impact of diabetes on postinfarction heart failure and left ventricular remodeling. Curr Heart Fail Rep 2011; 8:242–51.

[2] Picchi A, Capobianco S, Qiu T *et al.*; Coronary microvascular dysfunction in diabetes mellitus: a review. World J Cardiol 2010;2:377–90.

[3] Barili F, Vitale N, D'Errigo P *et al.* The effect of diabetes on long-term outcomes in patients following coronary artery bypass grafting. Eur J Cardiothorac Surg 2025;67:ezaf024.

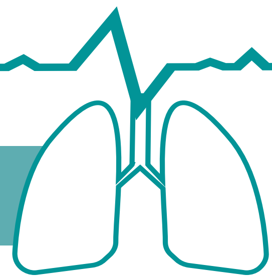
[4] Kim H, Kang D-Y, Ahn J-M *et al.*; BEST Extended Follow-Up Study Investigators. Everolimus-eluting stents or bypass surgery for multivessel disease in diabetics: the BEST extended follow-up study. JACC Cardiovasc Interv 2023;16:2412–22.

[5] Misfeld M, Sandner S, Caliskan E *et al.*; European DuraGraft Registry Investigators. Outcomes after surgical revascularization in diabetic patients. Interdiscip Cardiovasc Thorac Surg 2024;38:ivae014.

[6] Schillaci O, Tavolozza M, Di Biago D *et al.* Reverse perfusion pattern in myocardial spect with 99mTc-sestaMIBI. J Med Life 2013;6:349–54.

© The Author(s) 2025. Published by Oxford University Press on behalf of the European Association for Cardio-Thoracic Surgery.
This is an Open Access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted reuse, distribution, and reproduction in any medium, provided the original work is properly cited.
European Journal of Cardio-Thoracic Surgery, 2025, 67, 1–2
https://doi.org/10.1093/ejcts/ezaf046
Invited Commentary

Real-world experience with Thopaz+



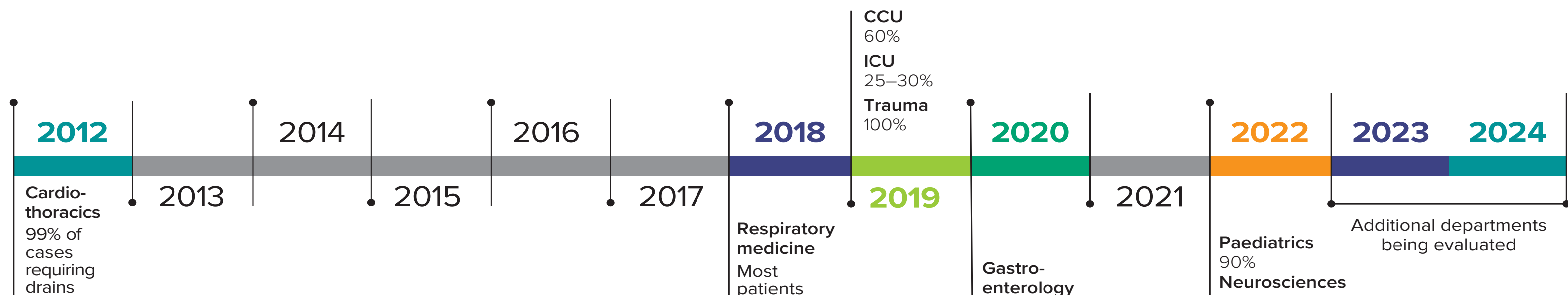
The Oxford University Hospitals NHS Foundation Trust experience

This article was funded by Medela AG

Thopaz+ is a portable digital chest drainage and monitoring system developed by Medela. It offers continuous objective monitoring of fluid loss and air leaks, which facilitates assessment of patients' progress, as well as standardisation of chest drainage management across different departments.[1] Clinical evidence has demonstrated that Thopaz+ is a useful tool in the management of patients that require chest drains and has clear clinical advantages compared with underwater seal drains.[1–3]

Thopaz+ and its predecessor, Thopaz, have been used within the Cardiothoracic Department at Oxford University Hospital NHS Trust since 2012. A report on this experience contributed to National Institute for Health and Care Excellence (NICE) Medical Technology Guidance 37.[1,4] Use of Thopaz+ in Oxford has since expanded to other departments within the trust. This document summarises the experience with Thopaz+ based on interviews with healthcare professionals (HCPs) at Oxford University Hospital NHS Trust in February/March 2024.

Evolution of Thopaz+ use in Oxford: initial introduction by department and current usage*



*Percentage of cases using Thopaz+, where known from interviews.

CHEST DRAINAGE PROTOCOLS

Each department has a chest drain protocol based on their use of Thopaz+ or underwater seal drains, and whether active suction or physio mode is needed.

MOBILISATION

Improved and earlier mobilisation is a major advantage of Thopaz+ in relation to complications associated with immobility.

OBJECTIVE AND CONTINUOUS MONITORING LEADS TO IMPROVED DECISION-MAKING

Continuous monitoring improves chest drain decision-making by providing objective estimates/measurement of leakage. It helps determine when air leaks are resolving (allowing for earlier drain removal and discharge planning) or when further intervention is needed (such as referral to a surgeon).

LENGTH OF STAY

Digital drainage facilitates day-case procedures by giving HCPs confidence that their patients have no persistent air leaks or fluid loss.

RESPIRATORY

70% of patients following pleural intervention and 60% undergoing thoracoscopy return home the same day.

CORONARY CARE UNIT (CCU)

Length of stay of 7 days with Thopaz+ compared with 10 days with underwater seal drains.

THROUGHOUT THE PATIENT JOURNEY

Thopaz+ can be used throughout a patient's journey, which can reduce the possibility of issues and errors, because drains can become kinked or displaced whenever a device is changed. Suction can be added to a Thopaz+ device set up to provide straightforward drainage simply by pressing a button to initiate suction via the device itself.

COSTS AND EFFICIENCIES

The use of the device can lead to improved operational efficiencies and cost savings, which may justify the acquisition costs. From an evidence-based practice project in the USA, a digital air leak detection device after pulmonary lobectomy led to cost savings of $2,659 per hospital day.[5]

IMPROVED PATENT SAFETY

Thopaz+ is a closed system, reducing incidents, errors, mishaps, and infections. As a dry system, Thopaz+ prevents issues with water and device positioning. Non-medical staff can manage Thopaz+ if it is knocked over, with no patient impact. Thopaz+ has its own suction source, preventing complications with wall suction becoming displaced or unclipped.

STAFF EXPERIENCE

Precise fluid and air leak measurements including time trends, improve clinician confidence and decision-making and facilitate continuity of care. The user-friendly interface makes it easier to track air leaks and fluid output. Nursing time is saved with easy canister replacement, reduced manual monitoring, and visual and audible notifications alert HCPs of issues.

PATIENT EXPERIENCE

Patients can move around freely without nursing or healthcare assistant support. Earlier discharge reduces hospital stay. Patients can monitor their progress in terms of reducing volumes of fluid and air leaks on the display.

Summary of the real-world experience with Thopaz+

The experience of HCPs within Oxford University Hospitals NHS Foundation Trust over the past 12 years has shown that Thopaz+ has multiple benefits in the right circumstances and should be available for the vast majority of patients requiring a chest drain.

Francesco Di Chiara MD, MS THOR (Hons), FEBTS
Consultant Thoracic Surgeon Oxford University Hospitals NHS Foundation Trust

Overall, our experience at Oxford University Hospitals NHS Foundation trust has shown that Thopaz+ is an indispensable asset for HCPs, redefining standards of care and operational efficiency across multiple medical departments. We encourage all units using chest drains to consider making the move from underwater seal drains to Thopaz+ in the vast majority of patients requiring chest drainage.

Quotes from interviews with a number of healthcare professionals at Oxford University Hospital NHS Trust:

From the NHS perspective, I think it probably allows us to make earlier decisions about withdrawing chest drains and getting peopleout of hospital earlier.

There are a number of ways to recoup the costs: efficiencies in the system, less litigation because things don't go wrong, staff sickness due to back injuries, and length of stay if you can get patients home quicker.

References

1. NICE. *Thopaz+ portable digital system for managing chest drains*. Medical technologies guidance 37. London: NICE, 2018 (updated 2022). (assessed March 2025)
2. Abdul Khader A *et al*. *J Thorac Dis* 2023;**15**:3776–82.
3. Frediani S, Romano G, Pardi V *et al*. *Front Pediatr* 2023;**11**:1280834.
4. Mitchell J. *Adopting Thopaz+ portable digital system for managing chest drains on the cardiothoracic ward at Oxford University Hospitals NHS Foundation Trust*. (assessed March 2025)
5. Patel C *et al*. Use of a digital air leak detection device to decrease chest tube duration. *Critical Care Nurs* 2023;**43**:11–21.

Read the full report:

The summary report has been written by HSJ Advisory on behalf of Medela AG, reflecting the views expressed in interviews with healthcare professionals. Medela AG funded the project and had input into the development of this report.

HSJ Advisory

Read the evidence

*Pioneering the digital chest drainage market since 2007. Market report and data show number 1 market share as of January 2024. Thopaz/Thopaz+ being named or referred to in >100 published studies, reports, or publicly available data.