

The Influence of Severe Obesity on the Safety of Minimally Invasive Coronary Revascularization

Volodymyr Demianenko, Marius Grossmann, Ahmed Belmenai, Hilmar Dörge, Christian Sellin

Department of Cardiothoracic Surgery, Heart-Thorax Center, Klinikum Fulda, University Medicine Marburg, Campus Fulda, Germany

Objective: Obesity is a well-established risk factor in surgical procedures; however, its impact on outcomes following Total Coronary Revascularization via Anterior Thoracotomy (TCRAT) remains uncertain. This study aimed to evaluate the influence of severe obesity on in-hospital outcomes in patients undergoing TCRAT.

Methods: A retrospective analysis was conducted on 600 patients who underwent TCRAT between November 2019 and November 2024. Patients were stratified by body mass index (BMI) into normal weight, pre-obesity, and obesity classes, with Group A (BMI <35.0 kg/m²) and Group B (BMI >35.0 kg/m²) serving as primary comparison groups. Intraoperative parameters, including total operation time, aortic cross-clamp time, and cardiopulmonary bypass (CPB) time, were recorded. Postoperative outcomes, such as ICU length of stay, incidence of delirium, atrial fibrillation, pneumonia, and wound infection, were analysed.

Results: The cohort included 551 non-obese patients (mean age 67.5 ± 9.6 years; BMI 27.4 ± 3.6 kg/m²) and 49 patients with severe obesity (mean age 63.6 ± 7.6 years; BMI 37.8 ± 2.2 kg/m²). Obese patients had significantly longer total operation times (349.4 ± 80.6 min vs. 313.4 ± 74.1 min, p < 0.05), while aortic cross-clamp times (96.5 ± 27.1 min vs. 92.5 ± 33.1 min) and CPB times (161.9 ± 34.0 min vs. 151.2 ± 42.6 min) were comparable between groups. The average number of distal anastomoses per patient was similar (3.1 ± 0.7 in obese patients vs. 3.0 ± 0.8 in non-obese patients). Postoperative complications, including pneumonia and wound infections, did not differ significantly between groups

Preoperative baseline characteristics

	BMI < 35 kg/m² (n=551)	BMI > 35 kg/m² (n=49)	p value
Age (years)	67.5±9.7 (32-88)	63.7±7.3 (50.2-78)	p<0.05
Male, n (%)	400 (87.1)	36 (83.7)	ns
BMI (kg/m²)	27.5±3.6 (18-34.9)	37.8±2.2 (35.2-42.6)	p<0.05
LVEF (%)	49.1±9.9 (10-65)	47.8±9.8 (25-60)	ns
Diabetes mellitus, n (%)	151 (32.9)	31 (72.1)	p<0.05
Hypertension, n (%)	419 (91.3)	37 (86.1)	ns
Prior PCI, n (%)	113 (24.6)	9 (20.9)	ns
Peripheral arterial disease, n (%)	224 (48.8)	24 (55.8)	ns
COPD, n (%)	80(17.4)	11 (25.6)	ns
Smoker, n (%)	137 (29.8)	17 (39.5)	ns
NYHA III, n (%)	386 (84.1)	36 (83.7)	ns
EuroScore II	3.0±2.9 (0.4-29.6)	3.3±2.6 (0.6-11.0)	ns

Operative data

	BMI < 35 kg/m² (n=551)	BMI > 35 kg/m² (n=49)	p value
LIMA, n (%)	453 (98.7)	41 (95.3)	ns
Radial artery, n (%)	300 (65.3)	30 (69.8)	ns
Multiple arterial revascularization, n (%)	306 (66.7)	29 (67.4)	ns
Distal anastomoses, n	3.0±0.8 (2-5)	3.1±0.7 (2-4)	ns
Total operation time, min	313.4±74.1 (145-618)	349.4±80.6 (212-705)	p<0.05
CPB time, min	151.2±42.6 (52-313)	161.9±34 (102-275)	ns
Aortic cross-clamp time, min	92.5±33.1 (22-255)	96.5±27.1 (45-148)	ns

In-hospital outcome

	BMI < 35 kg/m² (n=551)	BMI > 35 kg/m² (n=49)	p value
Hospital mortality, n (%)	5 (1.1)	1 (2.3)	ns
Stroke, n (%)	3 (0.6)	0 (0.0)	ns
Myocardial infraction, n (%)	3 (0.6)	0 (0.0)	ns
Re-revascularization, n (%)	5 (1.1)	0 (0.0)	ns
Revision for bleeding, n (%)	33 (7.2)	2 (4.6)	ns
Delirium, n (%)	35 (7.6)	5 (11.6)	ns
Atrial fibrillation, n (%)	45 (9.8)	5 (11.6)	ns
Pneumonia, n (%)	6 (1.3)	0 (0.0)	ns
Wound complications, n (%)	5 (1.1)	1 (2.3)	ns
Length of stay in ICU, days	2.2±4.6 (1-70)	2.7±4.5 (1-26)	ns
Length of hospital stay, days	10.8±8.6 (4-73)	12.3±9.6 (2-44)	ns

Conclusions: Severe obesity does not appear to negatively affect the safety or efficacy of TCRAT. Although operation times were longer in obese patients, complete anatomical revascularization was achieved in 100% of cases, with an average of 3.0 distal anastomoses per patient.

The incidence of postoperative complications was comparable between obese and non-obese patients. These findings indicate that obesity should not be considered a contraindication for TCRAT.

With appropriate perioperative management, TCRAT represents a viable and effective minimally invasive surgical option for complete coronary revascularization in obese patients.

Patient on the 4th postoperative day

