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Sternal microcirculation after harvesting of the left internal mammary artery.

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Thoracic internal arterial grafts for cardiac surgery in coronary artery disease, such as the left and right internal mammary artery, provide excellent longterm results regarding patency. Due to the high incidence of sternal infections after harvesting of especially both internal mammary arteries in diabetics in the pedicled technique, the blood supply of the sternum has become the focus of attention. Using Oxygen-To-See (O2C), a novel laser Doppler flowmetry and remission spectroscopy system (LEA Medizintechnik, Giessen), it is possible for the first time to measure real time parameters of microcirculation in vivo.

Methods: In this study, 17 patients (12 males) were enrolled who were scheduled for coronary artery bypass grafting (CABG). After sternotomy, the probe was placed either pre- or retrosternal for measurements of tissue oxygen saturation (S02), haemoglobin concentration (rHb), superficial (2mm) and deep (8mm) blood flow. Measurements were performed before and after clamping the left internal mammary artery (LIMA) in pedicled technique.

Results: Baseline presternal SO2 was 90±3% in line with retrosternal SO2 87±4%. After LIMA harvesting, presternal SO2 was rather unchanged (90±4%, n.s.), whereas retrosternal SO2 decreased significantly (54±4%, $p<0.05$). In line retrosternal postcapillary venous filling (rHb) increased significantly after LIMA harvesting (86±2 vs. 93±2, $p<0.05$). Retrosternal superficial and deep blood flow also decreased significantly (75±5 vs. 41±4, and 94±5 vs 52±6).

Conclusions: Pedicled LIMA grafts for coronary revascularization significantly decrease retrosternal tissue oxygen saturation with postcapillary venous stasis and expected reduced retrosternal blood flow, which may explain the higher incidence of sternal infections after pedicled LIMA harvesting. In contrast, presternal tissue microcirculation is not significantly influenced after LIMA grafting. Skeletonized LIMA preparation may minimize sternal devascularization and therefore subsequent sternal malperfusion promoting infections.