

MICROCIRCULATION OF THE HAND FOLLOWING HARVESTING OF RADIAL ARTERY FOR CORONARY BYPASS SURGERY

**K. Knobloch, A. Lichtenberg, M. Pichlmaier, H. Mertsching,
U. Klima, A. Haverich**

**Thoracic and cardiovascular surgery
Medizinische Hochschule Hannover**

Introduction: Radial artery grafts for cardiac surgery in coronary artery disease provide reasonable good longterm results regarding patency. The use of radial grafts depends on the collateral flow from the ulnar artery, which can be assessed clinically by the Allen test. Using Oxygen-To-See (O2C), a new laser Doppler flowmetry and remission spectroscopy system (LEA Medizintechnik, Giessen), it is for the first time possible to measure real time parameters of microcirculation in vivo.

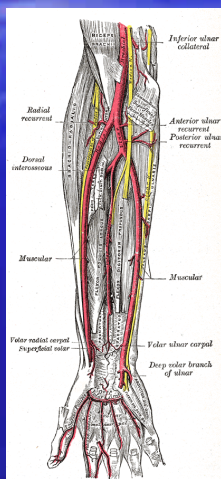


Figure A: Arterial vessel distribution of the forearm.

Methods: In this study, 23 patients (16 males) were enrolled who were scheduled for complete arterial bypass grafting. Pre- and postoperative evaluation were performed using O2C, measuring tissue oxygen saturation (SO₂), haemoglobin concentration (rHb), superficial (2mm) und deep (8mm) blood flow after either complete suprasystolic compression, radial or ulnar compression at fingertips D1/3/5 of both hands.

Results: Preoperatively, during suprasystolic compression, SO₂ decreased significantly at fingertips as expected. Radial compression reduced SO₂ (-12%/-14%/-16%), as did ulnar compression (-24%/-18%/-10%). Postcapillary venous haemoglobin concentration (rHb) did not change significantly at either compression type. Superficial and deep blood flow decreased significantly after suprasystolic, and only slightly after radial, and ulnar compression at either side. No differences were seen between the dominant and the non-dominant hand regarding all parameters examined. After radial artery harvesting, tissue parameters measured did not change significantly vs. the preoperative results.

Conclusions: The decrease of tissue SO₂ after radial compression did not show any clinical relevance regarding blood supply of the hand. No differences between the dominant and non-dominant hand were seen regarding SO₂, rHb or blood flow after radial artery grafting. Oxygen-to-see is an objective novel method to detect parameters of microcirculation in the hand. It is a safe and quantitative method for clinical assessment of ability of ulnar artery for collateral compensation in the hand after radial artery harvesting for bypass surgery compared to Allen test.



Figure B: Oxygen-to-see (O2C)-system in cardiac surgery.

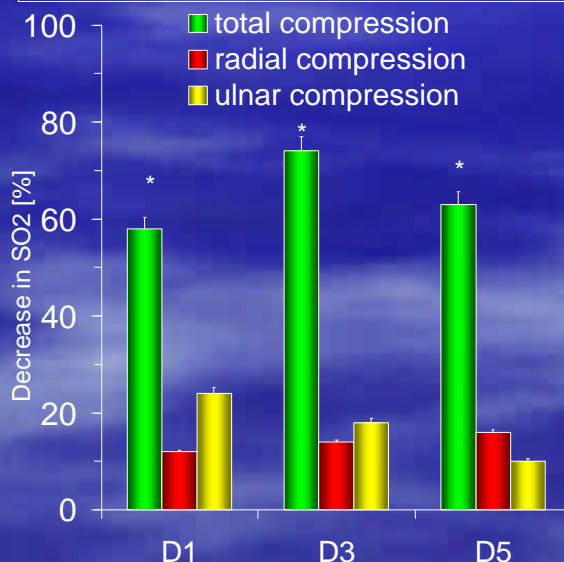


Figure C: Percent decrease of tissue oxygen saturation (SO₂) after total forearm compression, selective radial or ulnar compression preoperatively. *p<0.05