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Abstracttitel: STRAIN ECHOCARDIOGRAPHY FOR QUANTIFICATION OF INTRAOPERATIVE REGIONAL MYOCARDIAL FUNCTION

Purpose: Transesophageal echocardiography (TEE) is widely used to study myocardial segmental wall function during cardiac surgery. Conventional qualitative wall motion analysis, however, is dependent upon user experience and detects only major alterations in regional myocardial contractile function after therapeutic procedures. Recently developed techniques offer a quantitative measure of regional myocardial deformation, that may be more independent of operator experience. We aimed to exam the feasibility of TEE acquisition of strain and to compare the results of qualitative analysis with peak systolic strain measurements taken immediately before und after CABG in patients with reduced left ventricular (LV) function.

Methods: Ten patients with ejection fraction lower than 35% undergoing coronary revascularization were studied before and immediately after the procedure. B-mode cine-loops were acquired using midesophageal 2-, 4-chamber and long axis views (ME 2C, ME 4C, ME Lax) for quantitative analysis and for visual wall motion scoring (WMS). To calculate longitudinal and radial peak systolic strain we used the non-Doppler-based speckle tracking method. Wall segment function was visually scored from the same B-mode cine-loops.

Results: A total of 120 myocardial segments were analyzed pre and post coronary artery bypass grafting (CABG). In WMS there were 29 normokinetic (N), 69 hypokinetic (H), 19 akinetic (A) and 3 dyskinetic (D) segments preoperatively and 26 N, 65 H, 21 A and 8 D segments after CABG. Preoperative radial strain correlated well with WMS ($r^2 = 0.67$, $p < 0.0001$) while longitudinal strain showed only a weak correlation ($r^2 = 0.19$, $p < 0.0001$). Postoperatively correlations were similar. Preoperatively strain was significantly greater in normally perfused segments than in ischemic segments, while mean WMS revealed no difference. Also, WMS did not change after CABG, while strain decreased in normally perfused segments and remained unchanged (radial) or decreased (longitudinal) in revascularized segments.

Conclusion: Strain calculation from TEE images is feasible during cardiac surgery and correlates well with WMS. Strain analysis but not WMS detected functional differences between normally perfused and ischemic segments as well as alterations in segment function after cardioplegic ischemia. This simple and reliable method allows intraoperative quantification of myocardial segment function and may provide important information for intraoperative and postoperative patient care.