Presented at EACTA (Poster 36), Barcelona, 7 June 2013.

Haemodynamic monitoring with hTOE? – A case series report

S. Treskatsch, M. Habicher, J.P. Braun, C. Spies, M. Sander

Department of Anesthesiology and Intensive Care Medicine, Campus Charite Mitte, Charité - Universitätsmedizin Berlin, Germany

Introduction

Low cardiac output (CO) is one of the major determinates of insufficient oxygen delivery [1]. Today, in case of severe hemodynamic instability (HI) a multiplane transoesophageal echocardiography (TOE) is recommended to determine underlying pathophysiological causes, e.g. hypovolaemia, reduced myocardial contractility, etc. [2]. However, performing a monoplane, continuous, haemodynamic focused, transoesophageal examination (hTOE) using the ImaCor® ClariTEE® probe might be a useful alternative and we want to present our first experiences.

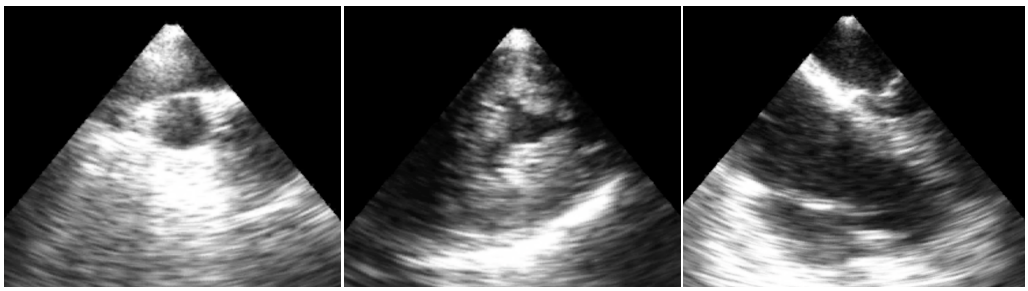
Methods

Residents of our ICU, not previously familiar with echocardiography, received an approx. 6-hours training session to obtain the three most important 2D views to determine haemodynamics: a) transgastric short axis view of the left ventricle, b) mid-oesophageal four chamber view and c) mid-oesophageal superior vena cava (SVC) view. For continuous examination the probe was designed to remain in situ for up to 72 hours.

Results

Up to date, we performed 10 hTOE´s in cardiac surgery patients experiencing sustained haemodynamic instability postoperatively. In all cases residents achieved at least moderate image quality which was sufficient for haemodynamic guidance. Results of the hTOE exams changed the current therapy in nearly all cases, e.g. a) further volume administration in patients with severely reduced left ventricular function, b) re-operation due to pericardial tamponade, c) supporting right ventricular function due to new postoperative failure, etc. In three cases hTOE changed clinical management despite measurements from an inherent PAC and/or PICCO.

	Age (years)	Sex	Indication	Image quality	Views	Main finding hTOE	Change in therapy	How?
1	78	W	HI *post* myocardial biopsy, known pulmonary hypertension	Good	3 / 3	Right Heart Failure	Yes	NO
2	70	M	HI *post* emergent CABG	Moderate	3 / 3	Hypovolaemia, Pericardial Tamponade	Yes	Volume and Redo
3	85	M	HI *post* CABG	Good	3 / 3	Hypovolaemia, Left Heart Failure	Yes	Volume and Levosimendan
4	64	W	HI *post* MV replacement	Moderate	3 / 3	New akinesia inferior and reduced right heart function (mainly due to insuffcient RCA cardioplegia)	Yes	Levosimendan and NO, Angiography
5	78	M	HI *post* CABG, *PAC in situ / „normal values“*	Good	3 / 3	Hypovolaemia, Left Heart Failure	Yes	Volume, Dobutamin → Epinephrine
6	75	M	Hi *post* CABG / NSTEMI, *PICCO in situ / „normal values“*	Good	3 / 3	Hypovolaemia, Left Heart Failure	Yes	Volume, Dobutamin → Epinephrine
7	69	M	HI *post* CABG / NSTEMI, *PAC in situ / „normal values“*	Moderate	3 / 3	Hypovolaemia, Left Heart Failure	Yes	Volume, Epinephrine
8	78	M	HI *post* TAVI, oulmonary hypertension / COPD	Moderate	3 / 3	Right Heart Failure, dynamic LVOT obstruction	Yes	Heart rate control, Norepinephrine ↑, Epinephrine↓
9	56	M	HI *post* emergent CABG	Good	3 / 3	Hypervolaemia, Left Heart Failure	Yes	Levosimendan, Volume restriction
10	74	M	HI *post* Re-AV-Endocarditis with coronary reinsertion	Good	3 / 3	Right Heart Failure	Yes	Volume restriction / guided by VCS, Levosimendan, NO



Case 10 „Right Heart Failure“:

Left: Dilated SVC

Middle: Left ventricular hypovolaemia, normal left ventricular systolic function

Right: Right ventricular dilation, severly reduced right ventricular function

Discussion

Performing hTOE in haemodynamically instable patients was feasible without extensive cardiologic echocardiographic knowledge. Current haemodynamic management was immediately and persistently influenced by hTOE, occasionally despite an extended haemodynamic monitoring [3]. Nevertheless, prospective, randomised, clinical trials investigating a possible benefit of hTOE are lacking so far.

[1] Giglio M, Dalfino L, Puntillo F, et al. Haemodynamic goal directed therapy in cardiac and vascular surgery. A systematic review and meta-analysis. interact Cardiovasc Thorac Surg 2012; 15: 818-87 [2] Flachskampf FA, Badano L, Daniel WG, et al. Recommendations for transoesophageal echocardiography: update 2010. Eur J Echocardiogr 2010; 11: 557–576 [3] Benjamin E, Griffin K, Leibowitz AB, et al. Goal-directed transesophageal echocardiography performed by intensivists to assess left ventricular function: comparison with pulmonary artery catheterization. J Cardiothorac Vasc Anesth 1998; 12: 10–15