

Intraoperative Cardiac Ultrasound Examination Using Vector Flow Imaging - DTU Orbit (09/11/2017)

Intraoperative Cardiac Ultrasound Examination Using Vector Flow Imaging

Conventional ultrasound (US) methods for blood velocity estimation only provide onedimensional and angle-dependent velocity estimates; thus, the complexity of cardiac flow has been difficult to measure. To circumvent these limitations, the Transverse Oscillation (TO) vector flow method has been proposed. The vector flow method implemented on a Commercial scanner provided real-time, angle-independent estimates of cardiac blood flow. Epicardiac and epiaortic, intraoperative US examinations were performed on three patients with stenosed coronary arteries scheduled for bypass surgery. Repeating cyclic beat-to-beat flow patterns were seen in the ascending aorta and pulmonary artery of each patient, but these patterns varied between patients. Early systolic retrograde flow filling the aortic sinuses was seen in the ascending aorta as well as early systolic retrograde flow in the pulmonary artery. In diastole, stable vortices in aortic sinuses of the ascending aorta created central antegrade flow. A stable vortex in the right atrium was seen during the entire heart cycle. The measurements were compared with estimates obtained intraoperatively with conventional spectral Doppler US using a transesophageal and an epiaortic approach. Mean differences in peak systole velocity of 11% and 26% were observed when TO was compared with transesophageal echocardiography and epiaortic US, respectively. In one patient, the cardiac output derived from vector velocities was compared with pulmonary artery catheter thermodilution technique and showed a difference of 16%. Vector flow provides real-time, angle-independent vector velocities of cardiac blood flow. The technique can potentially reveal new information of cardiovascular physiology and give insight into blood flow dynamics.

General information

State: Published

Organisations: Department of Electrical Engineering, Biomedical Engineering, Center for Fast Ultrasound Imaging, Copenhagen University Hospital

Authors: Hansen, K. L. (Ekstern), Pedersen, M. M. (Ekstern), Møller-Sørensen, H. (Ekstern), Kjaergaard, J. (Ekstern), Nilsson, J. C. (Ekstern), Lund, J. T. (Ekstern), Jensen, J. A. (Intern), Bachmann, M. B. (Ekstern)

Pages: 318–322

Publication date: 2013

Main Research Area: Technical/natural sciences

Publication information

Journal: Ultrasonic Imaging

Volume: 35

Issue number: 4

ISSN (Print): 0161-7346

Ratings:

BFI (2017): BFI-level 1

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 1

Scopus rating (2016): SJR 0.858 SNIP 0.912 CiteScore 1.75

BFI (2015): BFI-level 1

Scopus rating (2015): SJR 0.606 SNIP 0.751 CiteScore 1.76

BFI (2014): BFI-level 1

Scopus rating (2014): SJR 0.871 SNIP 1.028 CiteScore 1.63

BFI (2013): BFI-level 1

Scopus rating (2013): SJR 0.768 SNIP 0.623 CiteScore 1.29

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 1

Scopus rating (2012): SJR 0.745 SNIP 0.918 CiteScore 1.41

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 2

Scopus rating (2011): SJR 0.753 SNIP 0.722 CiteScore 1.63

ISI indexed (2011): ISI indexed yes

BFI (2010): BFI-level 2

Scopus rating (2010): SJR 0.602 SNIP 0.753

BFI (2009): BFI-level 2

Scopus rating (2009): SJR 0.713 SNIP 1.231

BFI (2008): BFI-level 1

Scopus rating (2008): SJR 1.107 SNIP 0.919

Scopus rating (2007): SJR 1.358 SNIP 1.399

Scopus rating (2006): SJR 1.157 SNIP 1.208

Scopus rating (2005): SJR 1.025 SNIP 1.12

Scopus rating (2004): SJR 0.721 SNIP 1.07

Scopus rating (2003): SJR 1.195 SNIP 1.471

Scopus rating (2002): SJR 1.098 SNIP 0.812

Scopus rating (2001): SJR 1.2 SNIP 1.09

Scopus rating (2000): SJR 1.944 SNIP 1.851

Scopus rating (1999): SJR 1.025 SNIP 1.107

Original language: English

Ultrasound, Vector flow imaging, Cardiac imaging, Blood flow, Transverse Oscillation

Electronic versions:

[hansen_2013.pdf](#)

DOIs:

[10.1177/0161734613505552](https://doi.org/10.1177/0161734613505552)

Source: dtu

Source-ID: u:**8839**

Publication: Research - peer-review › Journal article – Annual report year: 2013