Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

Original research article

Me 4 chamber view in asessment of regional wall motion abnormality using transoesophageal echocardiography

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Abstract

In this global and RWMA, both are assessed in systole and diastole which gives information about the wall and the artery to be grafted. It also helps in assessing the EF. IOTOE also helps in giving information about giving order of preference for grafting. It also helps to decide the need for IABP and ionotropes to maintain the haemodynamic stability. Septal wall examination before grafting showed, dyskinesia, akinesia, severe hypokinesia and mild hypokinesia in 7 (10%), 8 (11%), 11 (15%) and 15 (21%) patients. There were 31 (43%) patients with normokinetic wall movement. Post grafting there was improvement as 48 (67%) patients had normokinetic wall movement. Mild hypokinetic wall movement was seen in 23 (32%) patients and only 1 (1%) patient had severe hypokinesia. On assessment, lateral wall of 3 (4%) patients had dyskinesia, 4 (6%) patients had akinesia and 11 (15%) patients had severe hypokinesia before grafting. There were 30 (42%) patients with normokinetic wall movement. After grafting, normokinesia was seen in 52 (72%) patients and mild hypokinesia in 20 (28%) patients. There were no akinetic, dyskinetic and severely hypokinetic wall movement in any of the patients.

Keywords: Me 4chamber view, regional wall motion abnormality, transoesophageal echocardiography

Introduction

Since its invention, the TOE probe has undergone various changes and technological modifications to enhance its imaging capability and modify the probe structure and design. The first TOE probe consisted of an M-mode transducer attached to a coaxial cable. Later a phased array transducer was attached to the end of a gastroscope, which along with producing two- dimensional images, also allowed for finer control of the transducer position by using the flexion and angling controls akin to a gastroscope. The biplane transducer was later introduced in 1984, followed by the development of multiplane transducer in 1992. A number of technological developments such as the introduction of a flexible endoscope, probe temperature regulation, miniaturization, transducer design, addition of colour and spectral Doppler, and three-dimensional imaging, have led to the widespread usage of TOE in clinical care [1, 2].

Perioperative TOE is generally considered to be a safe monitoring modality. Traumatic placement or unwanted manipulation of the probe may lead to an increased chance of morbidity. The use of force should be prohibited while manipulating the TOE probe.

In this global and RWMA, both are assessed in systole and diastole which gives information about the wall and the artery to be grafted. It also helps in assessing the EF. IOTOE also helps in giving information about giving order of preference for grafting. It also helps to decide the need for IABP and ionotropes to maintain the haemodynamic stability [3].

Post grafting RWMA and EF helps in predicting the outcome of OPCAB. IOTOE assess the improvement of wall motion due to previously dysfunctional segments, thereby concluding good anastomosis of the grafted vessel [4].

Methodology

Study design: Prospective observational study

Study population: Adult patients who underwent elective OPCAB procedure

Sample size: 83

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

Sample selection
Inclusion criteria
Adult patients who underwent OPCAB

Exclusion criteria
1. Contraindications for TOE-
2. Oesophageal pathology
3. Aortic aneurysm
4. Suspected/ actual neck injury
5. Post radiation therapy,
6. Emergency surgical procedures
7. Off pump CABG converted to on pump CABG
8. Patients weighing less than 25kg.

Results
In ME 4 chamber view, we assessed septal and lateral wall of the left ventricle.

Table 1: Pre-grafting findings of septal wall in ME 4 chamber view

Wall	RWMA	No of patients
Septal	Dyskinesia	7 (10%)
	Akinesia	8 (11%)
	Severe hypokinesia	11 (15%)
	Mild hypokinesia	15 (21%)
	Normokinesia	31 (43%)

Septal wall examination before grafting showed, dyskinesia, akinesia, severe hypokinesia and mild hypokinesia in 7 (10%), 8 (11%), 11 (15%) and 15 (21%) patients. There were 31 (43%) patients with normokinetic wall movement. Post grafting there was improvement as 48 (67%) patients had normokinetic wall movement. Mild hypokinetic wall movement was seen in 23 (32%) patients and only 1 (1%) patient had severe hypokinesia.

Table 2: Pre-grafting findings of lateral wall in ME 4 chamber view

Wall	RWMA	No of patients
Lateral	Dyskinesia	3 (4%)
	Akinesia	4 (6%)
	Severe hypokinesia	11 (15%)
	Mild hypokinesia	24 (33%)
	Normokinesia	30 (42%)

On assessment, lateral wall of 3 (4%) patients had dyskinesia, 4 (6%) patients had akinesia and 11 (15%) patients had severe hypokinesia before grafting. There were 30 (42%) patients with normokinetic wall movement. After grafting, normokinesia was seen in 52 (72%) patients and mild hypokinesia in 20 (28%) patients. There were no akinetic, dyskinetic and severely hypokinetic wall movement in any of the patients.

Discussion
Savage *et al.* [5] conducted a prospective study in high risk patients undergoing CABG in a period of eight months between March to November 1995. In this study comparison between groups using of IOTOE (study group) with no IOTOE (control group) use was done. High risk patients were classified based on severity score criteria, where score > 4 was defined as high risk. Study group with IOTOE included 82 patients and NO IOTOE group included 478 patients. A SONOS 2500 (M2406A) Ultrasound System with a (21367A) 6.2/5.0-MHz OMNI II multiplane transoesophageal echocardiographic probe and linear array 7.5-MHz (21367A) transducer for epivascular scanning (Hewlett Packard, Andover, MA) was used in each of the 82 patients. Examination was done at four stages during the procedure which consisted of assessment of all cardiac chambers during systole and diastole which gives information about RWMA, structure and functional status of valve, and the ascending and descending aorta for any atheromatous changes. Between the two groups studied, age and severity scores were comparable. There was one (1.2%) hospital death in the study group, whereas 18 (3.8%) deaths were reported in the control group and myocardial infarction was reported in one (1.2%) patient in the study group and seven (3.5%) patients in the control group.
Sutton and Kluger. [6] did a prospective observational study on 238 consecutive adult patients who underwent cardiac surgeries with IOTOE examination between October 1993 to August 1995. The study population was divided into routine TOE group i.e., IOTOE examination was not requested by surgeon

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

but routinely done in all and TOE requested group i.e., IOTOE examination requested by surgeon. Experienced anaesthesiologist in TOE investigated the patients before the commencement of the study. In the routine TOE group 120 patients underwent CABG out of which new RWMA was found in 25 (21%) patients before grafting and 22 among them had wall improvement in post grafting. Three patients required graft revision and had improvement post procedure. Routine TOE was done in 64 patient who underwent valve replacement or other cardiac surgeries in which 12 (19%) patients had significant TOE findings. In TOE requested group 45 out of 46 electively posted had significant diagnostic information which refined preoperative diagnosis and surgical planning. In this study IOTOE provided precise diagnostic information in 21% of patients and alteration of surgical plan in 6% of patients. Hence, the authors have demonstrated significant impact of routine TOE in cardiac surgeries.

Koolen *et al*. [7] conducted a study on 30 patients undergoing elective CABG. 2D TOE was done for all patients at cross – sections at the level of papillary muscles with an interval of 15 minutes after intubation, 15 minutes after sternal closure, 6 and 12 hours after procedure in Intensive care unit. Using floating axis system regional myocardial function of eight segmental areas were documented. Depending on baseline regional ejection fraction (RAEF) the segments conditions were classified into 4 types - condition I) RAEF < 0%; condition II) RAEF = 0% to 25%; condition III) RAEF = 26% to 50%; or condition IV) RAEF > 50% (normal). With respect to baseline values after induction, RAEF changes seen after sternal closure i.e., after revascularisation in condition I from 10.4% +/- 5.4% to 17.6% +/- 10.3% (p<.01), in condition II from14.3% +/- 6.1% to 30.7% +/- 7.8% (p<.01), and in condition III from 35.0% +/- 6.1% to 50.4% +/- 6.3% (p<.01). Later in intensive care unit there was no improvement of RAEF in any of the above conditions. The study concluded that the preoperative normal myocardial function of a region was not hampered in coronary revascularization procedure and also the abnormal myocardium improved immediately after revascularization.

Shih *et al*. [8] did study in which IABP placement confirmation using TOE was compared with fluoroscopy in patients who underwent cardiopulmonary bypass for various cardiac surgeries. The study was done on 56 patients who required IABP for haemodynamic support. All these patients IABP position was verified using TOE. Balloon tip of IABP was identified by TOE and again it was confirmed by postoperative portable chest x – ray. The balloon tip placement in proximal descending aorta was successfully verified by TOE in 98.1% of patients as confirmed by post-operative chest x ray. In five (8.9%) of patients there was failure to pass the balloon catheter in first attempt attributing to high arterial resistance. One (1.8%) case of iatrogenic aortic dissection and one case in the wrong lumen was also detected by TOE. There was no case of early death report due to IABP insertion. Thus, the study concludes that TOE can replace the fluorography in verifying balloon catheter position quickly and also helps in early detection of complication of IABP.

Conclusion

IOTOE should be employed as a routine assessment tool in OPCAB procedure for monitoring, surgical planning, and assessment of surgical outcome.

References

1. Mathew JP, Ayoub CM, Swaminathan M, editors. Clinical manual and review of transesophageal echocardiography. 3rd ed. Vol. 1. New York, United states: Mc Graw Hill; c2019.
2. Muralidhar K, Tempe D, Chakravarthy M, Shastry N, Kapoor PM, Tewari P, *et al*. Practice guidelines for perioperative transesophageal echocardiography: Recommendations of the Indian association of cardiovascular thoracic anesthesiologists. Ann Card Anaesth. 2013;16(4):268.
3. Bergquist BD, Bellows WH, Leung JM. Transesophageal echocardiography in myocardial revascularization: II. Influence on intraoperative decision making. Anesth & Analg. 1996;82(6):1139-45.
4. Hahn RT, Abraham T, Adams MS, Bruce CJ, Glas KE, Lang RM, *et al*. Guidelines for performing a comprehensive transesophageal echocardiographic examination: recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists. Journal of the American Society of Echocardiography. 2013;26(9):921-64.
5. Savage RM, Lytle BW, Aronson S, Navia JL, Licina M, Stewart WJ, *et al*. Intraoperative echocardiography is indicated in high-risk coronary artery bypass grafting. Ann Thorac Surg. 1997;64(2):368-74.
6. Sutton DC, Kluger R. Intraoperative transoesophageal echocardiography: impact on adult cardiac surgery. Anaesth Intensive Care. 1998;26(3):287-93. DOI: 10.1177/0310057X9802600310.
7. Koolen JJ, Visser CA, Van Wezel HB, Meyne NG, Dunning AJ. Influence of coronary artery bypass surgery on regional left ventricular wall motion: An intraoperative two-dimensional transesophageal echocardiographic study. J Cardiothorac Anesth. 1987;1(4):276-83. DOI: 10.1016/s0888-6296(87)80037-6
8. Shih CT, Yang MW, Lai ST, Lin CY. Early detection of the tip position and complication of the intra-aortic balloon pump catheter by perioperative transesophageal echocardiography. Zhonghua yi

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

xue za zhi. Chinese medical journal; Free China ed. 1994;53(3):131-4.