

Title : TRANSESOPHAGEAL 2D ECHOCARDIOGRAPHY EJECTION FRACTION AREA : CORRELATION WITH GATED RADIONUCLIDE ANGIOGRAPHY.

Authors : D. BRUERE, M.D., P. CORIAT, M.D., Y. PHILIP, M.D., L. MONTEJO, M.D., M. FAUCHET, M.D., S. CHEOUR, M.D., P. VIARS, M.D.

Affiliation : Département d'Anesthésie Réanimation Groupe Hospitalier Pitié Salpêtrière
75013 PARIS - FRANCE -

The assessment of global left ventricular function by transesophageal two dimensional echocardiography (TEE) may be determined by deriving the fractional area changes (F.A.C.) from end systolic (ESa) and end diastolic (EDa) area (1). However it has never been demonstrated that the value of F.A.C. obtained with TEE correlates with that of left ventricular ejection fraction obtained by gated radionuclide angiography (GRA), considered one of the gold standards for ejection fraction measurement (2).

The aim of our study was to determine the degree of correlation of ejection fraction obtained with these two techniques in awake patients.

METHODS : Twenty seven patients undergoing either abdominal aortic or distal vascular surgery were studied. All gave informed consent after approval from our Ethics Committee.

Those patients on chronic cardiac medications received their usual treatment up until 2 hours before both GRA and TEE.

GRA was performed 24 to 48 hours before the surgical procedure. Data were collected with a large field gamma camera oriented in a modified L.A.O. 30° position. First pass and equilibrium studies (250 cardiac cycles) were undertaken. These were then sequentially read by two experienced radiologists who were unaware of the patients' clinical findings; the mean results were considered.

TEE was performed in awake patients two hours before surgery. After premedication with morphine 5 mg, scopolamine 0.5 mg and topical anesthesia of the pharynx (lidocaine gel) a Diasonics 3.5 MHz TEE probe was gently introduced into the patients' esophagus and positioned to afford the most spherical short axis view of the left ventricle at the level of the papillary muscles. In 17 patients in whom a radial artery and pulmonary catheters were in place prior to introduction of the TEE transducer, hemodynamic measurements were determined before and 10 minutes after the probe insertion. Images were recorded at this time, with the patient in a quiet state. Retrospectively, four successive beats were quantitatively analyzed by a light pen digitizing system to provide a mean value for cross sectional area. F.A.C. was calculated as $((EDa - ESa)/EDa) \times 100$

The percent change in hemodynamic parameters before and after the probe insertion is expressed as mean \pm SD. Correlation of FAC and EF is demonstrated by linear regression analysis.

RESULTS : All patients had a systolic blood pressure (SBP) below 160 mmHg before probe insertion. At the swallowing of the probe a transient elevation in SBP greater than 180 mmHg was observed in 12 patients. Ten minutes after probe insertion, we noted that SBP ($9\% \pm 13\%$), heart rate ($6\% \pm 8\%$) and cardiac output ($6\% \pm 10\%$) were higher than at pre probe insertion time. Correlation between FAC by TEE and

FE by GRA is excellent : $FAC : .91 FE + 3$, $r = .92$ (Figure).

DISCUSSION : We found a close correlation between FAC obtained by TEE and EF obtained by GRA in awake patients. TEE cannot provide an accurate assessment of long axis dimensions in the left ventricle. This limitation is unimportant when considering global LV function since myocardial shortening occurs essentially in the short axis (3).

Ejection fraction, derived from precordial echocardiography recordings is known to minimally underestimate E.F. determined using GRA (3). Perhaps due to the slight hyperdynamic state induced by probe placement, our results are not consistent with the above finding.

Since GRA is known to provide a highly accurate and reproducible measurement of LV ejection fraction, the information obtained on global LV function using TEE, a non invasive tool, can be considered reliable and valuable.

REFERENCES

- 1 - ABEL MD., NISHIMURA RA., CALLAHAN MJ. et al. Evaluation of intraoperative transesophageal two dimensional echocardiography. *Anesthesiology* 66 : 64-68, 1987.
- 2 - GOULD KL. Quantitative imaging in nuclear cardiology (Editorial). *Circulation* 66 : 1141-1146, 1982.
- 3 - TRIULZI MO., WILKINS G., GILLAM L., et al. Normal adult cross-sectional echocardiographic values : left ventricular volumes. *Echocardiography* 2 : 153-169, 1985.

