

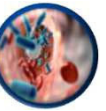
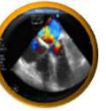
DIU TUSAR

Bordeaux – Lundi 15 décembre 2025

ETT & ETO : quelles incidences pour quels paramètres en soins critiques ?

Philippe Vignon

Réanimation Polyvalente
Inserm CIC 1435
CHU Limoges



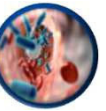
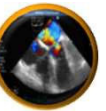
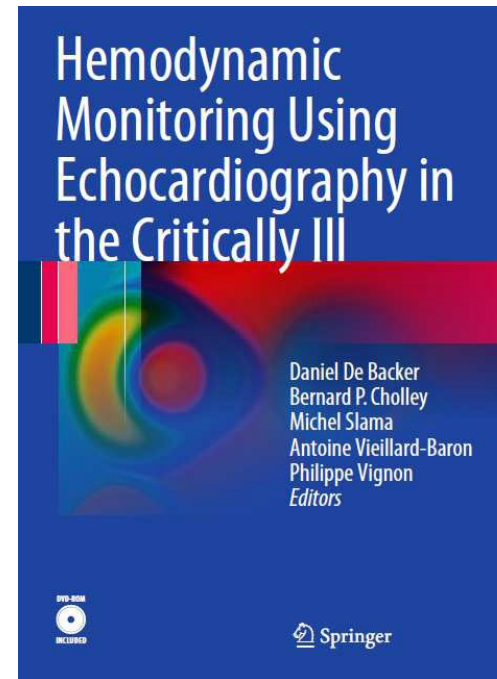
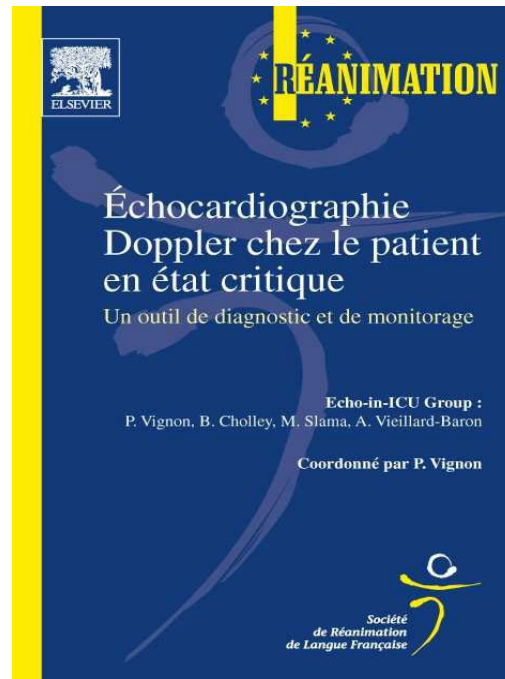
DIU TUSAR

Bordeaux – Lundi 15 décembre 2025

Conflit d'intérêt

Philippe Vignon

Réanimation Polyvalente
Inserm CIC 1435
CHU Limoges





Diagnostic accuracy and therapeutic impact of transthoracic and transesophageal echocardiography in mechanically ventilated patients in the ICU

P Vignon, H Mentec, S Terre, H Gastinne, P Gueret and F Lemaire

Chest 1994;106;1829-1834

L'ETO a globalement une capacité diagnostique supérieure à l'ETT

Table 3—Transthoracic (TTE) vs Transesophageal (TEE) Echocardiographic Findings According to the Clinical Problems (n=98) in Patients Who Were Scheduled for Both Examinations (n=96)

Clinical Problems		No Superiority of TEE Over TTE	Diagnosis Ruled Out by TEE and Not Excluded by TTE	Additional Diagnosis Yielded by TEE Without Therapeutic Impact	Additional Diagnosis Yielded by TEE With Therapeutic Impact*
Shock, hypotension	(n=19)	0	2	4	13 (2)
Endocarditis	(n=18)	1	10	4	3 (2)
Traumatic rupture of the aortic isthmus, acute aortic dissection	(n=16)	1	10	1	4 (3)
Valvulopathy or valvular prosthesis assessment	(n=12)	0	3	5	4 (1)
Left ventricular function	(n=9)	0	5	1	3
Assessment of a cardiopathy after cardiac arrest	(n=6)	0	2	3	1
Pulmonary hypertension, thrombus in right chambers	(n=5)	0	4	0	1
Systemic arterial embolism	(n=4)	0	2	1	1
Ventricular assistance device	(n=4)	0	2	2	0
Patent foramen ovale	(n=3)	0	2	1	0
Atrial compression by postoperative hematoma	(n=1)	0	1	0	0
Tumor of the mediastinum	(n=1)	0	1	0	0
Total	(n=98)	2	44	22	30

*The number of patients who underwent cardiovascular surgery based on TEE findings are indicated in parentheses.



Si ETO, toujours commencer par l'ETT (guide l'examen, informations complémentaires)

Favors transthoracic echocardiography	Favors transesophageal echocardiography
Versatility, strictly non invasive , availability, no contra-indication (even in spontaneously breathing patients)	Consistent high imaging quality, reproducibility and stability of imaging planes (especially in ventilated patients)
Assessment of superficial anatomical structures (apical thrombus, pericardial space, inferior vena cava)	Assessment of deep anatomical structures (great vessels, base of heart, mediastinum, prosthetic valves, atria and appendages)
Optimal alignment of Doppler beam with transvalvular blood flows (mitral, aortic and tricuspid valves), and abnormal jets (valvulopathy, left ventricular outflow tract obstruction)	Precise identification of the mechanism of certain native or prosthetic valve dysfunctions (eccentric mitral regurgitation, prosthetic valve dysfunction) Identification of intracardiac shunts
Evaluation of pulmonary artery pressure (tricuspid and pulmonary regurgitant jets)	Identification of great vessels diseases (proximal pulmonary embolism, spontaneous or traumatic acute aortic conditions)



ASE GUIDELINES AND STANDARDS

Guidelines for Performing a Comprehensive Transesophageal Echocardiographic Examination: Recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists

Rebecca T. Hahn, MD, FASE, Chair, Theodore Abraham, MD, FASE, Mark S. Adams, RDCS, FASE, Charles J. Bruce, MD, FASE, Kathryn E. Glas, MD, MBA, FASE, Roberto M. Lang, MD, FASE, Scott T. Reeves, MD, MBA, FASE, Jack S. Shanewise, MD, FASE, Samuel C. Siu, MD, FASE, William Stewart, MD, FASE, and Michael H. Picard, MD, FASE, *New York, New York; Baltimore, Maryland; Boston, Massachusetts; Rochester, Minnesota; Atlanta, Georgia; Chicago, Illinois; Charleston, South Carolina; London, Ontario, Canada; Cleveland, Ohio*

(J Am Soc Echocardiogr 2013;26:921-64.)

Table 4 General indications for TEE

General indication	Specific examples
1. Evaluation of cardiac and aortic structure and function in situations where the findings will alter management and TTE is non-diagnostic or TTE is deferred because there is a high probability that it will be non-diagnostic.	a. Detailed evaluation of the abnormalities in structures that are typically in the far field such as the aorta and the left atrial appendage. b. Evaluation of prosthetic heart valves. c. Evaluation of paravalvular abscesses (both native and prosthetic valves). d. Patients on ventilators. e. Patients with chest wall injuries. f. Patients with body habitus preventing adequate TTE imaging. g. Patients unable to move into left lateral decubitus position.
2. Intraoperative TEE.	a. All open heart (i.e., valvular) and thoracic aortic surgical procedures. b. Use in some coronary artery bypass graft surgeries. c. Noncardiac surgery when patients have known or suspected cardiovascular pathology which may impact outcomes.
3. Guidance of transcatheter procedures	a. Guiding management of catheter-based intracardiac procedures (including septal defect closure or atrial appendage obliteration, and transcatheter valve procedures).
4. Critically ill patients	a. Patients in whom diagnostic information is not obtainable by TTE and this information is expected to alter management.



ASE GUIDELINES AND STANDARDS

Guidelines for Performing a Comprehensive Transesophageal Echocardiographic Examination: Recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists

Rebecca T. Hahn, MD, FASE, Chair, Theodore Abraham, MD, FASE, Mark S. Adams, RDCS, FASE, Charles J. Bruce, MD, FASE, Kathryn E. Glas, MD, MBA, FASE, Roberto M. Lang, MD, FASE, Scott T. Reeves, MD, MBA, FASE, Jack S. Shanewise, MD, FASE, Samuel C. Siu, MD, FASE, William Stewart, MD, FASE, and Michael H. Picard, MD, FASE, *New York, New York; Baltimore, Maryland; Boston, Massachusetts; Rochester, Minnesota; Atlanta, Georgia; Chicago, Illinois; Charleston, South Carolina; London, Ontario, Canada; Cleveland, Ohio*

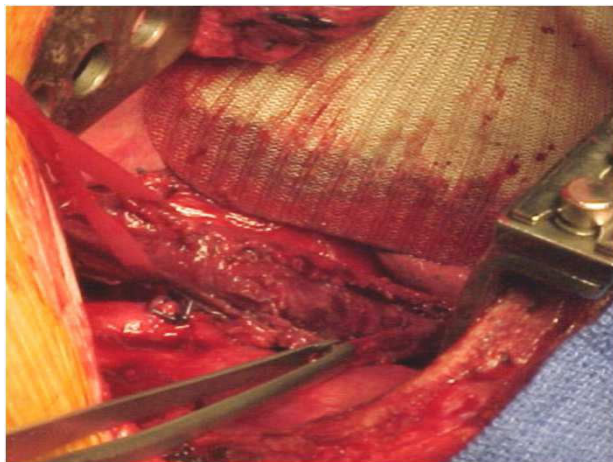
(J Am Soc Echocardiogr 2013;26:921-64.)

Table 6 List of absolute and relative contraindications to transesophageal echocardiography

Absolute contraindications	Relative contraindications
• Perforated viscus • Esophageal stricture • Esophageal tumor • Esophageal perforation, laceration • Esophageal diverticulum • Active upper GI bleed	• History of radiation to neck and mediastinum • History of GI surgery • Recent upper GI bleed • Barrett's esophagus • History of dysphagia • Restriction of neck mobility (severe cervical arthritis, atlantoaxial joint disease) • Symptomatic hiatal hernia • Esophageal varices • Coagulopathy, thrombocytopenia • Active esophagitis • Active peptic ulcer disease

GI, Gastrointestinal.

Modified from Hilberath *et al.*²⁶



Tolérance de l'ETO

Good	Questionable	Contra-indications
Ventilated patients	Spontaneously breathing unstable patients	Oesophagogastric surgery
Adequate sedation	Shock potentially related to tamponade or massive pulmonary embolism in the absence of mechanical ventilation	Any relevant esophageal disease
		Excessive risk of bleeding
		Unstable neck fracture Mediastinal radiation therapy

Vignon P et al. In: Hemodynamic monitoring using echocardiography Doppler in the critically ill. Springer 2011



Complications de l'ETO (1)

- ❖ Respect des contre-indications +++
- ❖ Introduction de la sonde d'ETO sous contrôle de la vue (ventilés)
- ❖ Hütteman et al. : 2 504 ETO en réanimation ; 2,6% complications (2006)
- ❖ Daniel et al. : 10 419 ETO en cardiologie (multicentrique) ; 0,88% complications (1991)
- ❖ Min et al. : 10 000 ETO en cardiologie (monocentrique) ; 0,88% complications et 0,03% de perforation digestive haute (2005)
- ❖ Risque : respiratoire chez les patients instables en VS +++



Complications de l'ETO (2)

TABLE II.—*Complications of TEE in the ICU (21 studies with n=2 508 examinations). With permission from Hüttemann et al.¹⁰*

Category	Details	N.
Airway	Displacement of tracheostomy tube (1), pulmonary aspiration during tracheal intubation before TEE (1)	2
Ventilation	Respiratory failure (1), transient hypoxia (4)	5
Circulation	Hypotension (15), hypertension (4), increase in pulmonary artery pressure (1)	20
Arrhythmias	Atrial flutter, atrial fibrillation (5), VES (1)	6
Cardiac arrest	Circumstances not further specified (1), due to abruptly discontinued inotropic support but successful resuscitation - not related to TEE study (1)	2
Seizures	Grand mal seizure (1)	1
Vomitus	(1)	1
Coughing	(7)	7
Oropharyngeal mucosal lesions	Superficial mucous lesion (1), self-terminating oral blood suffusion (15), oropharyngeal bleeding (1)	17
Total		61 (2.6%)



ASE GUIDELINES AND STANDARDS

Guidelines for Performing a Comprehensive Transesophageal Echocardiographic Examination: Recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists

Rebecca T. Hahn, MD, FASE, Chair, Theodore Abraham, MD, FASE, Mark S. Adams, RDCS, FASE, Charles J. Bruce, MD, FASE, Kathryn E. Glas, MD, MBA, FASE, Roberto M. Lang, MD, FASE, Scott T. Reeves, MD, MBA, FASE, Jack S. Shanewise, MD, FASE, Samuel C. Siu, MD, FASE, William Stewart, MD, FASE, and Michael H. Picard, MD, FASE, *New York, New York; Baltimore, Maryland; Boston, Massachusetts; Rochester, Minnesota; Atlanta, Georgia; Chicago, Illinois; Charleston, South Carolina; London, Ontario, Canada; Cleveland, Ohio*

(J Am Soc Echocardiogr 2013;26:921-64.)

Table 7 List of complications reported with TEE and the incidence of these complications during diagnostic TEE and intraoperative TEE^{7,24-31}

Complication	Diagnostic TEE	Intraoperative TEE
Overall complication rate	0.18-2.8% (refs 24,25)	0.2% (ref 7)
Mortality	<0.01-0.02% (refs 24,25,27)	0% (ref 7)
Major morbidity	0.2% (ref 27)	0-1.2% (refs 7,28,29)
Major bleeding	<0.01% (ref 24)	0.03-0.8% (refs 7,28)
Esophageal perforation	<0.01 (ref 24)	0-0.3% (refs 7,28,29)
Heart failure	0.05% (ref 28)	
Arrhythmia	0.06-0.3% (refs 7,28,30)	
Tracheal intubation	0.02% (ref 30)	
Endotracheal tube malposition		0.03% (ref 7)
Laryngospasm	0.14% (ref 27)	
Bronchospasm	0.06-0.07% (refs 24,30)	
Dysphagia	1.8% (ref 31)	
Minor pharyngeal bleeding	0.01-0.2% (refs 24,25,27)	0.01% (ref 7)
Severe odynophagia		0.1% (ref 7)
Hoarseness	12% (ref 31)	
Lip injury	13% (ref 31)	
Dental injury	0.1% (ref 31)	0.03% (ref 7)

ETT vs ETO

Vues ETT

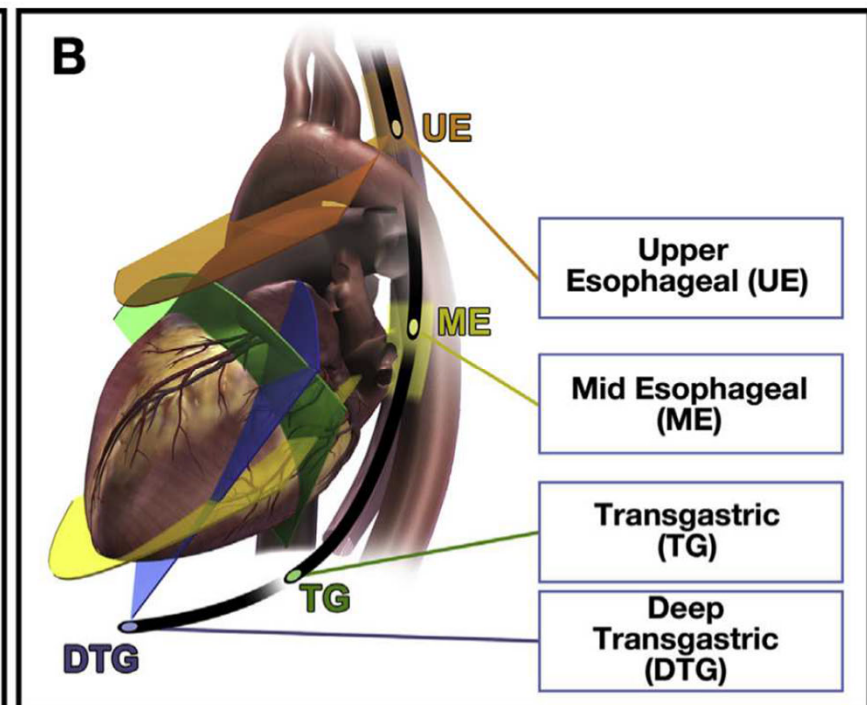
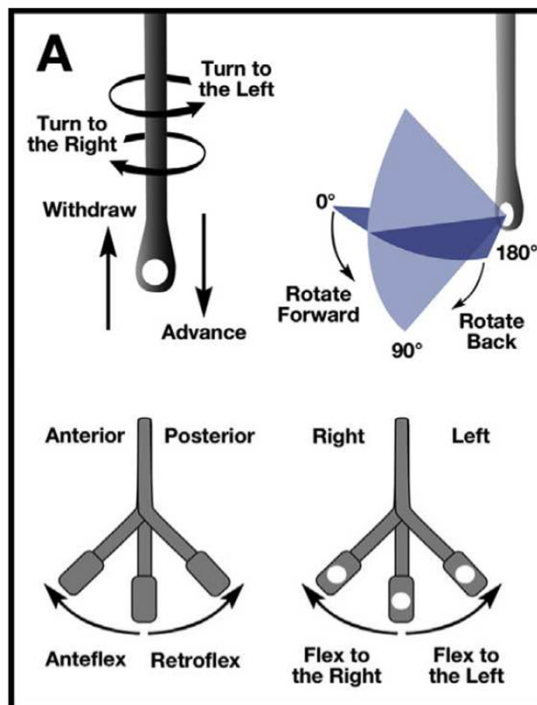
Vues ETO

ASE GUIDELINES AND STANDARDS

Guidelines for Performing a Comprehensive Transesophageal Echocardiographic Examination: Recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists

Rebecca T. Hahn, MD, FASE, Chair, Theodore Abraham, MD, FASE, Mark S. Adams, RDCS, FASE, Charles J. Bruce, MD, FASE, Kathryn E. Glas, MD, MBA, FASE, Roberto M. Lang, MD, FASE, Scott T. Reeves, MD, MBA, FASE, Jack S. Shanewise, MD, FASE, Samuel C. Siu, MD, FASE, William Stewart, MD, FASE, and Michael H. Picard, MD, FASE, *New York, New York; Baltimore, Maryland; Boston, Massachusetts; Rochester, Minnesota; Atlanta, Georgia; Chicago, Illinois; Charleston, South Carolina; London, Ontario, Canada; Cleveland, Ohio*

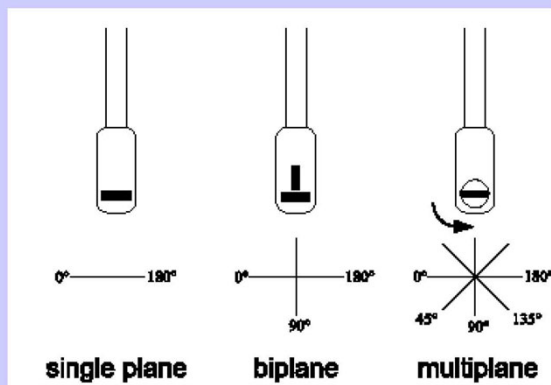
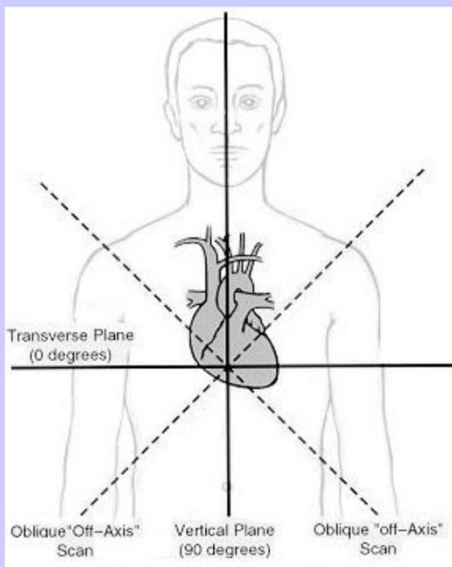
(J Am Soc Echocardiogr 2013;26:921-64.)



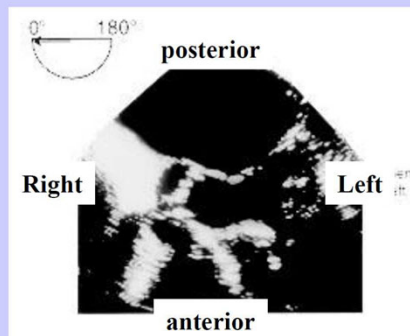
ETT vs ETO

Vues ETT

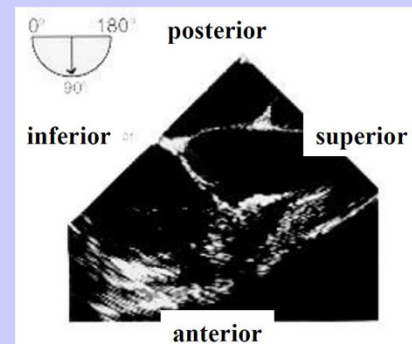
Vues ETO



Transverse plane



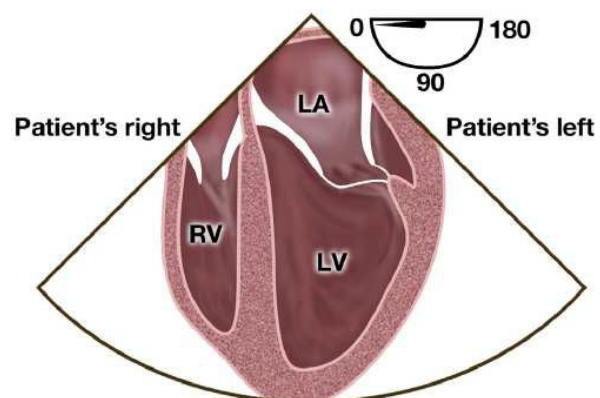
Vertical (longitudinal) plane



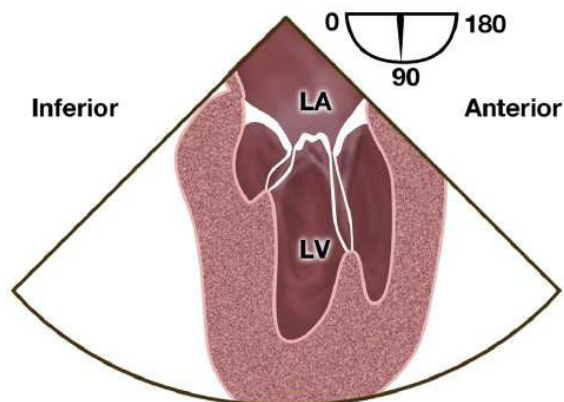
ETT vs ETO

Vues ETT

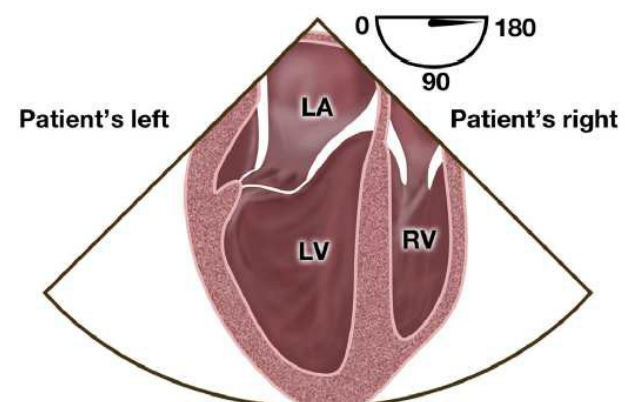
Vues ETO



A. Multiplane angle 0



B. Multiplane angle 90



C. Multiplane angle 180

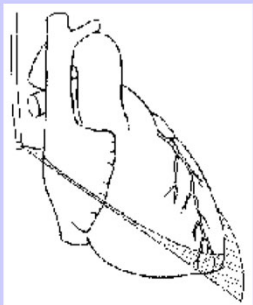
ETT vs ETO

Vues ETT

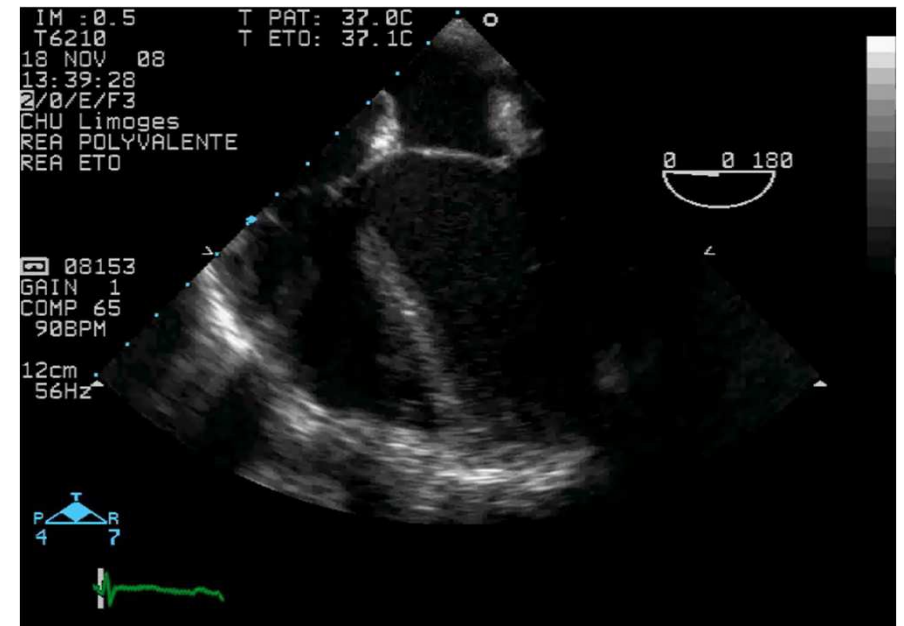
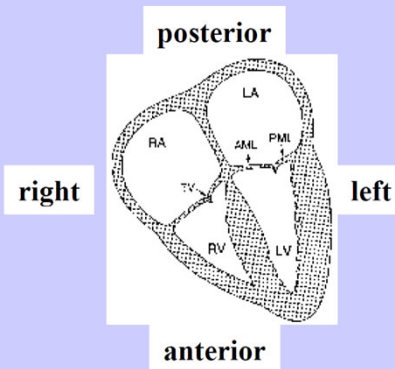
Vues ETO

Vues transversales (1)

Vue transoesophagienne quatre cavités



30-35 cm under the dental arch





Vues transversales (2)

Vue transoesophagienne quatre cavités

1. Evaluation de la taille et de la fonction systolique des deux ventricules
2. Anomalie de contraction segmentaire
3. Valvulopathie mitrale ou tricuspide
4. Profil Doppler mitral, vitesse maximale de l'insuffisance tricuspide
5. Accélération du jet éjectionnel (obstruction intra-VG)
6. Epanchement péricardique.

**Vue de référence
qui débute en
règle chaque
examen**

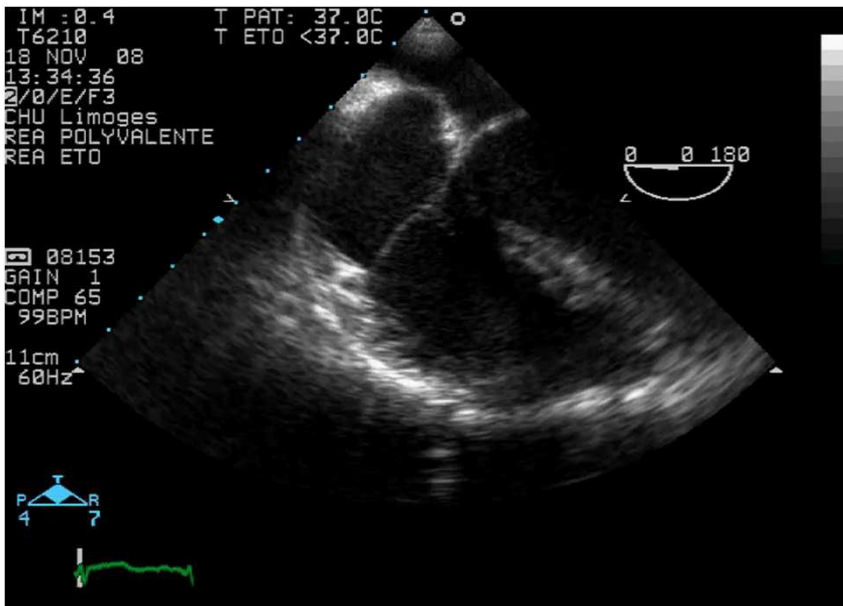
ETT vs ETO

Vues ETT

Vues ETO

Vues transversales (2)

Vue transoesophagienne centrée sur le VD



1. Evaluation fonction systolique du VD
2. Evaluation d'une HVD
3. Examen de l'oreillette droite.

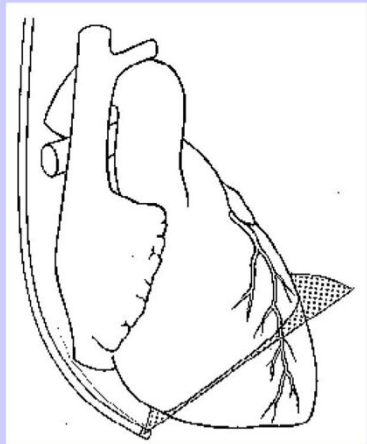
ETT vs ETO

Vues ETT

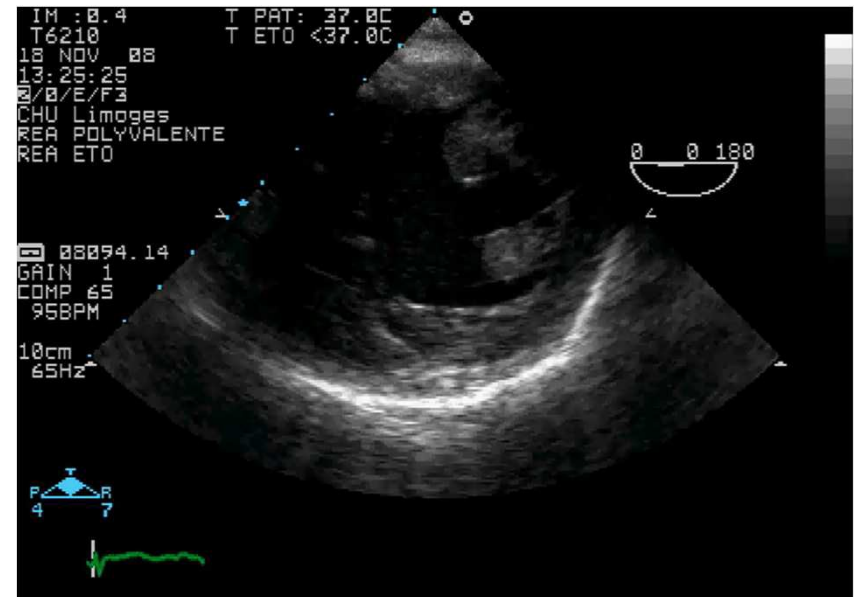
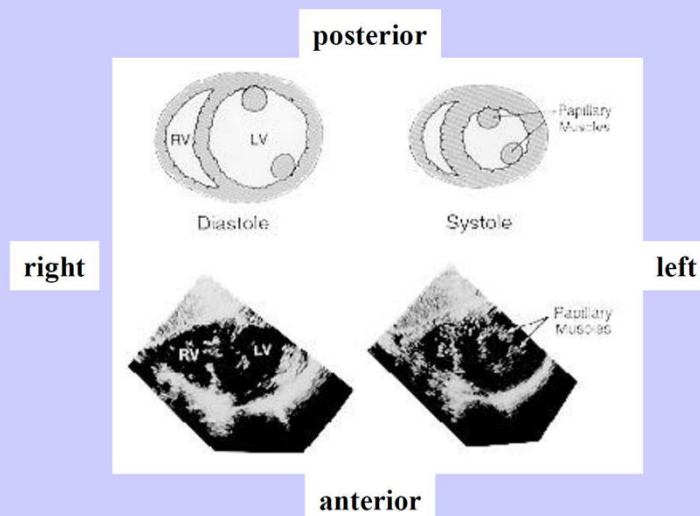
Vues ETO

Vues transversales (3)

Vue transgastrique petit axe



40-45 cm under the dental arch





Vues transversales (4)

Vue transgastrique petit axe

1. Evaluation de la taille et de la fonction systolique des deux ventricules
2. Anomalie de contraction segmentaire (3 territoires coronaires représentés)
3. Cinétique du septum interventriculaire (surcharge de pression / volume du VD)
4. Epanchement péricardique.

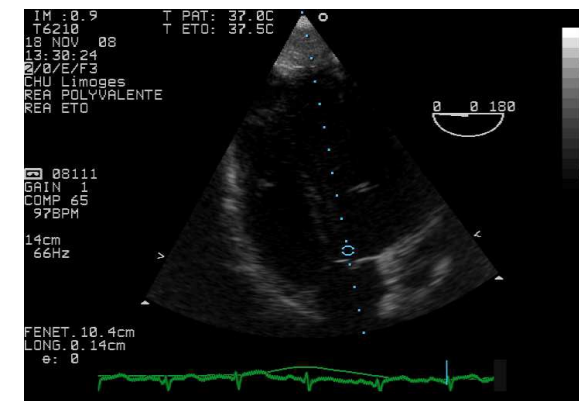
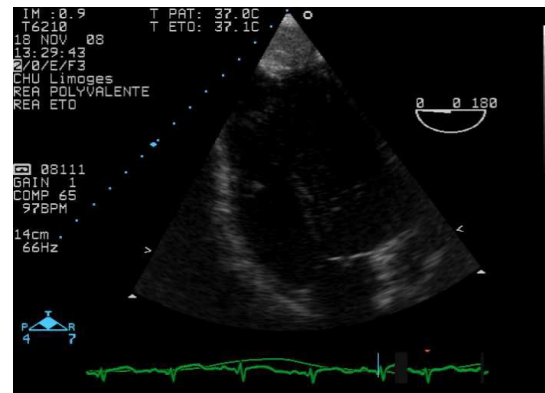
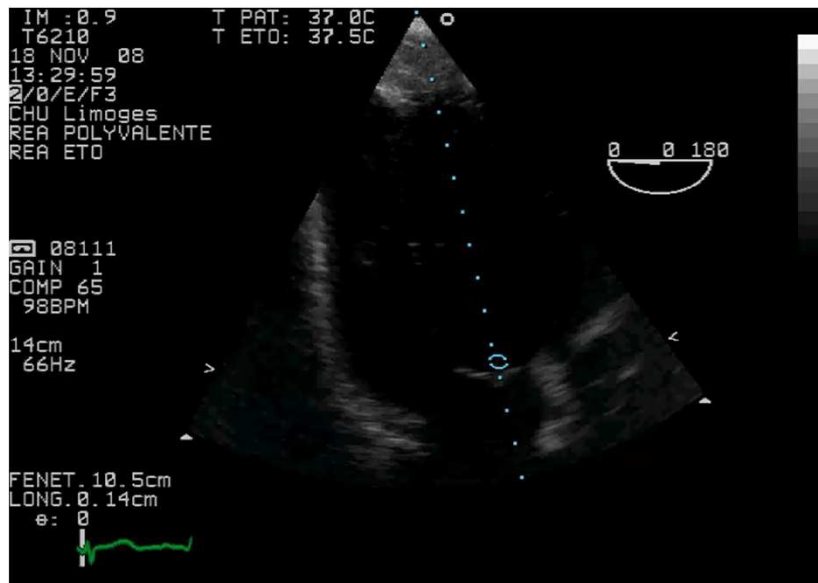
ETT vs ETO

Vues ETT

Vues ETO

Vues transversales (5)

Vue transgastrique profonde 5 cavités



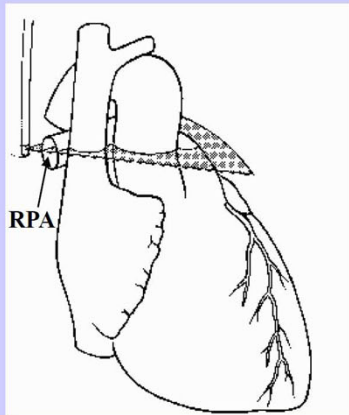
ETT vs ETO

Vues ETT

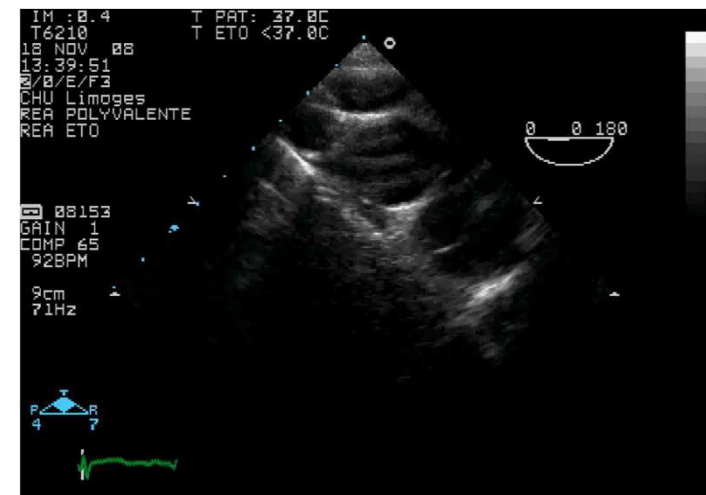
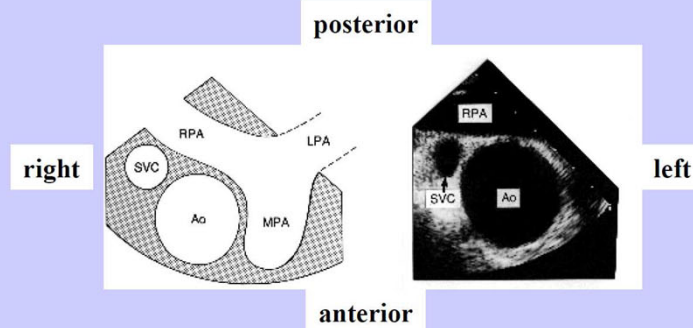
Vues ETO

Vues transversales (6)

Vue transoesophagienne des vaisseaux de la base



25-30 cm under the dental arch



ETT vs ETO

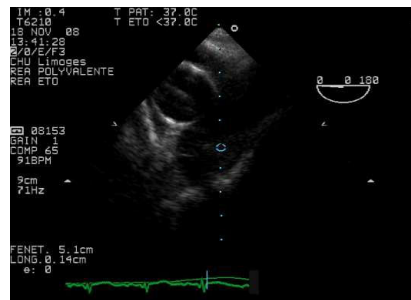
Vues ETT

Vues ETO

Vues transversales (7)

Vue transoesophagienne des vaisseaux de la base

1. Evaluation de la taille des gros vaisseaux (AP, aorte ascendante, veine cave supérieure)
2. Evaluation des variations respiratoires de la veine cave supérieure
3. Recherche d'embolie enclavé dans l'artère pulmonaire droite
4. Profil Doppler dans l'artère pulmonaire.



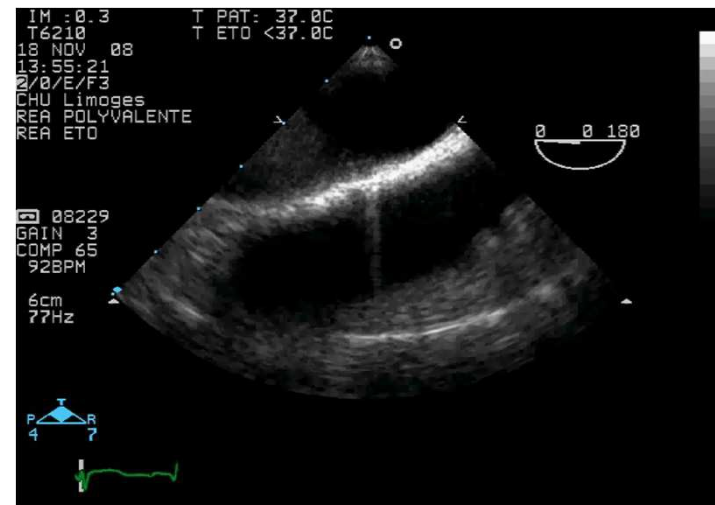
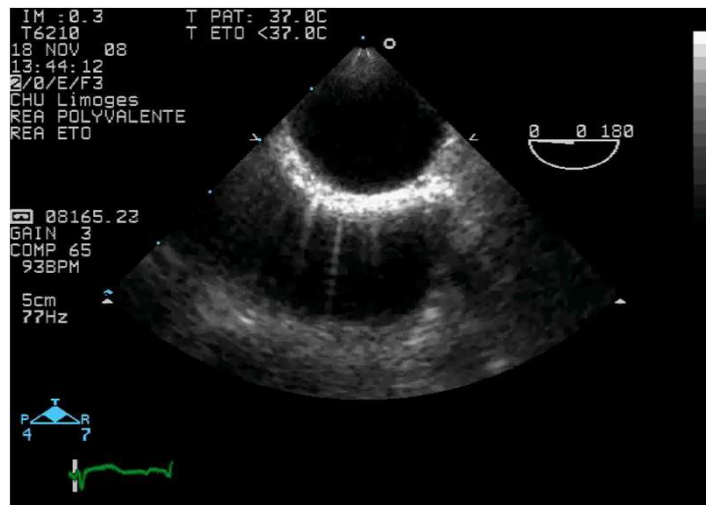
ETT vs ETO

Vues ETT

Vues ETO

Vues transversales (8)

Vue transoesophagienne de l'aorte descendante & crosse

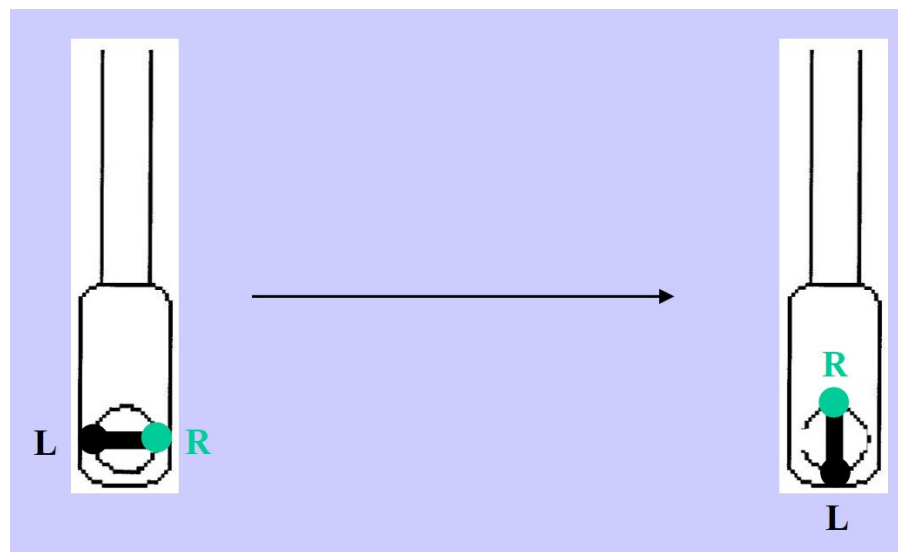


ETT vs ETO

Vues ETT

Vues ETO

Vues longitudinales (1)



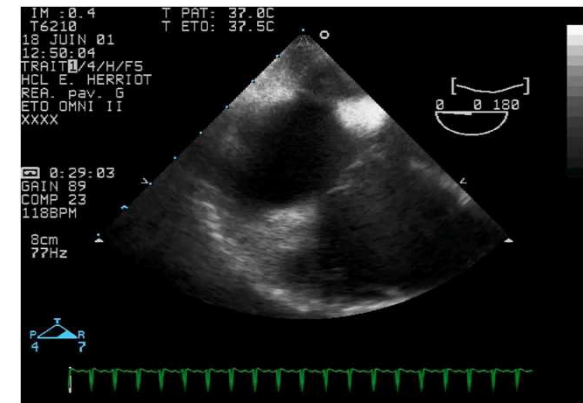
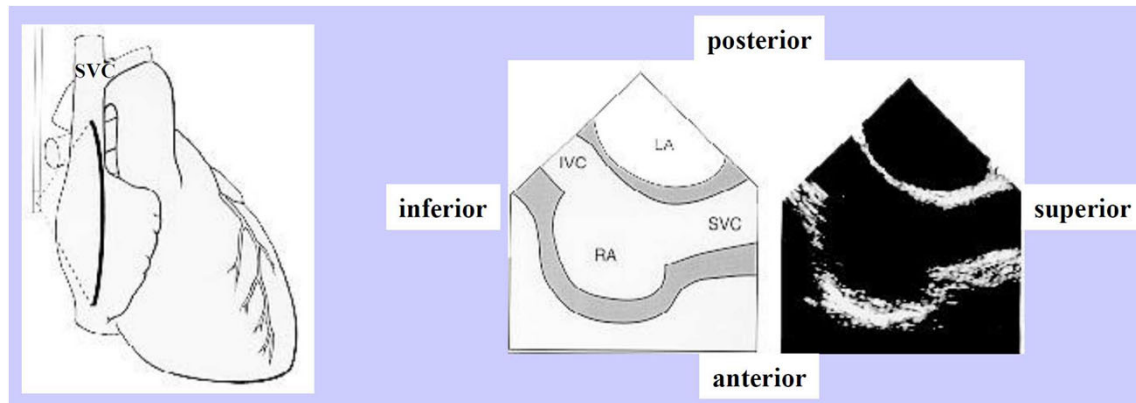
ETT vs ETO

Vues ETT

Vues ETO

Vues longitudinales (2)

Vue transoesophagienne bicavale



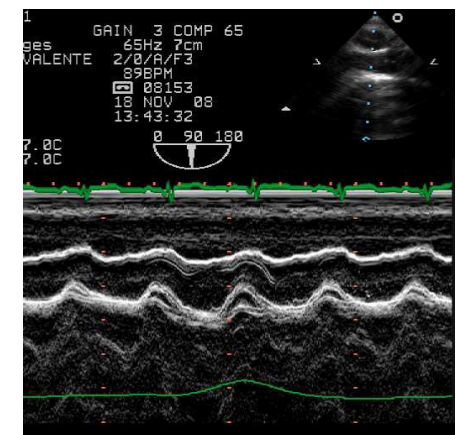
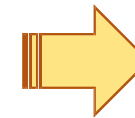
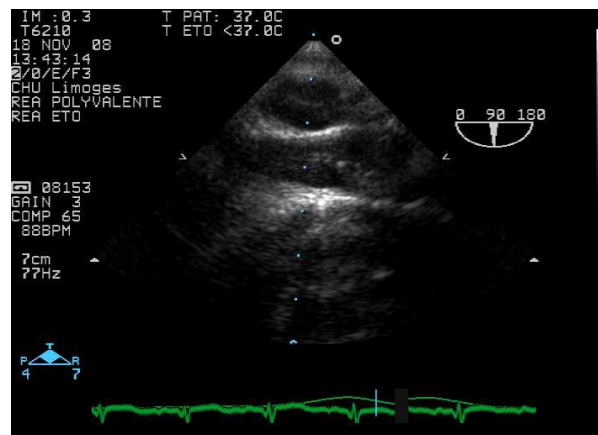
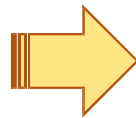
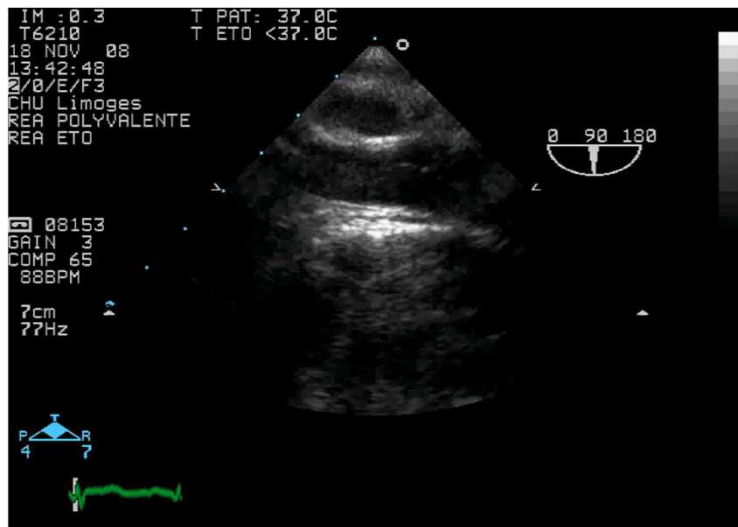
ETT vs ETO

Vues ETT

Vues ETO

Vues longitudinales (3)

Vue transoesophagienne longitudinale de la VCS



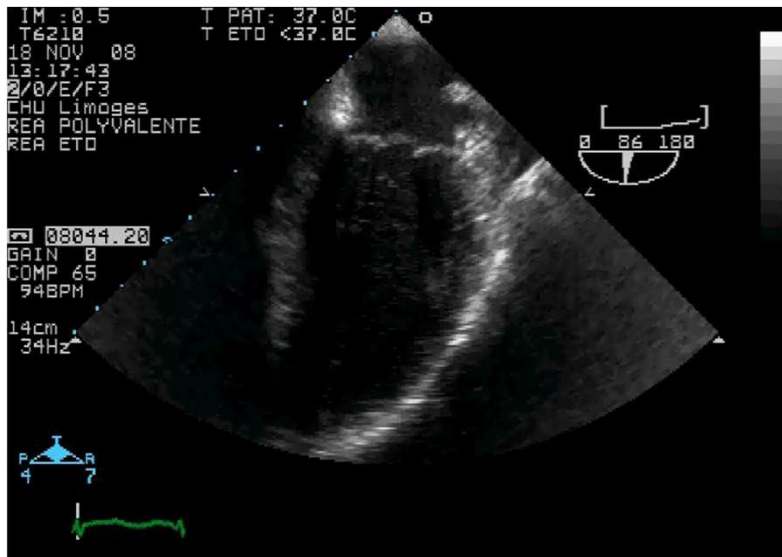
ETT vs ETO

Vues ETT

Vues ETO

Vues longitudinales (4)

Vue transoesophagienne 2 cavités



1. Mesure FEVG
2. Evaluation contractilité parois antérieure et inférieure
3. Evaluation d'une IM
4. Examen de l'auricule gauche.

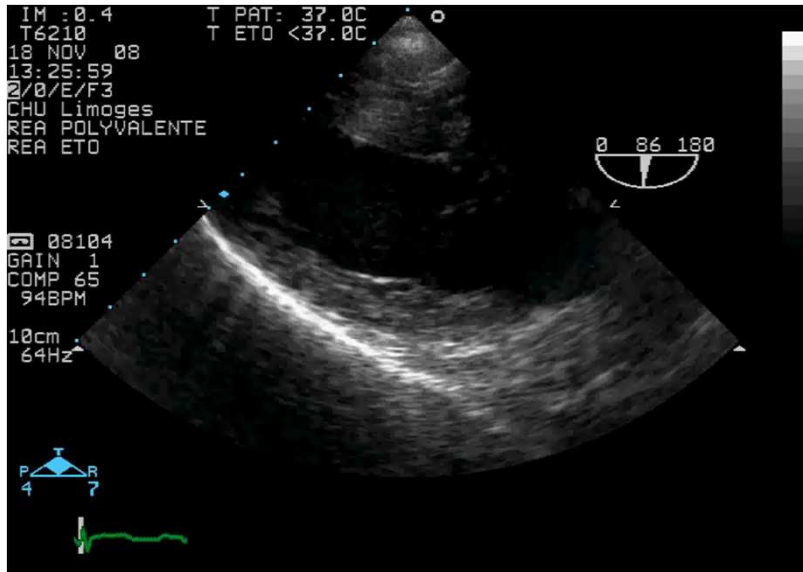
ETT vs ETO

Vues ETT

Vues ETO

Vues longitudinales (5)

Vue transgastrique grand axe



1. Evaluation fonction systolique VG
2. Examen des piliers mitraux
3. Evaluation d'une IM.

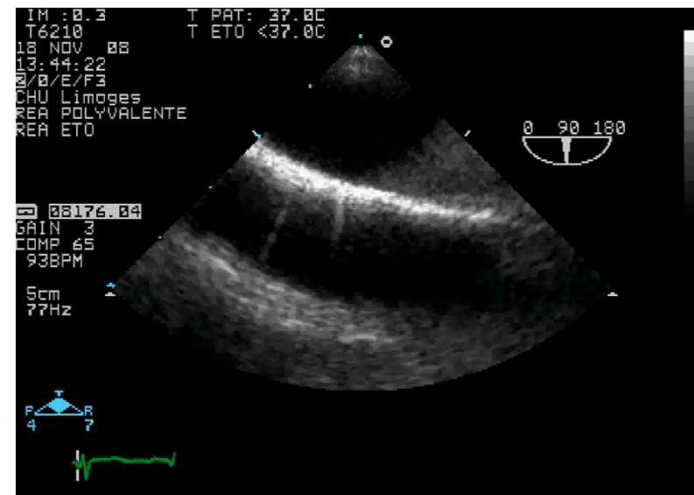
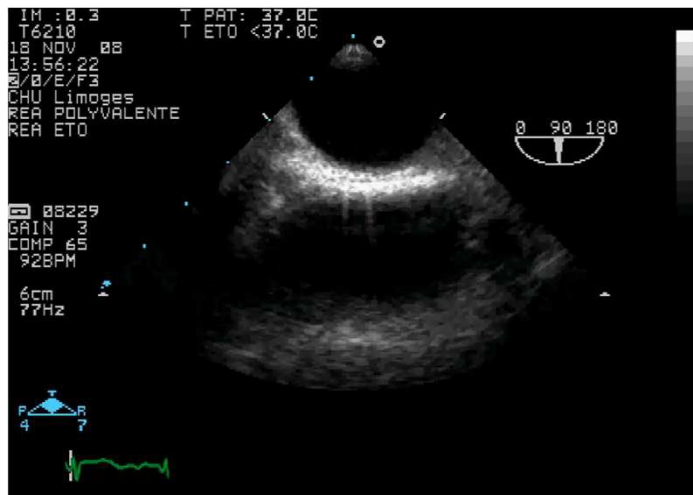
ETT vs ETO

Vues ETT

Vues ETO

Vues longitudinales (6)

Vue aorte descendante & crosse

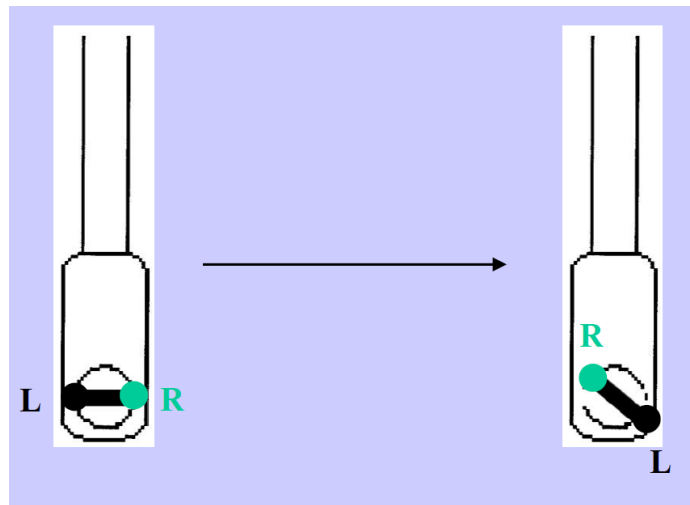


ETT vs ETO

Vues ETT

Vues ETO

Vues obliques (1)



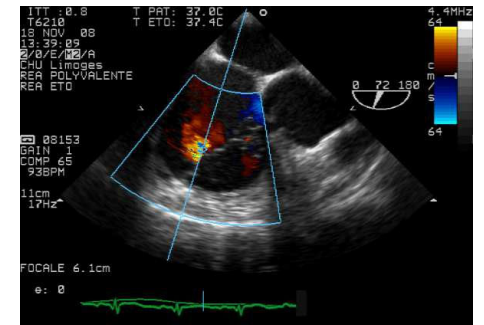
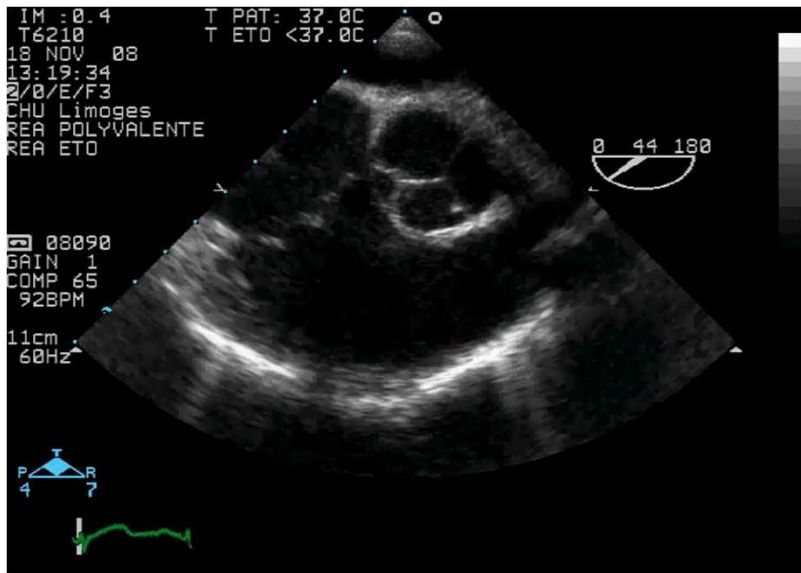
ETT vs ETO

Vues ETT

Vues ETO

Vues obliques (2)

Vue des cavités droites à 40-60°



1. Evaluation fonction systolique VD
2. Evaluation d'une IT
3. Evaluation valve aortique (petit axe).

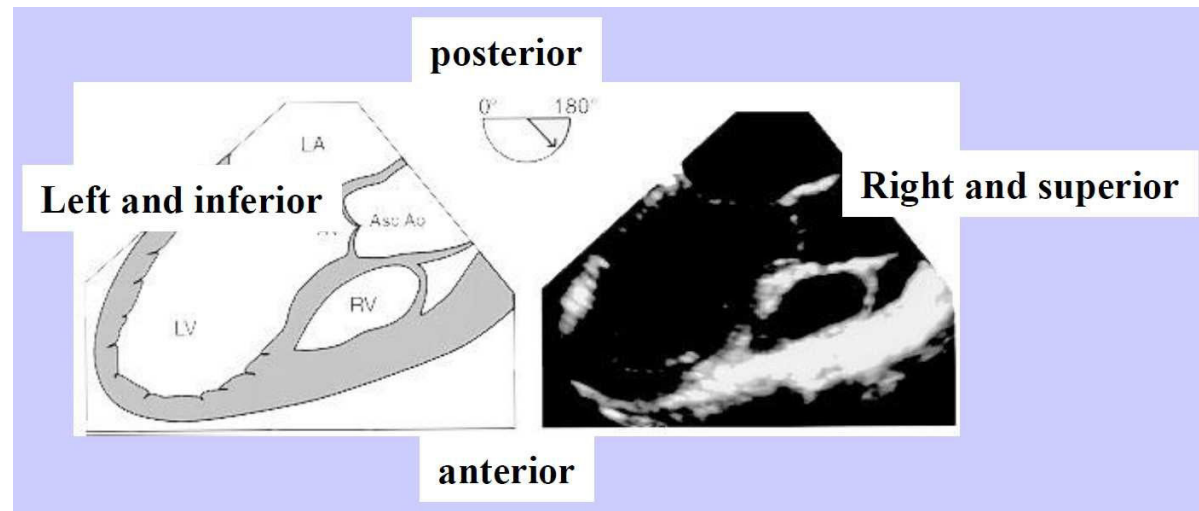
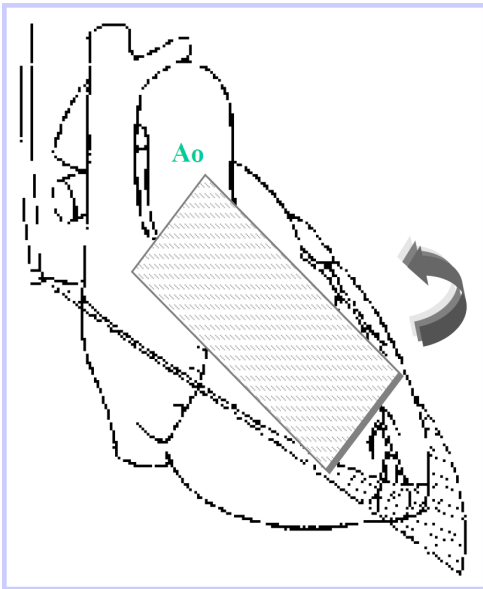
ETT vs ETO

Vues ETT

Vues ETO

Vues obliques (3)

Vue transoesophagienne de la chambre de chasse du VG à 120°



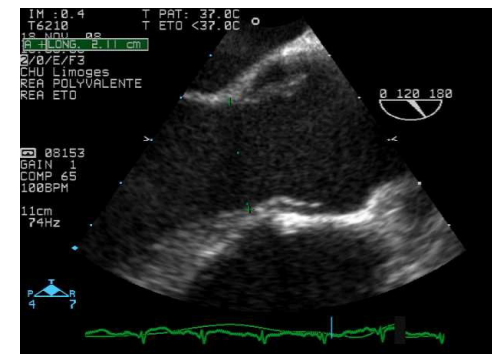
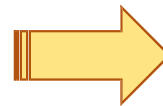
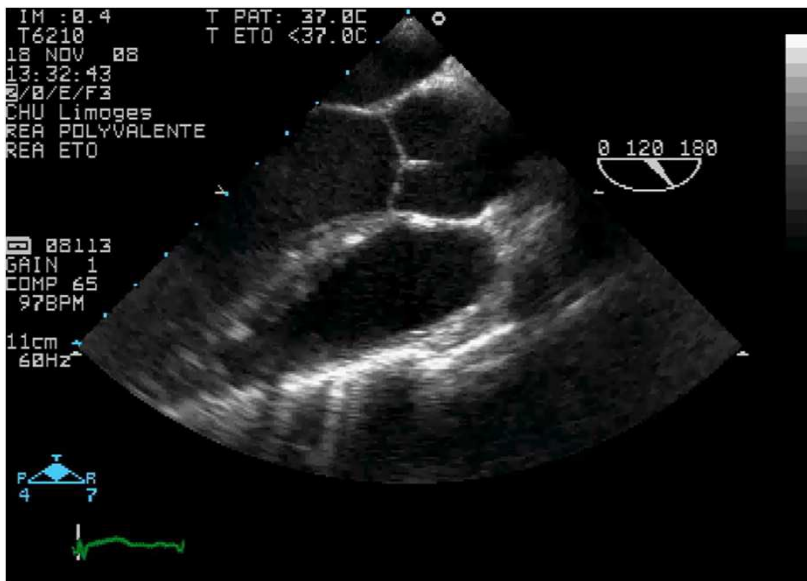
ETT vs ETO

Vues ETT

Vues ETO

Vues obliques (4)

Vue transoesophagienne de la chambre de chasse du VG à 120°



1. Mesure chambre de chasse du VG (calcul du VES)
2. Evaluation valvulopathie aortique
3. Evaluation d'une IM & obstruction CCVG.

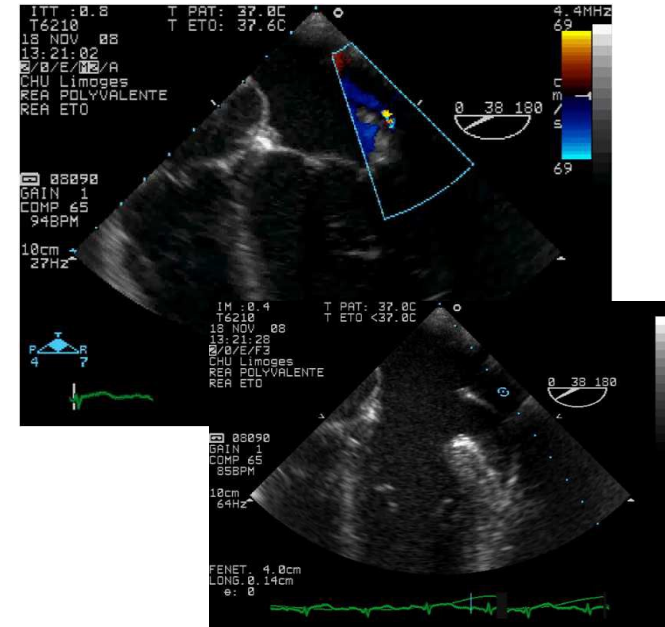
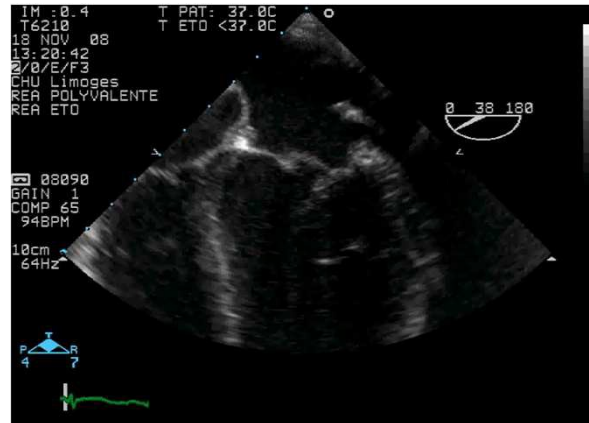
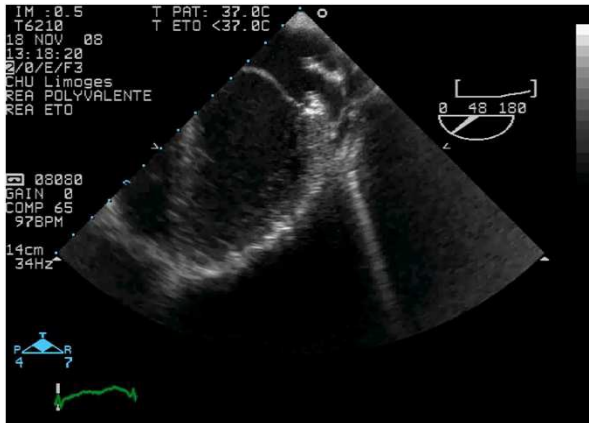
ETT vs ETO

Vues ETT

Vues ETO

Vues obliques (5)

Vue transoesophagienne de la chambre de chasse du VG à 120°



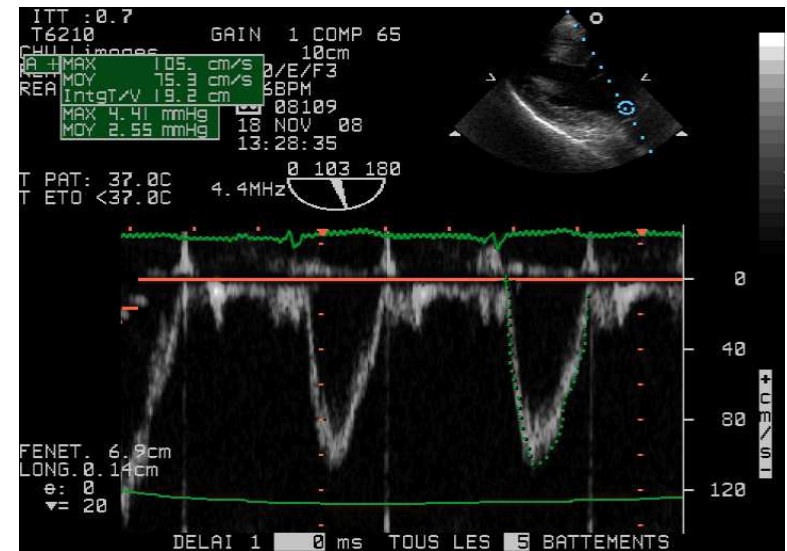
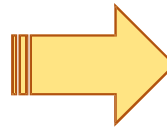
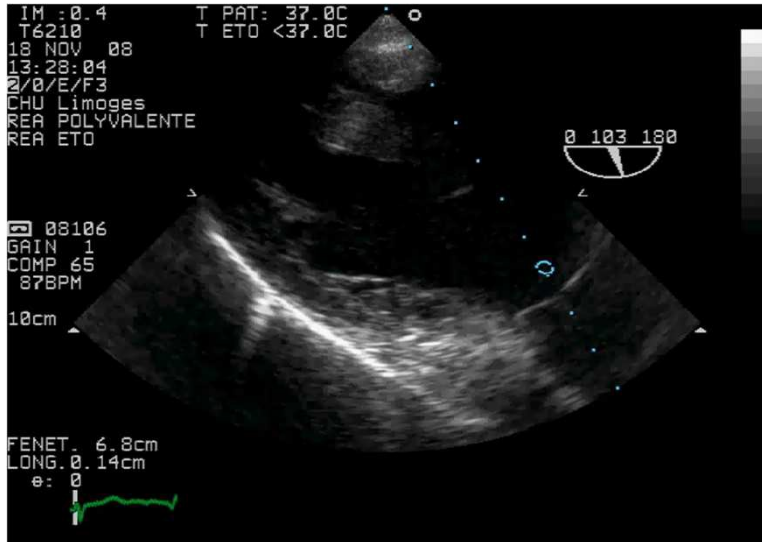
ETT vs ETO

Vues ETT

Vues ETO

Vues obliques (6)

Vue transgastrique de la chambre de chasse du VG à 120°



ETT vs ETO

Vues ETT

Vues ETO

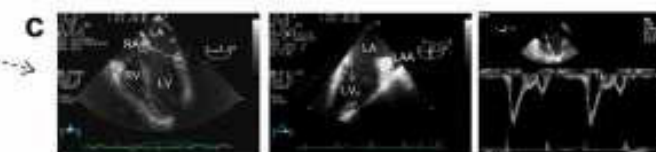
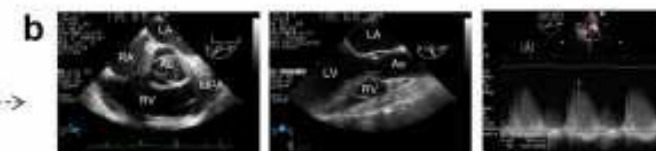
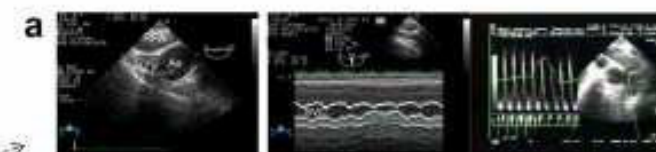
Niveau avancé : ETT & ETO

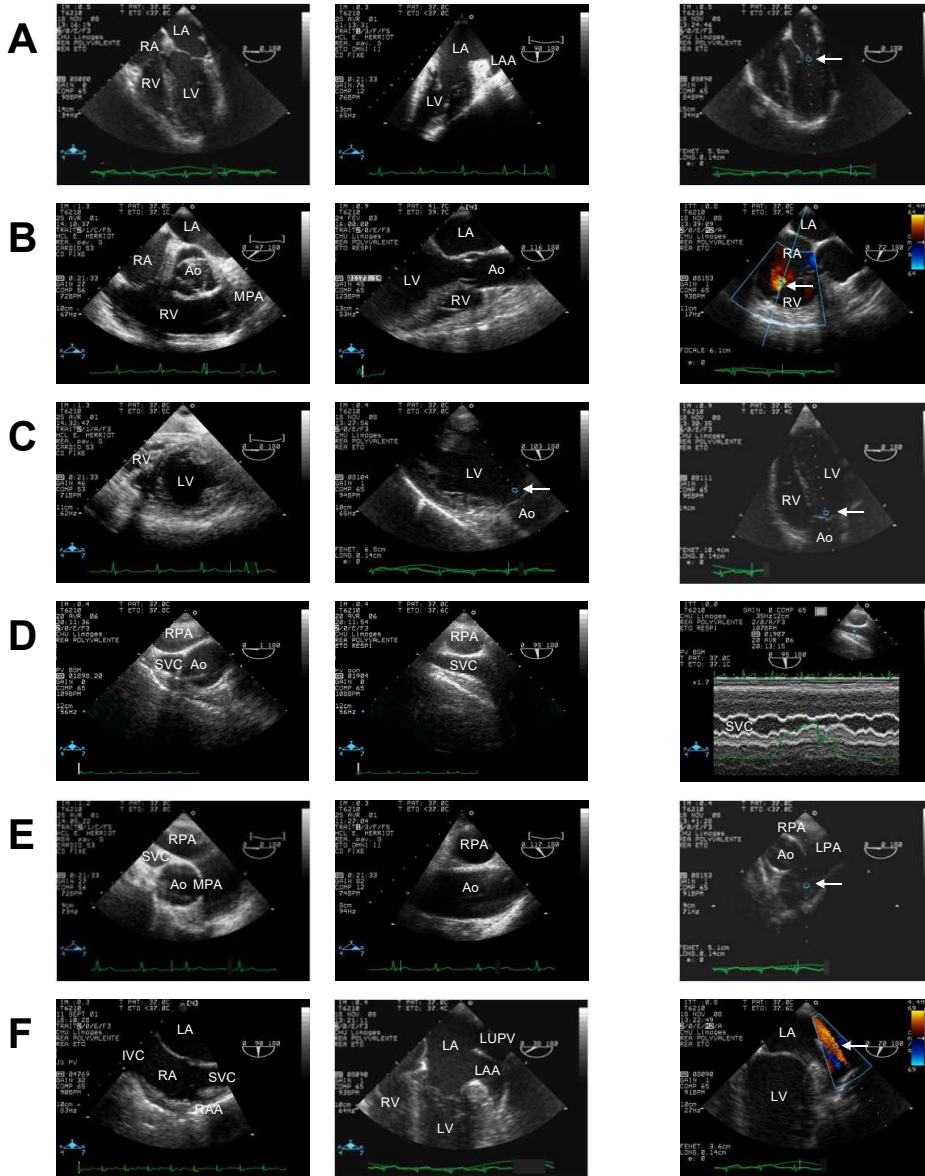
WHAT'S NEW IN INTENSIVE CARE

Ten reasons for performing hemodynamic monitoring using transesophageal echocardiography

Philippe Vignon^{1,2,3*}, Tobias M. Merz⁴ and Antoine Vieillard-Baron^{5,6}

© 2017 Springer-Verlag Berlin Heidelberg and ESICM





Transesophageal 4- and 2-chamber views:

Hemodynamics: LVEF, mitral Doppler pattern, TDI of mitral annulus, paradoxical septal motion, RV size, LVOT dynamic obstruction

Other information: RWMA, LV remodeling, mitral/tricuspid valvulopathy, pericardial disease, PFO

Transesophageal ~40° and ~120° views:

Hemodynamics: LVOT diameter/surface, maximal Doppler velocity of tricuspid regurgitation

Other information: aortic valvulopathy, RV function, RV infundibulum, pulmonary regurgitation, coronary arteries, aortic dissection

Transgastric short- and long-axis (& deep) views:

Hemodynamics: LVFAC, velocity time integral of LVOT Doppler velocities, paradoxical septal motion, LVOT dynamic obstruction

Other information: RWMA, LV remodeling, aortic/mitral valvulopathy, pericardial disease

Transesophageal views of great vessels
1- short- and long-axis views of SVC:

Hemodynamics: respiratory variations of SVC

Other information: proximal pulmonary embolus (RPA), abnormal ascending aorta

Transesophageal views of great vessels
2- short- and long-axis views of PA:

Hemodynamics: Doppler pattern of PA bloodflow

Other information: proximal pulmonary embolus (right or left PA), abnormal ascending aorta

Transesophageal atrial views (bicaval and LSPV):

Hemodynamics: pulmonary vein Doppler pattern

Other information: atrial dilatation, PFO, bulging of interatrial septum, thrombus in LAA or in PFO, mitral regurgitation in pulmonary veins

- ❖ Toujours finir en examinant l'aorte thoracique (descendante et crosse)
- ❖ Toute coupe supplémentaire utile selon les anomalies constatées
- ❖ 4 cavités : repère
- ❖ Séquence type.

ETT & ETO : quelles vues pour quels paramètres ?

