

Intérêt de l'échocardiographie dans l' arrêt cardiaque.

Dr GENRE GRANDPIERRE

DIUMUS - Janvier 2016

Sommaire:

Durée: 25 minutes

1. Epidémiologie
2. Rationnel scientifique
3. Description de la technique et algorithme

Discussion : 5 minutes

INTRODUCTION

EPIDEMIOLOGIE



Epidémiologie

- Première cause de mortalité dans le monde:
 - 37 pour 100 000 habitants
 - Survie de 10% à l'arrivée à l'hôpital



Recommandations

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

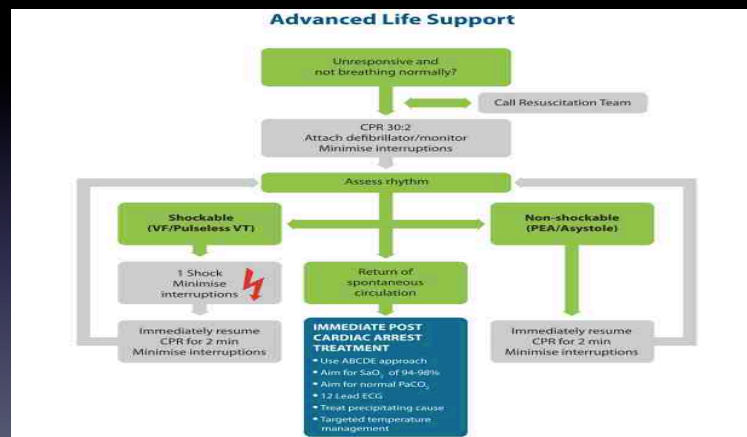
ELSEVIER

EUROPEAN RESUSCITATION COUNCIL

European Resuscitation Council Guidelines for Resuscitation 2015
Section 1. Executive summary

Koenraad G. Monsieurs^{a,b,*}, Jerry P. Nolan^{c,d}, Leo L. Bossaert^e, Robert Greif^{f,g}, Ian K. Maconochie^h, Nikolaos I. Nikolaouⁱ, Gavin D. Perkins^{j,k}, Jasmeet Soar^k, Anatolij Truhlar^{l,m}, Jonathan Wyllie^o, David A. Zideman^o, on behalf of the ERC Guidelines 2015 Writing Group¹

Recommandations



Recommandations

DURING CPR

- Ensure high quality chest compressions
- Minimise interruptions to compressions
- Give oxygen
- Use waveform capnography
- Continuous compressions when advanced airway in place
- Vascular access (intravenous or intraosseous)
- Give adrenaline every 3-5 min
- Give amiodarone after 3 shocks

TREAT REVERSIBLE CAUSES

Hypoxia	Thrombosis - coronary or pulmonary
Hypovolaemia	Tension pneumothorax
Hypo-/hyperkalaemia/metabolic	Tamponade - cardiac
Hypothermia/hyperthermia	Toxins

CONSIDER

- **Ultrasound imaging**
- Mechanical chest compressions to facilitate transfer/treatment
- Coronary angiography and percutaneous coronary intervention
- Extracorporeal CPR

Place de l'échographie dans cet algorithme précis ???

Recommandations

- Peri-arrest **ultrasound** may have a role in identifying reversible causes of cardiac arrest.

*Use of **ultrasound** imaging during advanced life support.* Several studies have examined the use of **ultrasound** during cardiac arrest to detect potentially reversible causes.²¹⁵⁻²¹⁷ Although no studies have shown that use of this imaging modality improves outcome, there is no doubt that echocardiography has the potential to detect reversible causes of cardiac arrest. The integration of **ultrasound** into advanced life support requires considerable training if interruptions to chest compressions are to be minimised.

Tamponade (cardiac)

The mortality after cardiac tamponade is high and immediate decompression of the pericardium is required to give any chance of survival. If thoracotomy is not possible, consider **ultrasound**-guided pericardiocentesis to treat cardiac arrest associated with suspected traumatic or non-traumatic cardiac tamponade. Non-image guided

Problématique :

- Place de l'échographie :
 - Quinze lignes sur 80 pages
 - Propos peu clairs avec plusieurs pb en suspens

Problématique :

- A quel moment inclure dans algorithme ?
- Quelle formation ?
- Perte de temps donc perte de chance ?
- Intérêt réel ?
 - Puisqu'il n'est pas inclus dans algorithme
 - Pas de preuve scientifique de son intérêt

Alors pourquoi en parler ?

Pourquoi en parler ?



curables
matrice im



Pourquoi en parler ?

- Détection des causes curables
- Apprentissage rapide :
– Formation en 1 jour



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Clinical paper

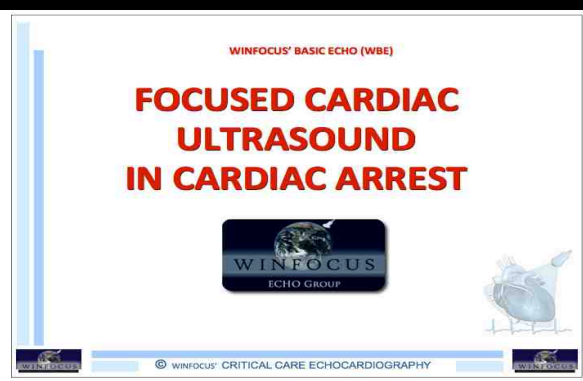
Peri-resuscitation echocardiography: Training the novice practitioner[☆]

Susanna Price^{a,1}, Hendrik Ilper^{b,1}, Shahana Uddin^c, Holger V. Steiger^d, Florian H. Seeger^e,
Sebastian Schellhaas^b, Frank Heringer^f, Miriam Ruesseler^{f,g}, Hanns Ackermann^h,
Gabriele Viaⁱ, Felix Walcher^{f,g,1}, Raoul Breitzkreutz^{b,f,j,*,1}

Pourquoi en parler ?

- Détection de
- Apprentissage

International Evidence-
for Focused C



Gabriele Via, MD, Arif Hussain, MD, Mike Wells, MD, BSc, BMBCh, FCEM, Dip PEC,
Robert Reardon, MD, Mahmoud ElBarbary, MD, Vicki E. Noble, MD, James W. Tsung, MD, MPH,
Aleksandar N. Neskovic, MD, PhD, FESC, FACC, Susanna Price, MD, MBBS, BSc, MRCP, EDICM, PhD,
FFICM, FESC, Achikam Oren-Grinberg, MD, MS, Andrew Liteplo, MD, RDMS, Ricardo Cordoli, MD,
Nitha Naqvi, MD, MSc, MRCPCH, Philippe Rola, MD, Jan Poelaert, MD, PhD, Tatjana Golob Gulić, MD,
Erik Sloth, MD, PhD, DMSc, Arthur Labovitz, MD, FACC, Bruce Kimura, MD, FACC, Raoul Breitzkreutz, MD,
Navroz Masani, MBBS, FRCP, Justin Bowra, FRCR, CCPU, Daniel Talmor, MD, MPH,
Fabio Guarracino, MD, Adrian Goudie, BMedSci(Hons), MBBS, FRCR, Wang Xiaoting, MD,
Rajesh Chawla, MD, FCCM, Maurizio Galdenzi, MD, Michael Blaivas, MD, FACEP, FAIUM,
Tomislav Petrovic, MD, Enrico Storti, MD, Luca Neri, MD, and Lawrence Melniker, MD, MS, International
Liaison Committee on Focused Cardiac UltraSound (ILC-FoCUS) for the International Conference on Focused
Cardiac UltraSound (IC-FoCUS)

Pourquoi en parler ?

- Détection des causes curables
- Apprentissage rapide :
- Nouvelles publications depuis 2010

On doit en parler !!!

En conclusion , malgré un certain
obscurantisme dans ces recommandations ,
l'échocardiographie dans l'ACR:

- Traitement des causes curables
- S'apprend rapidement
- Est intégrée dans les recommandations

RATIONNEL SCIENTIFIQUE

RFE (2012)

International Evidence-Based Recommendations for Focused Cardiac Ultrasound

Gabriele Via, MD, Arif Hussain, MD, Mike Wells, MD, BSc, BSc Hons, MBCh, FCEM, Dip PEC,
Robert Reardon, MD, Mahmoud ElBarbary, MD, Vicki E. Noble, MD, James W. Tsung, MD, MPH,
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RFE : JASE

- Dans le cadre de l'ACR , l'échocardiographie :

- Q34 : est plus précise que l'ECG pour évaluer la

fonction mécanique

- Q35 : modifie la s

- Q36 : augmente

- Q37 : modifie la s

34. *In the setting of cardiac arrest, FoCUS is more accurate than electrocardiography for determining mechanical cardiac function.*

[1A: Strong Recommendation, with Very Good Agreement; Level A Evidence]

35. *In the setting of cardiac arrest, FoCUS changes management.*

[1A: Strong Recommendation, with Very Good Agreement; Level A Evidence]

36. *In the setting of cardiac arrest, FoCUS improves the clinician's ability to predict outcome.*

[1B: Strong Recommendation, with Good Agreement; Level B Evidence]

37. *In the setting of cardiac arrest, FoCUS improves outcome.*

[NO Recommendation, NO Agreement; Level C Evidence]

RFE : JASE

- Dans le cadre de l'ACR, l'échocardiographie :

- Q38: est plus précise que l'examen clinique pour déterminer la cause

- Q39: est plus précise pour la fonction cardiaque

- Q40: diminue la mortalité des patients pénétrants (1A)

- Q42 : diminue la mortalité

40. In patients with suspected cardiac injuries from penetrating trauma, using FoCUS rather than relying on clinical signs and symptoms decreases mortality.

11B: Strong Recommendation, with Very Good Agreement; Level B Evidence

41. In patients with suspected cardiac injuries from penetrating trauma, using FoCUS rather than relying on clinical signs and symptoms improves neurologic outcomes.

INO Recommendation, NO Agreement; Level C Evidence

42. In patients with suspected cardiac tamponade (after potential penetrating cardiac injury), FoCUS is as accurate as comprehensive standard echocardiography for identifying a pericardial collection.

11A: Strong Recommendation, with Very Good Agreement; Level A Evidence

Winfocus (2014)



But :

- I : Détecter les causes traitables.
- II : Différencier les rythmes électriques sans pouls (RESP) par détection d'une activité mécanique cardiaque.
- III : Détection des signes précoces de RACS (Reprise Activité Electrique Spontanée).

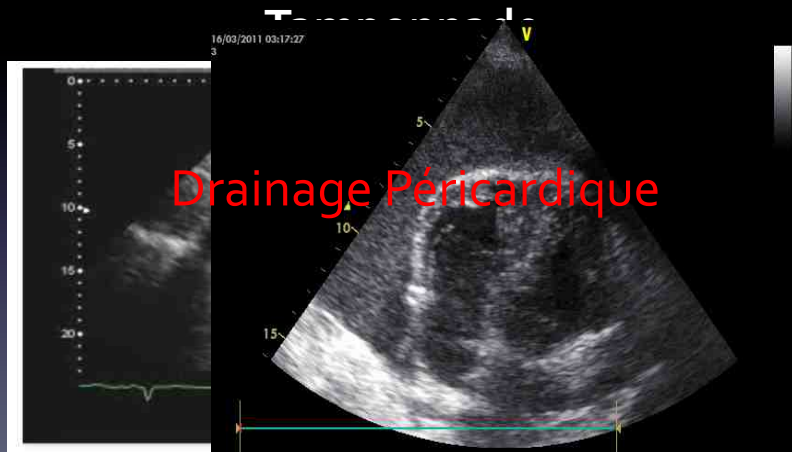
But :

“Rendre la vision à un aveugle”



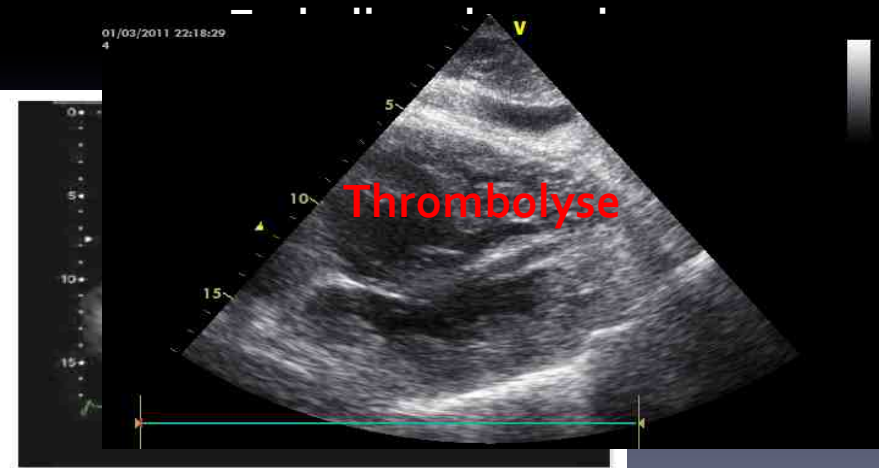
Causes traitables

Drainage Péricardique



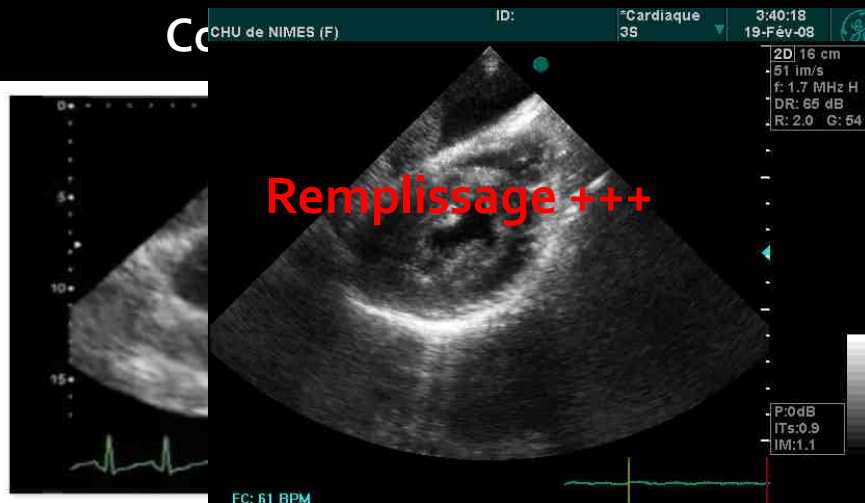
Causes traitables

Thrombolyse



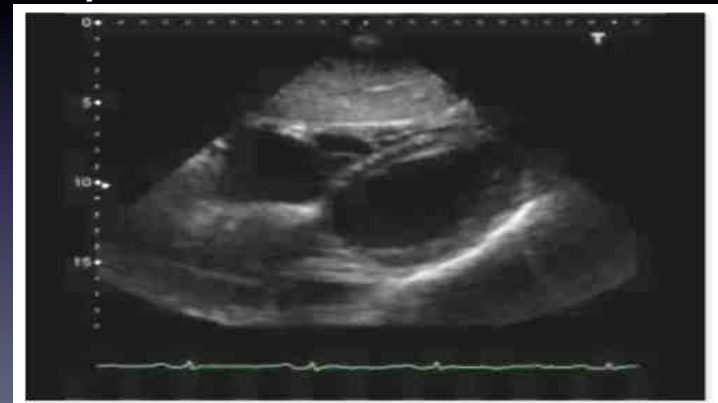
Causes traitables

Remplissage +++



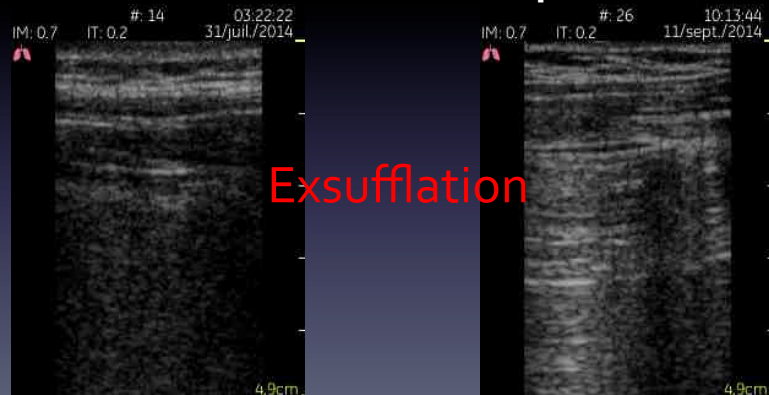
Causes traitables

Dysfonction du ventricule droit



Causes traitables

Pneumothorax compressif



Causes traitables



Différencier les RESP

- Détecter les dissociations électro-mécaniques



Clinical paper

Focused echocardiographic evaluation in life support and peri-resuscitation of emergency patients: A prospective trial^{☆,☆☆}

Raoul Breitzkreutz^{a,c,*}, Susanna Price^b, Holger V. Steiger^c, Florian H. Seeger^d, Hendrik Ilper^e, Hanns Ackermann^f, Marcus Rudolph^g, Shahana Uddin^h, Markus A. Weigandⁱ, Edgar Müller^j, Felix Walcher^k, from the Emergency Ultrasound Working Group of the Johann Wolfgang Goethe-University Hospital, Frankfurt am Main¹

ALGORITHME

DECISIONNEL

Enjeux

- I. Intégration dans l'algorithme sans perte de temps :
 - Sans convention, gêne le management dans 78% des cas



Clinical paper

Focused echocardiographic evaluation in life support and peri-resuscitation of emergency patients: A prospective trial^{☆,☆☆}

Raoul Breitzkreutz^{a,c,*}, Susanna Price^b, Holger V. Steiger^c, Florian H. Seeger^d, Hendrik Ilper^e, Hanns Ackermann^f, Marcus Rudolph^g, Shahana Uddin^h, Markus A. Weigandⁱ, Edgar Müller^j, Felix Walcher^k, from the Emergency Ultrasound Working Group of the Johann Wolfgang Goethe-University Hospital, Frankfurt am Main^l

Enjeux

- I. Intégration dans l'algorithme sans perte de

Recommended:

“high-quality cardiopulmonary resuscitation with minimal interruptions to reduce the no-flow intervals”

2005 American Heart Association/European Resuscitation Council/
International Liaison Committee on Resuscitation guidelines

- Doit engendrer le minimum de No-flow

Enjeux

- I. Intégration dans l'algorithme sans perte de temps :
 - Sans convention, gêne le management dans 78% des cas
 - Doit engendrer le minimum de No-flow

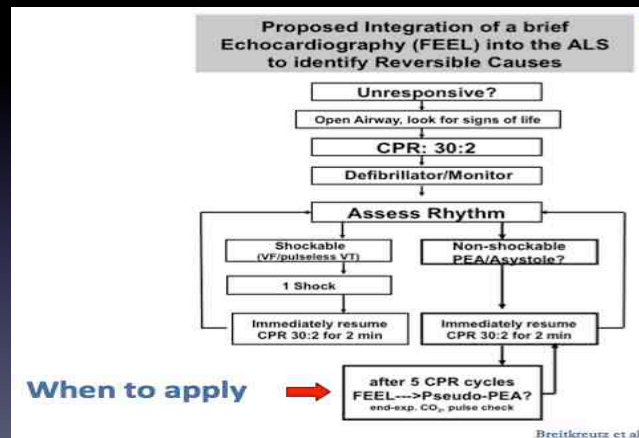
→ QUAND ?

Enjeux

- I. Intégration dans l'algorithme sans perte de temps :
- II. Intégration dans l'algorithme pour un management adéquate en accord avec la prise de décision

→ Procédure en 4 temps

Quand ?



Quand ?



Procédure en 4 temps :

- Phase I : **Réanimation et préparation**
 - 5 cycles soit au moins dix minutes de RCP spécialisée.
 - Préparer l'appareil d'échographie
 - Annoncer à l'équipe: "Echographie va débuter – décompte de 10 secondes"

Procédure en 4 temps :

- Phase II : **Obtention des images**
 - Durant l'analyse du rythme.
 - Vue sous costale (sous-xyphoïdienne)
 - Enregistrer boucles d'images
 - Stop si pas d'images au bout de 3 secondes (Vue parasternale ou apicale possible au prochain cycle)

Procédure en 4 temps

- Phase III : Reprise de la RCP
 - A 9 secondes : " Reprise Massage "
 - Reprendre RCP
 - Se préparer à recommencer deux minutes plus tard

Procédure en 4 temps

- Phase IV : Interprétation et communication
 - Relire les boucles pendant RCP
 - Communiquer le diagnostic à toute l'équipe
 - Geste curatif si nécessaire

Procedure en 4 temps

Table 1. Focused Echocardiographic Evaluation in Resuscitation (FEER) management examination in ten steps^a

Phase	Step with Command, Element
High-quality CPR, preparation, team information	1) Perform immediate and accurate BLS and ACLS according to AHA/ERC/ILCOR guidelines, at least five cycles of chest compression/ventilation 2) Tell the CPR team: "I am preparing an echocardiogram" 3) Prepare portable ultrasound (let prepare) and test it 4) Accommodate situation (e.g., best position of patient and doctor, removal of clothes), be ready to start
Execution, obtaining the echocardiogram	5) Tell CPR Team to count down 10 secs and to undertake a pulse check simultaneously 6) Command: "Interrupt at the end of this cycle for echocardiography" 7) Put the probe gently onto the patients subxiphoidal region during chest compressions 8) Perform a subcostal (long axis) echocardiogram as quickly as possible. If you cannot identify the heart after 3 secs, stop the interruption and repeat again five cycles later and/or with the parasternal approach.
Resuming CPR	9) Command after 9 secs at the latest: "Continue CPR" and control it
Interpretation and consequences	10) Communicate (after continuation of chest compressions only) the findings to the CPR team (e.g. wall motion, heart is squeezing, cardiac stand still, (massive) pericardial effusion, no conclusive finding, suspected pulmonary artery embolism, hypovolemia) and explain consequences and follow-up procedure

CONCLUSION

Conclusion

- Technique efficace
- Apprentissage rapide
- Procédure précise à respecter
- Réalisation à 2 médecins si possible

→ *Nécessité d'études complémentaires*