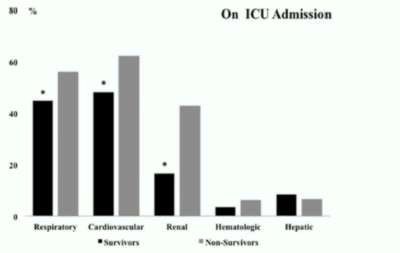


Whole body ischemia/reperfusion causes organ failure



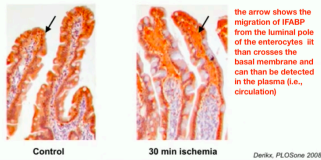
Noble L. Crit Care 2016

Evidences of gut injury in human after OH-CA

- Autopsic cases series
Bedell et al. Arch Int Med 1986, Piton et al. JOP 2010
- Bacterial translocation
Gaussorgues et al. Intensive Care Med 1998, Chalkias et al. J Crit Care 2015
- Occurrence of Non occlusive mesenteric ischemia
Wurm et al. Eur Heart J Acute Cardiovasc Care. epub 2017

Evaluation of gut dysfunction

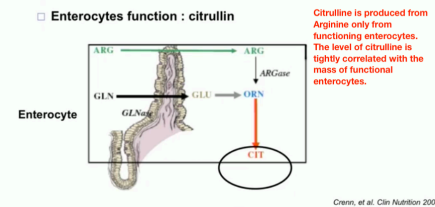
- Examination of digestive tract is difficult
- Needs for global intestinal evaluation = biomarkers
 - Permeability : Intestinal Fatty Acid Binding Protein IFABP



Denk, PLOSone 2008

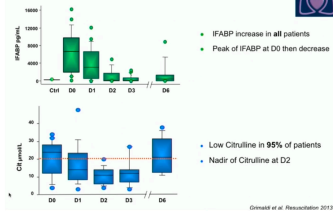
Gut dysfunction evaluation

- Examination of digestive tract is difficult
- Needs for global intestinal evaluation = biomarkers
 - Permeability : Intestinal Fatty Acid Binding Protein IFABP
 - Enterocytes function : citrullin



Chern, et al. Clin Nutrition 2009

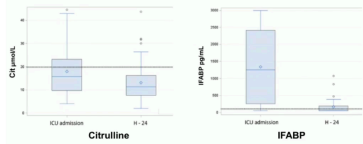
Digestive biomarkers of intestinal injury – pilot study



Grimaldi et al. Resuscitation 2013

ENTEROCYTE DAMAGE: A PIECE IN THE PUZZLE OF POST-CARDIAC ARREST SYNDROME

Gaël Piton,¹ Nicolas Belin,² Loïc Barrot,³ François Belon,⁴ Benoît Cyprian,¹ Jean-Christophe Navetlour, and Gilles Capellier^{1*}

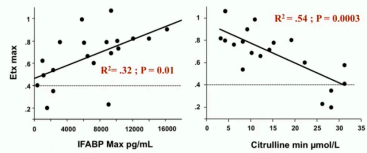


69 patients after OH-CA, NF 0 min (0-5), LF 15 min (10-30)



Piton et al. Shock 2015

Endotoxemia was correlated with markers of intestinal injury

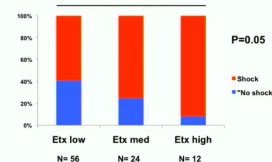


Etx correlated with IFABP and inversely correlated with Citrullin, which suggest intestine source of endotoxemia

Grimaldi et al. Resuscitation 2013

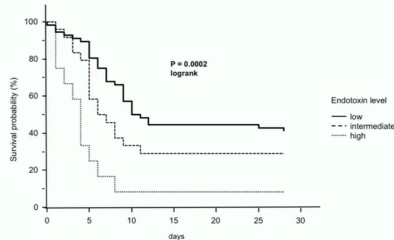
Post-CA endotoxemia is associated with shock

92 patients: etx prospectively measured in the 12h following cardiac arrest 3 levels of endotoxemia: low, medium & high



Grimaldi et al. Crit Care Med 2015

Short term survival & endotoxemia



Grimaldi et al. Crit Care Med 2015

ENTRACT study

digestive ENDoscopy aTter out-of-hospital Cardiac arrest



- Multicentric prospective study (France & Belgium)
- Aimed to define the incidence of upper GI tract ischemia after OH-CA
- Gastroscopy systematically performed D2 – D4
- Main exclusion criteria: extubated patients



Coordinator : Dr Grimaldi
Promotor : DRCI CH Versailles

Results

- 221 included patients, 214 endured gastroscopy
- At least one ischemic digestive lesion in 121 patients (57%, CI95: 50-63%)
 - Severe (ulcer, necrosis): 45% (54/121)
 - Mild (edema, erythema): 55% (67/121)



Grimaldi et al. unpublished data

Patients' and CA characteristics

	Dig lesions - N = 93	Dig lesions + N = 121	P
Age, years, med (IQR)	65.9 (55.7-72.1)	59.9 (50.9 - 71.3)	0.09
Peripheral Artery Disease, N (%)	13 (14)	6 (5)	0.02
Coronopathy, N (%)	16 (17)	16 (13)	0.4
PPI, N (%)	29 (31)	19 (16)	0.007
Witnessed, N (%)	87 (94)	105 (87)	0.11
No flow, min, med (IQR)	4 (0-10)	5 (2-7)	0.49
Low flow, min, med (IQR)	19 (12-30)	22 (15-35)	0.45
VF/VT, N (%)	47 (50)	65 (54)	0.74
Epinephrine, mg med (IQR)	1 (0-3)	2 (1-4)	0.005
Shock number, med (IQR)	2 (0-4)	2 (1-5)	0.14

Grimaldi et al. unpublished data

Predictors of Digestive Ischemia

	OR	CI: 95%
PAD	0.3	0.09 - 0.94
PPI (before CA)	0.49	0.23 - 1.03
Epinephrine dose per mg	1.17	1.03 - 1.32
Chloremia per meq/L	0.9	0.84 - 0.97
Hematocrit per %	1.04	1.00 - 1.09

Multivariate logistic regression

Grimaldi et al. unpublished data

No association with post-CA shock

	Isch dig -	Isch dig +	P
Post-CA shock	61 (65.6)	77 (63.6)	0.77
d10 Vasopressor free days	5 [2-7]	5 [2-8]	0.78

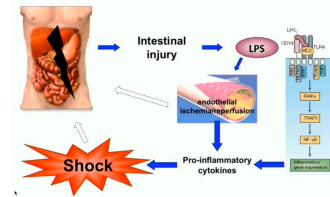
Grimaldi et al. unpublished data

Conclusion

- Cardiac arrest related ischemia/reperfusion induced gut injury
- Intestinal injury is associated with endotoxin translocation
- Upper dig tract lesions are frequent (+/- 50%), severe in +/- 50%
 - Most severe patients (died before day-2) not included
 - Less severe patients (extubated before day-2) not included
- Not associated with shock (lower tract ?)
- Severe digestive lesions associated with worse prognosis



Pathophysiological hypothesis



Conclusion

- Causality ? Or just association with ischemic injury ?
- Potential modifiable risk factors:
 - Epinephrine during CPR
 - Volemia (Ht, Chloremia)
- Maybe a vicious circle
- Improvement with hemodynamic optimization ?
- Adjuvant therapy
 - endotoxin removal ?
 - SDD with colimycine ?



