MANAGEMENT OF ANTIPLATELET AND ANTICOAGULANT DRUGS IN PATIENTS WITH HCC TO BE SUBMITTED TO INTERVENTIONAL PROCEDURES OR WITH CARDIOVASCULAR DISEASES

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EVIDENCE BASED MEDICINE...
Cardiac risk profile in LT recipient

• CAD burden in ESLD: 18-28%

• Main cause of non-graft-related mortality after LT

• Need of CV assessment and treatment pre LT

Raval Z, J Am Coll Cardiol 2011
McAvoy NC, Liv Transpl 2008
Coss E, Liv Transpl 2011
Cardiovascular disease burden in fatty liver

- U.S.A. general population:
  - NAFLD: 25-30%
  - NASH: 2-3%

- Fibrosis in 15-40% pts within 10yrs in NASH

- 1-5% NAFLD pts progress to cirrhosis

- CAD as leading cause of death (30%)

Adams LA, Ann Epidemiol 2007
Fan JG, J Hep 2009
Bacon BR, Gastroenterology 1994
The “link” between NAFLD and coronary artery disease

<table>
<thead>
<tr>
<th>Ref., year</th>
<th>Study Characteristics</th>
<th>NAFLD diagnosis</th>
<th>CHD diagnosis</th>
<th>Prevalence of CHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targher et al, 2007</td>
<td>2839 type 2 diabetic; NAFLD in 69.5%</td>
<td>US</td>
<td>History,, ECG, Doppler of carotid and lower limb arteries</td>
<td>Coronary (27% vs. 18.3%) Cerebrovascular (20% vs. 13.3%) Peripheral (15% vs. 10%) vascular disease in pts with and without NAFLD</td>
</tr>
<tr>
<td>Targher et al, 2010</td>
<td>250 type 1 diabetic; NAFLD in 44.4%</td>
<td>US</td>
<td>History, ECG, Doppler of carotid and lower limb arteries</td>
<td>Coronary (11% vs. 1.1%) Cerebrovascular (37% vs. 5.5%) Peripheral (24% vs. 2.5%) vascular disease in pts with and without NAFLD</td>
</tr>
<tr>
<td>Wong et al, 2011</td>
<td>612 patients with suspicion of CHD; NAFLD in 58%</td>
<td>US</td>
<td>Coronary angiographyhy (elective)</td>
<td>CAD in 84.6% and 64.1% of pts with and without fatty liver (p&lt;0.001)</td>
</tr>
</tbody>
</table>
NASH related HCC - US

Trends in HCC Liver Transplantation by Etiology of Liver Disease

- HCV
- Modified NASH (BMI>25)
- Modified NASH (BMI>30)
- ALD
- HBV
- NASH

Wong R.J., Hep 2014
Virus-free HCC in ITA.LI.CA: temporal trends in the new century

Cardiovascular diseases (last 5yrs): 11%, 243/2280 patients
Coronary stents and antiplatelet therapy in cirrhosis

- Retrospective
- Bleeding complications in cirrhotics that received a coronary stent (followed by Clopidogrel and ASA).
- Age and sex-matched controls (cirrhosis without stents and not on therapy).
- Among 423 cirrhotic patients who underwent LT evaluation 16 (3.8%) received a stent.
Coronary stents and antiplatelet therapy in cirrhosis

- MELD score: 14.8 ± 4.7

- Two patients with large varices (12.5%) in the stent group had fatal variceal bleeding vs 2 controls (6.3%) who had non-fatal variceal bleeding (p=0.86)

- Double antiplatelet therapy safe and well tolerated.

- Larger prospective studies are needed
Antiplatelet therapy in stroke recurrence prevention in cirrhosis

• Retrospective

• 1180 cirrhotics with first ischemic stroke between:

  1. Antiplatelet drugs within 2 years of discharge: 214 (Aspirin 144, Clopidogrel 44, both drugs 26) patients.

  1. No prescription of antiplatelet drugs: 966 patients.

Chen CY, Pharmacoep and Drug Safety 2012
• ASA patients less likely to be readmitted for ischemic stroke (aHR: 0.904, p=0.012) or death (aHR: 0.919, p=0.006)

• ASA more effective than Clopidogrel in patients with non-alcoholic liver cirrhosis.

*Chen CY, Pharmacoep and Drug Safety 2012*
Anticoagulation in cirrhosis
## Prevalence of VTE in cirrhosis

### Table 3. Prevalence of venous thromboembolism in patients with cirrhosis admitted for hospitalization

<table>
<thead>
<tr>
<th>Reference</th>
<th>Type of study</th>
<th>Study population (n)</th>
<th>Incidence of DVT/PE (%)</th>
<th>% of patients on thromboprophylaxis</th>
<th>DVT number (%)</th>
<th>PE number (%)</th>
<th>DVT + PE number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northup et al. (54)</td>
<td>Case control</td>
<td>21 000</td>
<td>113 (0.5)</td>
<td>21</td>
<td>74 (65.5)</td>
<td>22 (19.5)</td>
<td>17 (15)</td>
</tr>
<tr>
<td>Garcia Fuster et al. (55)</td>
<td>Retrospective</td>
<td>2074</td>
<td>17 (0.8)</td>
<td>NA</td>
<td>10 (59)</td>
<td>6 (35)</td>
<td>1 (6)</td>
</tr>
<tr>
<td>Gulley et al. (57)</td>
<td>Case control</td>
<td>963</td>
<td>18 (1.87)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Lesmana et al. (58)</td>
<td>Retrospective</td>
<td>256</td>
<td>12 (4.7)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Ali et al. (87)</td>
<td>Retrospective</td>
<td>449 798</td>
<td>8231 (1.8)</td>
<td>NA</td>
<td>4335 (0.9)</td>
<td>3688 (0.8)</td>
<td>208 (0.8)</td>
</tr>
<tr>
<td>Dabbagh et al. (53)</td>
<td>Retrospective</td>
<td>190</td>
<td>12 (6.3)</td>
<td>25</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Wu et al. (49)</td>
<td>Retrospective</td>
<td>649 879</td>
<td>52 881 (8.1)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Aldawood et al. (3)</td>
<td>Retrospective</td>
<td>226</td>
<td>6 (2.7)</td>
<td>24</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>
## PVT incidence in cirrhosis

<table>
<thead>
<tr>
<th>Authors, year</th>
<th>Patients</th>
<th>Incidence of PVT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Francoz, 2005</td>
<td>230 patients listed for LT</td>
<td>7.4%</td>
</tr>
<tr>
<td>Zocco, 2009</td>
<td>100 consecutive cirrhotic patients</td>
<td>11%</td>
</tr>
<tr>
<td>Villa, 2012</td>
<td>36 patients (control group in RCT)</td>
<td>27.2% (two years f-up)</td>
</tr>
<tr>
<td>Nery, 2015</td>
<td>1243 patients screened for HCC</td>
<td>9.3%</td>
</tr>
</tbody>
</table>
PVT incidence in patients with and without HCC

Cirrhotic patients with and without HCC: 10/41 (24.4%) and 4/35 (11.4%)
<table>
<thead>
<tr>
<th>Author</th>
<th>Nº</th>
<th>Type</th>
<th>Dose</th>
<th>EBL</th>
<th>Duration anticoagulation</th>
<th>PVT (tot/part)</th>
<th>Extension splanchnic vessels</th>
<th>portal cavern a</th>
<th>Repermeation/stabilization/progression of thrombosis</th>
<th>Mean time repermeation</th>
<th>complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Francoz (2007)</td>
<td>19</td>
<td>Vitamin K antagonist</td>
<td>Target INR (2-3)</td>
<td>Yes, Number NA</td>
<td>Mean 8.1 months</td>
<td>18/1</td>
<td>NA</td>
<td>none</td>
<td>8/0/1</td>
<td>NA</td>
<td>Variceal bleeding following EBL</td>
</tr>
<tr>
<td>Amitrano (2010)</td>
<td>28</td>
<td>Enoxaparin</td>
<td>200 UI/Kg/die</td>
<td>7 for previous variceal bleeding</td>
<td>6 months in responders and non responders, until end of follow up in partial responders</td>
<td>5/23</td>
<td>20</td>
<td>none</td>
<td>21/5/2</td>
<td>6.5 months</td>
<td>Mild anemia in portal hypertensive gastropathy in 2</td>
</tr>
<tr>
<td>Delgado (2012)</td>
<td>55</td>
<td>47 LWMH (21VKA) 8 VKA</td>
<td>NA, target INR close to 2.0</td>
<td>NA</td>
<td>89%&gt;3 months 67%&gt;6 months</td>
<td>14/41</td>
<td>27</td>
<td>none</td>
<td>15/12/0</td>
<td>NA</td>
<td>Lower GI, dental, obscure GI, vaginal, surgical wound</td>
</tr>
<tr>
<td>Senzolo (2012)</td>
<td>33</td>
<td>Nadroparin</td>
<td>95 antiXa U/Kg td)*</td>
<td>12/33 primary prophylaxis</td>
<td>6 months after complete repermeation; until the end of follow up in other patients</td>
<td>11/24</td>
<td>14</td>
<td>4</td>
<td>21/7/5</td>
<td>5.5 months</td>
<td>1 epistaxis, 1 haematuria and 1 cerebral haemorrhage</td>
</tr>
<tr>
<td>Werner (2013)</td>
<td>28</td>
<td>Vitamin K antagonist</td>
<td>Target INR (2-3)</td>
<td>14/28 primary prophylaxis</td>
<td>302 days (range 54–1,213 days)</td>
<td>NA</td>
<td>15</td>
<td>NA</td>
<td>23/5</td>
<td>NA</td>
<td>1 vaginal haemorrhage</td>
</tr>
<tr>
<td>Shao-bo (2015)</td>
<td>65</td>
<td>Enoxaparin</td>
<td>1mg/Kg to 1.5mg/Kg</td>
<td>Secondary prophylaxis</td>
<td>6 months</td>
<td>11/54</td>
<td>NA</td>
<td>NA</td>
<td>51/8/6</td>
<td>NA</td>
<td>3 injections sites, 7 epistaxis, haematuria</td>
</tr>
</tbody>
</table>

15/200 (7.5%) possibly related bleeding complications
Interventional procedures in HCC

• Liver biopsy
• Percutaneous ethanol injection
• Radiofrequency thermoa ablation
• Chemoembolization
• Hepatic resection

Risk of bleeding?
Hemostatic balance in patients with liver cirrhosis: Report of a consensus conference

*Under the auspices of the Italian Association for the Study of Liver Diseases (AISF) and the Italian Society of Internal Medicine (SIMI)*

### Table 1
Post-procedural bleeding in cirrhotic patients, in relation to platelet counts and INR values.

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Study references</th>
<th>Bleeding following the procedure</th>
<th>Low platelet count ($\leq 50 - 60 \times 10^9$)</th>
<th>INR &gt; 1.5 no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paracentesis</td>
<td>[19,88–91]</td>
<td>0.3–3%</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Thoracentesis</td>
<td>[92,93]</td>
<td>2%</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Percutaneous liver biopsy</td>
<td>[13,94–97]</td>
<td>0.5%</td>
<td>Yes</td>
<td>Likely</td>
</tr>
<tr>
<td>Transjugular liver biopsy</td>
<td>[98–100]</td>
<td>&lt;1%</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Dentistry</td>
<td>[101,102]</td>
<td>2.9%</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Endoscopic variceal ligation</td>
<td>[103,104]</td>
<td>3–7.3%</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Endoscopic polypectomy</td>
<td>[105,106]</td>
<td>3–12.4%</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Percutaneous ablation HCC</td>
<td>[107,110]</td>
<td>1%</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>OLT</td>
<td>[28,111–114]</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Liver surgery</td>
<td>[115]</td>
<td>3.9–6.6%</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Cholecystectomy</td>
<td>[116,117]</td>
<td>3.9–6.6%</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Hernioplasty</td>
<td>[118,119]</td>
<td>2.3–10.8%</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

*Definition of the low threshold value varied among studies but is usually taken as $\leq 50 \times 10^9$.**
Procedure-related bleeding is uncommon

Standard coagulation tests are not good predictors of post procedure bleeding.

Platelet count <50-60 x 10^9/L may be predictive of bleeding (formal trials are missing)

Consensus paper AISF, SIMI Dig Liv Dis 2016
TACE

- “Moderate” risk of bleeding: access site hematoma (2%), hepatic artery dissection (rare), variceal bleeding (rare)

- RCTs Angio-Seal vs manual compression: similar rte of bleeding

- Preprocedure testing:
  - INR: recommended
  - aPTT: only in patients receiving UH
  - Platelet count: routinely recommended

- Management:
  - INR: correct to < 1.5
  - aPTT: no consensus (trend toward correcting for values < 1.5 x control)
  - Platelets: transfusion if < 50,000/microL
  - Clopidogrel: withhold for 5 days before procedure
  - Aspirin: do not withhold
  - LMWH (therapeutic dose): withhold one dose before procedure
Bleeding risk in liver cirrhosis undergoing invasive procedures and receiving ASA or anticoagulant therapy

- Lack of studies
- Same indications as general population?

**Low risk of bleeding**
- INR>2: threshold for treatment (i.e.: FFP, vit K)
- PTT: no consensus
- PLT: transfusion if < 50,000/microL
- Clopidogrel: withhold 5 dy before; aspirin: do not withhold
- LMWH (therapeutic dose): withhold one dose before procedure

**Medium risk of bleeding**
- INR: correct to < 1.5
- PTT: no consensus
- PLT: transfusion if < 50,000/microL
- Clopidogrel: withhold 5 dy before; aspirin: do not withhold
- LMWH (therapeutic dose): withhold one dose before procedure

**High risk of bleeding**
- INR: correct to < 1.5
- PTT: stop or reverse heparin for values < 1.5x control
- PLT: transfusion if < 50,000/microL
- Clopidogrel and aspirin: withhold 5 dy before
- LMWH (therapeutic dose): withhold two doses before procedure

*J Patel et al J Vasc Interv Radiol 2012*
Tailoring the cure

• Significant variability in risk from procedure to procedure (even in each category).

• Comorbidities and/or hemostatic defects.

• Specific assessment for the use of blood products and/or hemostatic agents must be individualized.
“Balance” the risk

• Lack of support in guidelines.
• Standard definitions are missing.
• Need of shared approach.
• Optimal regimen based on ischaemic vs haemorrhagic risk.

A consensus from Italian Cardiological, Surgical and Anaesthesiological Societies. Eurointervention, 2014
CURRENT CONCEPTS

Management of Antithrombotic Therapy in Patients Undergoing Invasive Procedures

Todd H. Baron, M.D., Patrick S. Kamath, M.D., and Robert D. McBane, M.D.
Thrombotic risk

- **FA** → $\text{CHA}_2 \text{DS}_2$ - VASc score.
- **Mechanical heart valve** → type, number, location, heart failure, FA, VTE.
- **VTE** → time (3 months).
- **Cancer** → type, therapy, angiogenesis inhibitors, radiotherapy, CVC (HCC?)
- **Coronary stents** → bare-metal vs drug-eluting, time.

Baron TH, NEJM 2015
Bleeding risks

- Type of procedure
- Residual effects of antithrombotic agents
- Reinitiation within 24 hours
- History of bleeding
- Active cancer
- Chemotherapy

Baron TH, NEJM 2015
Procedures

• Low-risk → bleeding rate $\leq 1.5\%$

• High-risk → bleeding rate $> 1.5\%$

• If intracranial/spinal, intraocular, retroperitoneal, intrathoracic or pericardial bleeding → High-risk

• Neuraxial anesthesia as high-risk

Percutaneous ablation $>$ LB

Resection $>$ VLS ablation, TACE

Baron TH, NEJM 2015
## Interval time withhold - Anticoagulant -

<table>
<thead>
<tr>
<th>Agent</th>
<th>Time Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfarin</td>
<td>1–8 days (INR and patient characteristics)</td>
</tr>
<tr>
<td>UFH</td>
<td>Intravenous → 2–6 hr; Subcutaneous → 12–24 hr</td>
</tr>
<tr>
<td>LMWH</td>
<td>24 h</td>
</tr>
<tr>
<td>Fondaparinux</td>
<td>36-48 h</td>
</tr>
<tr>
<td>Dabigatran</td>
<td>1-2 days or 3–5 days (ClCr ≥50 / &lt;50 ml/min)</td>
</tr>
<tr>
<td>Rivaroxaban</td>
<td>≥1 day if renal function is normal</td>
</tr>
<tr>
<td></td>
<td>2 - 3 - 4 days (ClCr 60–90 / 30–59 / 15–29 ml/min)</td>
</tr>
<tr>
<td>Apixaban</td>
<td>1 or 2 - 3 - 5 days (ClCr &gt;60 / 50–59 / &lt;30–49 ml/min)</td>
</tr>
</tbody>
</table>

*Baron TH, NEJM 2015*
## Interval time withhold

- **Antiplatelet**-

<table>
<thead>
<tr>
<th>Agent</th>
<th>Time Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Aspirin and dipyridamole</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Cilostazol</td>
<td>2 days</td>
</tr>
<tr>
<td>Clopidogrel and ticagrelor</td>
<td>5 days</td>
</tr>
<tr>
<td>Prasugrel</td>
<td>7 days</td>
</tr>
<tr>
<td>Ticlopidine</td>
<td>10-14 days</td>
</tr>
</tbody>
</table>
General concepts

• Individualize

• Patients involved in the decision

• If possible, withhold
Balance the risk
- Anticoagulant-

• Low-risk procedure $\rightarrow$ continue.

• High-risk procedure:
  – Low-risk pts: discontinue without bridging.
  – High-risk pts: bridging.

Baron TH, NEJM 2015
Balance the risk
- Antiplatelet-

- Dual therapy for stent (mostly).
- High risk elective procedure → postpone (bare-metal: 6 W; drug eluting: 6 M)
- If must be:
  - Within 6 W (bare-metal) or 6 M (drug-eluting): continue dual. Never stop ASA
  - More than 6 W (bare-metal) or 6 M (drug-eluting): continue ASA, discontinue thienopyridine
- If high risk for CV events continue full-therapy

Baron TH, NEJM 2015
Exceptional cases

- Male, 61 yo, alcoholic liver cirrhosis
- MELD 14
- Secondary prophylaxis with Aspirin and Clopidogrel (two strokes)
- Liver transplant was performed successfully without withdrawal of antiplatelet therapy.
- No cardiac event and no major bleeding complication occurred.
Additional tests to evaluate the influence of antiPLT drugs and anticoagulation on haemostasis?
ROTEM and bleeding risk in cirrhotics who undergo invasive procedures

- Controversial management.
- Routine test inappropriate.

Predicts bleeding risk
Guide prophylactic transfusions

Contribution of PLT

De Bernardi VW & Ponzo P, Eur J Gastr Hep 2015
ROTEM and bleeding risk in cirrhotics who undergo invasive procedures

• Groups:
  – Training set: 17 pts undergoing invasive procedures analyzed retrospectively.
  – Test set: 58 patients (12 with HCC).

• Haemostasis:
  – ROTEM (75 pts).
  – Multiplate, PFA-100 and Light Transmission Aggregometry (16 pts).

• Invasive procedure:
  – Variceal ligation, paracentesis, TIPS, TACE, CVC, RFA/MW for HCC, dental extraction, duodenal polipectomy, abdominal catheter, cholecystectomy, cardiac catheterization, larynx biopsy.

De Bernardi VW & Ponzo P, Eur J Gastr Hep 2015
ROTEM and bleeding risk in cirrhotics who undergo invasive procedures

• Bleeding 6/58 pts (10.3%) in test set:
  – Duodenal biopsy
  – Dental extraction
  – Abdominal catheter positioning
  – Variceal ligation
  – Cholecysiecctomy
  – TACE

De Bernardi VW & Ponzo P, Eur J Gastr Hep 2015
ROTEM and bleeding risk in cirrhotics who undergo invasive procedures

- ROTEM – conventional tests concordance: 35% (6/17 pts).

- PLT not correlated with bleeding (94% pts abnormalities)

- ROTEM:
  - Identify bleeding events (6 pts).
  - Reduce PLT transfusion in high risk pts.

*De Bernardi VW & Ponzo P, Eur J Gastr Hep 2015*
TEG platelets mapping in preoperative acute setting

• Increasing use of clopidogrel and ASA.

• No consensus on withdrawal for non-elective surgery.

• Ability of TEG-PM to detect PLT inhibition.
Surgery: repair of fractured femur, pelvis fixation, upper limb fixation, general surgery.

Baseline PLT function in cirrhosis?
Monitoring anticoagulation In Cirrhosis

• aPTT: often prolonged at baseline, range not established

• Anti-Xa: not applicable in cirrhosis

• INR: often prolonged at baseline, range not established
CLINICAL STUDIES

Low-molecular-weight heparin in patients with advanced cirrhosis

Lars P. Bechmann¹, Matthias Sichau¹, Marc Wichert², Guido Gerken¹, Knut Kröger³,⁴ and Philip Hilgard¹,⁵
Increased anticoagulant response to low-molecular-weight heparin in plasma from patients with advanced cirrhosis

M. SENZOLE, K. I. RODRIGUEZ-CASTRO, V. ROSSETTO, C. RADU, S. GAVASSO, P. CARRARO, P. ZERBINATI, M. T. SARTORI, and P. SIMIONI

Multivisceral Transplant Unit, Department of Surgical and Gastroenterological Sciences, Padua University Hospital, Padua; §Second Chair of Internal Medicine, Department of Cardiologic, Thoracic, and Vascular Sciences, Padua University Hospital, Padua; and §Section of Laboratory Medicine, Padua University Hospital, Padua, Italy

Fig. 1. Plasmatic coagulometric ATIII activity in healthy cirrhotic patients distributed according to Child Pugh class and subjects with a genetic ATIII defect type 1.

Fig. 3. Endogenous thrombin potential (ETP) ratio at 0.35 UI mL of enoxaparin in healthy controls, cirrhotic patients according to Child Pugh class and subjects with a genetic ATIII defect type 1.
Usefulness of TEG for monitoring LMWH and UFH in hemodialysis

• TEG expected to be useful to monitor heparin.

• 28 pts (UFH and LMH):
  – TEG
  – Activated coagulation time (aCT)
  – Activated partial thromboplastin time (aPTT)
  – Anti-Xa activity
Usefulness of TEG for monitoring LMWH and UFH in hemodialysis

- aPTT:
  - Correlated with anti-Xa (LMH $r=0.686$, $p<0.01$; UFH: $r=0.906$, $p <0.01$)
  - No correlated with degree of dialyzer clotting

- aCT:
  - No correlated with degree of dialyzer clotting nor anti-Xa

- TEG-r:
  - Correlated with degree of dialyzer clotting (extracorporeal circuit)
  - Weakly correlated with anti-Xa in LMH ($r=0.402$, $p<0.05$)

Shinoda T, Art Org 1990
CONCLUSIONS

• Cirrhotic patients on anti-PLT drugs or anticoagulation are not uncommon

• The prevalence of CAD in cirrhotics could further increase due to the increasing NASH aetiology of liver disease

• Treatment of HCC involves different invasive procedure at both low/high risk of bleeding

• Absence of specific guidelines in cirrhotics about withholding anticoagulation/anti-PLTs

• Apply guidelines for non cirrhotic patients?

• **Quantify** the risk of both patient and procedure to plan the decision making process

• **Correctly inform** the patient about the scarce data in the field!