Common Dilemmas in ACS and SIHD

“Cardiogenic Shock in STEMI”

Moderator: Marco A. Martínez Ríos
CARDIOGENIC SHOCK IN STEMI

Case Presenter:
Armando García-Castillo MD FACC
Interventional Cardiology
Governor ACC Chapter MEXICO
### Categories of potential conflict of interest

- Sponsoring of transport and/or hotel accommodations in Congresses
- Sponsored in clinical trials and/or in basic research funded by pharmaceutical companies
- Speaker in meetings sponsored by pharmaceutical companies
- Participate in normative committees of scientific trials sponsored by pharmaceutical companies
- Receive institutional support from pharmaceutical companies
- Writing of educative materials sponsored by pharmaceutical companies
- Hold stocks from pharmaceutical companies

### Company

<table>
<thead>
<tr>
<th>Company</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANOFI, Pfizer, AstraZeneca, MSD, Servier, Medtronic, Boston Sci, Abbot Vascular</td>
<td>-</td>
</tr>
<tr>
<td>SANOFI, AZ, Daichi, Esai, AMGEN</td>
<td>-</td>
</tr>
<tr>
<td>SANOFI, AZ, Pfizer, MSD, Abbot</td>
<td>-</td>
</tr>
<tr>
<td>SANOFI, Daichi, Esai</td>
<td>-</td>
</tr>
<tr>
<td>BI, MSD, Pfizer, Sanofi</td>
<td>-</td>
</tr>
</tbody>
</table>
* MLA male 65 years old

- Smoking suspended in 2003
- HTN dx in 2006
- PCI in 2003 with BMS to LAD & RC for UA
- PCI in 2007 with DES to LAD & RC secondary to progression disease
- Asymptomatic from 2007 to 2016 with several negative echostress tests
- On Jan 2017 during exercise activities developed chest pain and syncope
- Receive CPR in home and was transferred to Tertiary Hospital
- Arrive to ER with BP 80/40 HR 100x´ and short breath 8x´
- Presented VF requiring AED with 200 joules and intubation
- Was transferred immediately to cath lab
BASAL EKG

96248 1/5/2017 3:05:40 PM leal alanis, mario alberto
Nacido(a) 1/19/1951 Varón

TAQUICARDIA SINUSAL
frec.V> 99

DIE, CONSIDERAR BLOQUEO DE SUBDIVISION
a3e(240, -40), S>R en II III aVF

ANT. IZQDA

INFARTO ANTERIOR, AGUDO
ST >0.25mV, T neg, en V1-V5

ECG ANOMALO

Diagnóstico sin confirmar

Equipo:
Veloc.: 25 mm/s
Milib.: 10 mm/mV
Prec.: 10 mm/mV
F 60- 0.15-150 Hz
PHOSGA F?
Coronary Angiogram
Clinical Evolution

- After successful PCI arrives to ICU with BP 105/70 HR 90 and MV 14x´

- MV was retired 48 hours later

- Developed AKD with creatinine elevation until 6.2 mg and required haemodialysis

- Renal function was recovered on 7th day and Majurkal catheter was removed

- Levels of BNP reached > 5000 pcg/dl

- Patient was discharged on 10th day of MI

- Predischarge TTE showed EF 40%
In Hospital & Discharge Pharmacological Therapy

- Dopamine and Levosimendan inotropic agents
- IV Nitroglycerin
- Bisoprolol 2.5 mg TID
- Ramipril 2.5 mg TID
- Rosuvastatin 40 mg QD
- Ticagrelor 90 mg BID
- Aspirin 100 mg QD
- Furosemide 40 mg QD
Leal Alanis, Mariela
ID: 96248
Edad: 62 años, Hembra

5-ene-2017 17:07:46
Frec Vent: 97 LPM
Int PR: 171 ms
Dur QB: 197 ms
QT/QTC: 360/414 ms
Ejes P-R-T: 73 60 69

RITMO SINUSAL
POSSIBLE RETRASO EN LA CONDUCCION VENTRICULAR DERECHA (RSR (QR) EN V1/V2)
INFARTO DE MIOCARDIO SEPTAL (40+ ms ONDA Q EN V1/V2), DE EDAD INDETERMINADA
ECG NO NORMAL
INTERPRETACIÓN BASADA EN UNA EDAD POR DEFECTO DE 40 AÑOS
NO CONFIRMADO
TEACHING POINTS

• Imperative developing Regional Networks of Reperfusion Therapy

• To spread massively the App “Codigo Infarto”

• CS treated in the first hours get good results
CONTROVERSY POINTS

• IABP in CS: Routine pre PCI or Bailout?

• VAD (Impella): Convenient or Indispensable?

• ECMO: Routine for Refractary CS?

• PCI approach: Culprit lesion or Multivascular?
Percutaneous assist devices in cardiogenic shock.

A IABP  B Impella  C TandemHeart  D ECMO

Werdan K et al. Eur Heart J 2014;35:156-167

Published on behalf of the European Society of Cardiology. All rights reserved. © The Author 2013. For permissions please email: journals.permissions@oup.com
Trial Flow and Treatment

790 patients with AMI and cardiogenic shock screened

- 190 excluded because of exclusion criteria
  - No informed consent
  - 47 resuscitation >30 minutes
  - 19 shock duration >12 hours
  - 18 severe peripheral artery disease
  - 14 participation in another trial
  - 13 no intrinsic heart activity
  - 9 mechanical complication
  - 3 shock of other cause
  - 3 comorbidity with life expectancy <6 months
  - 2 severe cerebral deficit
  - 2 age >90 years

600 randomized

Allocation

- 301 randomized to IABP
  - 288 received IABP
  - 13 did not receive IABP
    - 10 died before IABP insertion
    - 3 protocol violation
      (2 not suitable for revascularization, 1 serious kinking)

- 299 intended early revascularization
  - 287 primary PCI
  - 3 primary CABG
  - 11 no revascularization
    - 3 not suitable for revascularization
    - 4 coronary artery disease with no identifiable culprit lesion
    - 4 no coronary artery disease

Revascularization

- 300 with 30-day follow-up
  - 1 lost to follow-up

Follow-up

- 300 primary endpoint analysis

Primary endpoint analysis

- 298 with 30-day follow-up
  - 1 withdrew informed consent

- 298 primary endpoint analysis

299 intended early revascularization

- 288 primary PCI
- 3 primary CABG
- 8 no revascularization
  - 1 not suitable for revascularization
  - 2 coronary artery disease with no identifiable culprit lesion
  - 5 no coronary artery disease

299 randomized to control

- 269 received control therapy
- 30 cross-over to IABP (22 first day, 8 day 1-8)
  - 4 mechanical complications
  - 25 protocol violation
  - 1 unknown reason

Thiele et al. NEJM 2012;367:1287-1296
# Mortality 12-Month Follow-up

P = 0.94; log-rank test
Relative risk 1.02; 95% CI 0.88-1.19

## Mortality Rates

<table>
<thead>
<tr>
<th></th>
<th>30-day Mortality</th>
<th>6-Month Mortality</th>
<th>12-Month Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>41.3%</td>
<td>48.7%</td>
<td>51.8%</td>
</tr>
<tr>
<td>IABP</td>
<td>39.7%</td>
<td>49.2%</td>
<td>51.4%</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| No. at risk      | 301  | 181  | 171  | 165  | 161  | 159  | 154  | 152  | 149  | 147  | 146  | 144  | 136  | 45   | 21   |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| IABP             | 301  | 181  | 171  | 165  | 161  | 159  | 154  | 152  | 149  | 147  | 146  | 144  | 136  | 45   | 21   |
| Control          | 299  | 174  | 166  | 165  | 159  | 154  | 154  | 152  | 147  | 147  | 146  | 144  | 140  | 55   | 29   |

Thiele et al. Lancet 2013;382:1638-1645
PROTECT II Trial Design

Patients Requiring Prophylactic Hemodynamic Support During Non-Emergent High Risk PCI on Unprotected LM/Last Patent Conduit and LVEF≤35% OR 3 Vessel Disease and LVEF≤30%

R
1:1

IABP + PCI

IMPELLA 2.5 + PCI

Primary Endpoint = 30-day Composite MAE* rate

Follow-up of the Composite MAE* rate at 90 days

*Major Adverse Events (MAE): Death, Stroke/TIA, MI (>3xULN CK-MB or Troponin), Repeat Revasc, Cardiac or Vascular Operation of Vasc. Operation for limb ischemia, Acute Renal Dysfunction, Increase in Aortic insufficiency, Severe Hypotension, CPR/VT, Angio Failure
PROTECT II MAE Outcome

Pre-specified High Risk PCI Without Atherectomy Group

Per Protocol (N=374)

- 42.4% (N=191)
- 29.5% (N=183)

\[ p = 0.009 \]

↓ 30% MAE

- 51.1% (N=190)
- 35.9% (N=181)

\[ p = 0.003 \]

↓ 30% MAE

30 day MAE

90 day MAE

Per Protocol = Patients that met all incl./ excl. criteria.

Log rank test, \[ p = 0.005 \]
<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Total Patients</th>
<th>Survived ECLS</th>
<th>Survived to DC or Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal</td>
<td>Respiratory</td>
<td>28,723</td>
<td>24,155</td>
<td>21,274</td>
</tr>
<tr>
<td></td>
<td>Cardiac</td>
<td>6,269</td>
<td>3,885</td>
<td>2,599</td>
</tr>
<tr>
<td></td>
<td>ECPR</td>
<td>1,254</td>
<td>806</td>
<td>514</td>
</tr>
<tr>
<td>Pediatric</td>
<td>Respiratory</td>
<td>7,210</td>
<td>4,787</td>
<td>4,155</td>
</tr>
<tr>
<td></td>
<td>Cardiac</td>
<td>8,021</td>
<td>5,341</td>
<td>4,067</td>
</tr>
<tr>
<td></td>
<td>ECPR</td>
<td>2,788</td>
<td>1,532</td>
<td>1,144</td>
</tr>
<tr>
<td>Adult</td>
<td>Respiratory</td>
<td>9,102</td>
<td>5,989</td>
<td>5,254</td>
</tr>
<tr>
<td></td>
<td>Cardiac</td>
<td>7,850</td>
<td>4,394</td>
<td>3,233</td>
</tr>
<tr>
<td></td>
<td>ECPR</td>
<td>2,379</td>
<td>948</td>
<td>707</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>73,596</td>
<td>51,837</td>
<td>42,947</td>
</tr>
</tbody>
</table>

**Cardiac** - 7850 pts  
56% survived ECLS  
41% survived to DC  
ECPR 2379 → 30% survived to DC

**Respiratory** - 9102 pts  
66% survived ECLS  
58% survived to DC