Pediatric Open Heart Surgery in Emerging Countries: A 10-year Experience in Mozambique and Cambodia

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22 avril 2015
CONTEXT

NGO “La Chaine de l’Espoir” created in 1994 by Pr. DELOCHE

5000 children per year receive surgery:
- In France
- Abroad: by surgical missions in welcoming hospitals or in hospitals created by the Chaine de l’espoir: Cambodia, Mozambique, Afghanistan, Ivory Coast, Senegal
STUDY OBJECTIVES

- Evaluation of morbi-mortality results in the short and medium term of the humanitarian cardiac surgery led by la Chaîne de l’Espoir
  - The Instituto do Coraçao, Maputo, Mozambique (ICOR)
  - The Centre de Cardiologie, Phnom Penh, Cambodia (CCCPP),

- Evaluation of mid term following quality of children who had surgery
METHODS

All consecutive patients undergoing open-heart surgery at ICOR and CCCPP between January 1st 2001 and December 31st 2011

Excluded: surgery on overseas, percutaneous interventions, non-cardiac (i.e., thoracic) surgery

Information collected:

- Demographic characteristics (age, sex, ...)
- Distance between the place of residence and the surgical centre
- Underlying aetiology, surgical procedure
- Aristotle Score for CHD (only in Mozambique)
- Early post-operative (i.e., <30 days) mortality
METHODS

Follow up:

- Mozambique:
  Lost of follow up = Absence of visit at the institution over 2 years. If yes, patients and their parents were contacted by phone on three occasions.

- Cambodia:
  Lost of follow up = absence of second visit at the institution

Use of secondary prophylaxis in patients with RHD at follow-up
2099 patients included,

767 in MOZAMBIQUE

- 887 patients screened 2001-2011
  - 115 double entries
  - 772 eligible patients
    - Missing data: 3 unknown diagnosis, 2 unknown procedures
      - 767 patients included

1332 in CAMBODIA

- 1523 patients screened 2001-2011
  - 47 non cardiac surgery
  - 14 performed overseas
  - 19 percutaneous procedures
  - 1443 eligible patients
    - Missing data: 5 date of birth, 106 unknown procedures
      - 1332 patients included
RESULTS: POPULATION

Aristotle Score (Mozambique only)

<table>
<thead>
<tr>
<th>Year</th>
<th>Score 1.5-5.9</th>
<th>Score 6.0-7.9</th>
<th>Score 8.0-9.9</th>
<th>Score 10.0-15.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-2006</td>
<td>30%</td>
<td>50%</td>
<td>20%</td>
<td>1%</td>
</tr>
<tr>
<td>2007-2011</td>
<td>24%</td>
<td>53%</td>
<td>19%</td>
<td>5%</td>
</tr>
</tbody>
</table>

P = 0.096
RESULTS : CHD

<table>
<thead>
<tr>
<th></th>
<th>Mozambique</th>
<th>Cambodia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001-2006</td>
<td>2007-2011</td>
</tr>
<tr>
<td>CHD</td>
<td>12%</td>
<td>16%</td>
</tr>
<tr>
<td>Other</td>
<td>43%</td>
<td>27%</td>
</tr>
<tr>
<td></td>
<td>45%</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td>2001-2006</td>
<td>2007-2011</td>
</tr>
<tr>
<td>CHD</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>43%</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td>56%</td>
<td>70%</td>
</tr>
</tbody>
</table>

P < 0.001
**Results: Mortality**

**Focus on early CHD mortality in Mozambique**
- Mozambique: 7.35% (23/313)
- Expected early mortality according to the Aristotle score: 5.61%

*after exclusion of patients lost to follow-up*

*after exclusion of patients lost to follow-up*

- At 30 days: 14.60% in Mozambique, 55.63% in Cambodia
- In 2012: 32.46% in Mozambique, 55.63% in Cambodia
RESULTS : FOLLOW UP

Mozambique :
Lost of follow up = Absence of visit at the institution over 2 years

Lost of follow up
At 30 days : 112 (14.60%)
In 2012 : 249 (32.46%)

Cambodia :
Lost of follow up = absence of second visit at the institution

Lost of follow up : 741 (55.63%)
RESULTS

LOST OF FOLLOW UP: RISK FACTOR

Distances between hospital and patient home

27% of the children live at more than 1000km from the hospital
## RESULTS

**FOCUS ON REUMATIC VALVULAR DISEASE**

<table>
<thead>
<tr>
<th></th>
<th>Mozambique N=268*</th>
<th>Cambodia N=490**</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve replacement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mitral valve replacement</td>
<td>30 (11.19)</td>
<td>95 (19.39)</td>
<td>0.004</td>
</tr>
<tr>
<td>Aortic valve replacement</td>
<td>17 (56.67)</td>
<td>47 (49.47)</td>
<td></td>
</tr>
<tr>
<td>Aortic and mitral valve replacement</td>
<td>10 (33.33)</td>
<td>31 (32.63)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 (10.00)</td>
<td>17 (17.89)</td>
<td></td>
</tr>
<tr>
<td>Valve repair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mitral valve repair</td>
<td>177 (89.85)</td>
<td>272 (97.84)</td>
<td></td>
</tr>
<tr>
<td>Aortic valve repair</td>
<td>3 (1.52)</td>
<td>3 (1.08)</td>
<td></td>
</tr>
<tr>
<td>Aortic and mitral valve repair</td>
<td>17 (8.63)</td>
<td>3 (1.08)</td>
<td></td>
</tr>
<tr>
<td>Ross procedure</td>
<td>6 (2.24)</td>
<td>0</td>
<td>0.002</td>
</tr>
<tr>
<td>Combined surgical procedures$</td>
<td>34 (12.69)</td>
<td>13 (2.65)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Surgical mitral commissurotomy</td>
<td>0</td>
<td>100 (20.41)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
## RESULTS

### Focus on Reumatic Valvular Disease (Mozambique Only)

<table>
<thead>
<tr>
<th></th>
<th>Mortality</th>
<th>Morbidity</th>
<th>Re-intervention</th>
<th>lost of follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surgical Valve Repair</strong></td>
<td>32 (12%)</td>
<td></td>
<td>18 (7%)</td>
<td>126 (47%)</td>
</tr>
<tr>
<td><strong>Prosthetic</strong></td>
<td>11 (18%)</td>
<td>15 (24%)</td>
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</tbody>
</table>

**Known to be under secondary prophylaxis:**
37/268 (13.8%) in Mozambique and 179/490 (36.5%) in Cambodia
RESULTS
FOCUS ON PALLIATIVE SURGERY (MOZAMBIQUE ONLY)

- 54 palliative surgery with complementary surgery programmed:

64% not yet re-operated
  → 22% Followed up
  → 11% Died
  → 30% Lost to follow up

Not yet re-operated – Followed up
Not yet re-operated – Died
Not yet re-operated – Lost to follow up
Not yet re-operated – Lost to follow up, not contactable
ANALYSES & CONCLUSIONS

- Largest series of open-heart surgery in low-income countries

- RHD and CHD, with increasing numbers of CHD patients over the past decade

- Early post-operative mortality rates may be acceptable and not far from what would be expected in high-income settings

- Continuous training of the medico-surgical teams results on an improving health care supply.
ANALYSES & CONCLUSIONS

But ...

The number of lost to follow-up is unexpectedly high:

- Long-term outcomes of cardiac surgery in low-income settings remain therefore unknown!

- Serious problems
  - for CHD patients in need for repeat procedures,
  - in RHD in need of secondary prophylaxis or long term anticoagulants.
Humanitarian actions should not be left to surgeons alone without a framework to continue care after surgery (RHD prophylaxis, infective endocarditis prophylaxis, and INR clinics.)

Remoteness may be a key factor in patient's selection for cardiac surgery.

Mitral valve repair seems a preferable option in order to avoid oral anticoagulants. Ross, an alternative?

When a child is planned to have surgery in France, be sure of the following possibilities in his country.
Thank you!

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