Patent Ductus Arteriosus Ligation – What is the ideal rate?

WIC Fall Research Meeting
Oxford, October 2-4, 2019
Patent Ductus Arteriosus (PDA)

2 Options:

1. Medical: Indomethacin, Ibuprofen, Paracetamol
2. Surgical ligation

“Despite … research and clinical experience … over 6 decades, there is still uncertainty and controversy about the significance, evaluation and management of PDA in preterm infants.”

AAP Committee on Fetus and Newborn
PDA Ligation in Swiss Neonatal Network

All 9 Swiss NICUs
- 2012 - 2016
- < 28 weeks gestation
- N = 1143

A: 5 NICUs <= 10% Ligation
   (range: 0% – 9.8%)

B: 4 NICUS > 10% Ligation
   (range: 13.8% – 23%)

For illustration purposes only: the real unit distribution is disclosed
Compare outcome group A versus B:

Odds of group A for:

- mortality
- severe morbidity (NEC Bell’s stage \( \geq 2 \), Moderate to severe BPD, ROP stage \( \geq 3 \))
- moderate to severe NDI at 2 years of age

- Risk adjustment is made for:
  - Gestational age, birth weight z-score, male sex, outborn, early onset sepsis, severe IVH
Outcome comparison group A versus B:

Adjusted OR for adverse outcome in units with lower proportion of PDA ligation

<table>
<thead>
<tr>
<th>Outcome</th>
<th>All infants</th>
<th>Infants with treated PDA only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child died at any time</td>
<td>1.007 (0.711-1.425)</td>
<td>0.992 (0.628-1.568)</td>
</tr>
<tr>
<td>Death or major morbidity</td>
<td>0.737 (0.563-0.965)</td>
<td>0.659 (0.465-0.934)</td>
</tr>
<tr>
<td>Major morbidity</td>
<td>0.695 (0.517-0.936)</td>
<td>0.604 (0.416-0.877)</td>
</tr>
<tr>
<td>Moderate to severe NDI at 2 years</td>
<td>1.135 (0.708-1.818)</td>
<td>1.372 (0.732-2.574)</td>
</tr>
</tbody>
</table>

Association of outcome with PDA ligation?

- Did group B have sicker infants requiring PDA ligation?
- Did group B have sicker infants because of PDA ligation?
### Outcome of infants with PDA ligation:

**Adjusted OR for adverse outcome of infants with PDA ligation**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>OR</th>
<th>95% CI</th>
<th>AUC</th>
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<th>AUC</th>
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<tr>
<td>Child died at any time</td>
<td>0.253</td>
<td>(0.133-0.48)</td>
<td>0.82</td>
<td>0.291</td>
<td>(0.15-0.563)</td>
<td>0.81</td>
</tr>
<tr>
<td>Death or major morbidity</td>
<td>2.075</td>
<td>(1.356-3.175)</td>
<td>0.78</td>
<td>1.824</td>
<td>(1.176-2.83)</td>
<td>0.75</td>
</tr>
<tr>
<td>Major morbidity</td>
<td>3.219</td>
<td>(2.088-4.962)</td>
<td>0.72</td>
<td>2.501</td>
<td>(1.652-4.065)</td>
<td>0.69</td>
</tr>
<tr>
<td>Moderate to severe NDI at 2 years</td>
<td>2.151</td>
<td>(1.186-3.899)</td>
<td>0.67</td>
<td>2.471</td>
<td>(1.268-4.816)</td>
<td>0.73</td>
</tr>
</tbody>
</table>

**Association of outcome with PDA ligation?**

- Are infants with PDA ligation sicker **requiring** PDA ligation?
- Are infants with PDA ligation sicker **because of** PDA ligation?
Outcome of infants with PDA ligation:

### Adjusted OR for adverse outcome of infants with PDA ligation

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Subgroup analysis of all infants that survived until day 10 of life.
Summary

• Supply sensitive variation of PDA ligation (0% - 23%)

• Infants born in group A have lower odds for major morbidities (0.5, CI: 0.33 to 0.75)

• Infants with PDA ligation have higher odds for major morbidities (2.6, CI: 1.58 to 4.25)

• Possible lower mortality in infants with PDA ligation (0.49, CI: 0.23 to 1.07)
How to improve quality?

- Study of PDA ligation:
  - Current: differentiation into pre and post-ligation morbidities
  - Publication in peer-reviewed journal
- Raise awareness, discuss, monitor
  - First presentation of results in Spring meeting
  - In-depth analysis of procedures in Fall meeting:
    - Director of unit with lowest rate presents local approach
    - Director of unit with highest rate presents local approach modelling his/her presentation on that of unit with lowest rate
    - Local adjustment of SOP?
    - Long term monitoring in online evaluation and SwissNeoNet Annual Report
SWISSNEONET CORE

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