Total Personal Brain Perfusion “Warm Brain, Cold Body”

(Penza Arch Technology)

Rosseikin E., Evdokimov M., Batrakov P., Kobzev E., and Bazylev V.

Federal Centre of Cardiovascular Surgery
Penza
Axiom — open distal anastomosis

• Circulatory arrest
  - profound
  - deep
  - moderate

• Brain protection
  - profound without perfusion
  - deep or profound + retrograde perfusion
  - different hypothermia + antegrade perfusion

• Antegrade brain perfusion
  - unilateral
  - bilateral
  - total
  - total personal

• Arch and vessels
  - nothing
  - hemiarch
  - full arch
  - “island”
  - “branch”

• Cannulation site
  - right SA
  - femoral artery
  - direct aortic
  - Inomate artery

• Descending aorta
  - nothing
  - «elephant trunk»
  - FET
Penza Arch Technology

1. Total Personal brain perfusion

2. SEPARATE BYPASS CIRCUITS for brain perfusion

3. “opposite branch-first”

4. Penza cannulation
Total Personal brain perfusion

- **TOTAL** – all branches of the aortic arch

- **PERSONAL** – volume of perfusion = volume of all branches
FLOW MEASUREMENT OF BRACHIOCEPHALIC VESSELS

TTFM VeriQ
ml / min

FEDERAL CENTRE of
CARDIOVASCULAR SURGERY
Peres City, Russia
www.cardio-peres.ru
TOTAL, PERSONAL brain perfusion

A, B, C – volume of the flow in BCA, LCCA and LSA
Locus minoris

• Flow measurement $t = 34-35$ ‘

• $t$ of circulatory arrest $= 24-26$ ‘
Different temperature BRAIN – BODY

“warm head, cold body”

Total Personal Brain Perfusion
Centrifusial Pump
Heat exchanger
Normothermia
Oxigination

Oxigination
Roller Pump
Heat exchanger

24-26
Circulatory arrest
2 SEPARATE BYPASS (CIRCUITS)
Radialis l, r
femoral

Body temperature - 26,2°C

Brain temperature

31.6°C
43 year old female.

Chronic aortic dissection type I (DeBakey).

Aortic regurgitation grade 3.

Marfan syndrome.
Penza cannulation

Another way
# Operative data

<table>
<thead>
<tr>
<th>parameters</th>
<th>results</th>
</tr>
</thead>
<tbody>
<tr>
<td>patient</td>
<td>64</td>
</tr>
<tr>
<td>age</td>
<td>58.5 (23-73)</td>
</tr>
<tr>
<td>CPB time</td>
<td>180 (105-257)</td>
</tr>
<tr>
<td>Total Personal Brain Perfusion</td>
<td>145 (78-220)</td>
</tr>
<tr>
<td>Flow</td>
<td>1.1 (0.6 – 2.0)</td>
</tr>
<tr>
<td>Body circulatory arrest time</td>
<td>24.5 (9 -55)</td>
</tr>
<tr>
<td>aneurysm</td>
<td>15 (9 – 19)</td>
</tr>
<tr>
<td>dissection</td>
<td>32 (25 – 55)</td>
</tr>
<tr>
<td>Temperature of body during CA</td>
<td>24.5 (23 – 26.2)</td>
</tr>
<tr>
<td>Temperature of the brain during CA</td>
<td>34.7 (31 – 36.2)</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>64</td>
</tr>
<tr>
<td>Mortality</td>
<td>0</td>
</tr>
<tr>
<td>Stroke permanent transient On 2 and 3 days after AF</td>
<td>1 (1.6%)</td>
</tr>
<tr>
<td>Time before extubation</td>
<td>8.5 (3.6 – 49) hours</td>
</tr>
<tr>
<td>ICU time</td>
<td>72 (48 – 312) hours</td>
</tr>
<tr>
<td>Hospital</td>
<td>11 (7 – 48) days</td>
</tr>
</tbody>
</table>
• Circulatory arrest
  - profound
  - deep
  - moderate for body only

• Brain protection
  - profound without perfusion
  - deep or profound + retrograde perfusion
  - normothermia perfusion

• Antegrade brain perfusion
  - unilateral
  - bilateral
  - total
  - total personal

• Arch and vessels
  - nothing
  - hemiarch
  - full arch
    - “island”
    - “branch”

• Descending aorta
  - nothing
  - «elephant trunk»
  - FET

• Cannulation site
  - right SA
  - femoral artery
  - direct aortic
  - Inomate artery
  - Penza cannulation
<table>
<thead>
<tr>
<th>Penza Arch Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADVANTAGES</strong></td>
</tr>
<tr>
<td>• Brain protection     - Personal and really physiological</td>
</tr>
<tr>
<td>• Visceral organs protection - nice perfusion without vasopressors  + shot CA time</td>
</tr>
<tr>
<td>• Spinal cord protection - always perfusion left subclavian artery  + shot CA time</td>
</tr>
<tr>
<td>• Arch and vessels     - universal, radical decision</td>
</tr>
<tr>
<td>• Descending aorta     - very good “landing zone”</td>
</tr>
</tbody>
</table>
Penza Arch Technology

• For perfusionist - easy to learn and comfortable work

• For anesthesiologist - very comfortable work (brain, visceral, spinal cord protection) 1 (1.6%) dialys

• For surgeon - Comfortable conditions for surgery
  • Universal type of reconstruction of the arch (Marfan, dissection, plugs ...)
  • More easy hemostasis 4 (6.2%) reoperation for bleeding
  • Shorter time of CA 24 min

• For patient
Penza Arch Technology

Universal technology, which we use in all clinical situation when the patient has the problems with aortic arch
WE

Penza Arch Technology