EXTENDED AORTIC ANEURYSM REPAIR WITH ARCH REPLACEMENT IS FEASIBLE AND SAFE WITHOUT CIRCULATORY ARREST AND HYPOTHERMIA

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Current outcomes after open arch repair

<table>
<thead>
<tr>
<th>Author</th>
<th>No Pts.</th>
<th>Perioperative mortality</th>
<th>Stroke rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strauch</td>
<td>120</td>
<td>13%</td>
<td>8%</td>
</tr>
<tr>
<td>Matalanis</td>
<td>62</td>
<td>8%</td>
<td>15%</td>
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<tr>
<td>Nakai</td>
<td>109</td>
<td>15%</td>
<td>17%</td>
</tr>
<tr>
<td>Jacobs</td>
<td>50</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Okita</td>
<td>246</td>
<td>20%</td>
<td>11%</td>
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</tbody>
</table>

Mean mortality: 10.8%
Mean stroke: 10.6%
Brain protection - 1

Hypothermic circulatory arrest remains an acceptable approach

HCA used during aortic surgery in 656 patients

- > 40 min → increased stroke rate 7%
- > 65 min → increased mortality rate 10%

Svensson et al · J Thorac Cardiovasc Surg 1993
Brain protection (ACP) - 2

Trifurcated technique: for continuous cerebral perfusion

Mortality 4.7% (7/150)*
Stroke 4% (6/150)*
Brain protection (ACP) - 3

- Simplifies delivery of antegrade cerebral perfusion
- Avoids malperfusion
- ACP via axillary artery has emerged as the method of choice
HOW WE DO IT

• A 67 year old male known for aortic valve insufficiency and aortic arch aneurysmal dilatation (56 mm) presented with orthopnea

• He had a EF of 30% and dual chambers PM

• Other comorbid conditions were: essential hypertension.
The right common femoral artery was exposed for cannulation. This allowed cerebral/visceral arteries perfusion during arch clamping.

Trough a median sternotomic approach heart, the aortic root and the entire aortic arch were exposed. By extending the incision cranially it was possible to isolate the proximal portion of all supra aortic vessels.

An atrial-caval cannulation have been performed.
HOW WE DO IT

- A customized trifurcated graft was built, using a 12 mm Intersurgical Intergard® and other two branches of 7 mm and 8 mm diameter.
- An “Y” derivation from the retrograde aortic perfusion cannula (femoral) was inserted in this graft.
A distal aortic clamp have been positioned proximally to the ostium of the innomiate artery and the proximal aortic anastomosys was performed by using a 27 mm valved tube (St. Jude Valsalva)
HOW WE DO IT

• The IA was sectioned from its ostium and anastomized in a termino-teriminal manner to the 12 mm graft
• By sequential clamping and suturing the same was done for the LCCA and the LSA
HOW WE DO IT

• The distal aortic clamp was then positioned at the level of the isthmus and the aortic arch aneurysm could have been completely resected.

• Circulation in new aortic arch is restored
HOW WE DO IT

• The proximal anastomosis between the customized graft and the aortic arch graft was then performed by side clamping.
• Cerebral perfusion cannula is removed.
HOW WE DO IT

Bilateral cerebral oxymetry
HOW WE DO IT

Final result
HOW WE DO IT

Postoperative CT scan
EXPERIENCES IN THIS SETTING

Total arch replacement under normothermic beating heart surgery

Normothermic total arch replacement without hypothermic circulatory arrest to treat aortic distal arch aneurysm in a patient with cold agglutinin disease
Ishida N. et al. - ICTVS 2011

Totally normothermic aortic arch replacement without circulatory arrest (29 pts)

Clinical and biochemical outcomes for additive 30°C mesenteric and lower body perfusion during hypothermic circulatory arrest for complex total aortic arch replacement surgery
Fernandes P. et al. - Perfusion 2012
PROS

1 - Avoid neurologic and neurocognitive consequences
2 - No need of blood derivates (plasma, platelets) usually provided to patients undergoing: platelet depletion, DIC.
3 - No need of bowel, liver and kidneys pharmacological protection which are related to:

- Degree of cooling
- Pump time
- Cooling time
- Antegrade brain perfusion
- Circulatory arrest time
LESSONS LEARNED

In this case

- **SAFER** - Avoid risks related to long period ECC and HCA
- **EASIER & FASTER** - Direct perfusion of SAVs. No need of axillary artery dissection and cannulation (pay attention to the cannula!!)
- **SPECIFIC** - Femoral perfusion thoraco-abdominal aorta maybe indicated in aneurysmal disease but it is to avoid in aortic dissections
Present studies can be termed as important addition to the ongoing efforts to standardize cerebral / visceral protection during aortic arch surgery.

However, the true merit of totally normothermic aortic arch replacement will be fully understood only when it will be critically judged against the other prevailing strategies, of which moderate hypothermic SCP has fared the best.

Teruhisa Kazui