"Differential Effects Of Various Endograft Fabric Coverings On Arterial Stiffness And EVAR Outcomes"

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Arterial Stiffness after EVAR

Arterial stiffness is a term used to describe the rigidity of the arterial wall mainly measured by Pulse Wave Velocity.

Impaired aortic biomechanics after EVAR, may directly increase the rigidity of the arterial wall

Does the choice of graft affect arterial stiffness?

Is there any clinical significance?

- Moulakakis KG, Liapis CD. Arterial Stiffness Alterations and Inflammatory Response Following Endovascular Aortic Repair. Aorta April 2015

Pulse wave velocity (PWV)

- Pulse wave velocity (PWV): the gold standard method of arterial stiffness measurement and a strong independent predictor of cardiovascular morbidity and mortality.

  - Therapeutic modalities reducing PWV are associated with fewer cardiovascular events and improved prognosis

Arterial stiffness, circulating vascular calcification inhibitors and inflammatory mediators in pts with AAA

- PWV, hCRP, WBC, IL-6 and Osteoprotegerin were significantly upregulated in pts with AAA.
- Independent association of PWV with mean blood pressure, OPG and AAA diameter was observed.


Changes in arterial stiffness in patients undergoing AAA repair

- Stent-graft implantation (n=48) was associated with significant increase in PWV 6 months following EVAR

  - Lantelme P et al J Hypertens 2009

Open surgical repair (n=39) of AAA induced modest increase of PWV and decreased by 8.5% the Augmentation index

  - Lantelme P et al J Hypertens 2009

"The Vascular world is coming together in New York
This November"

NO DISCLOSURES RELATED TO THE TOPIC
Differential effects of stent-graft fabrics on arterial stiffness in patients undergoing EVAR

Prospective study

N=118 pts


Values of PWV and novel biomarkers at baseline and after 12 months

<table>
<thead>
<tr>
<th>Patient</th>
<th>PWV (cm/s)</th>
<th>OPG (UI/ml)</th>
<th>IL-8 (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Post 12 mo.</td>
<td>Baseline</td>
<td>Post 12 mo.</td>
</tr>
<tr>
<td>PTFE</td>
<td>12.80 (2.90)</td>
<td>14.51 (3.49)</td>
<td>12.82 (2.70)</td>
</tr>
<tr>
<td>Polyester woven</td>
<td>12.15 (2.70)</td>
<td>10.65 (4.98)</td>
<td>12.30 (2.60)</td>
</tr>
<tr>
<td>Polyester</td>
<td>11.21 (5.90)</td>
<td>17.38 (1.85)</td>
<td>12.15 (2.90)</td>
</tr>
</tbody>
</table>

PWV, OPG and IL-8 increase was more pronounced in the Polyester Woven group compared to PTFE group (p=0.033, p=0.048, p=0.001 respectively)


Arterial Stiffness and cardiac outcomes

- Arterial stiffness has been correlated with long-term cardiovascular outcomes independent of traditional cardiovascular risk factors (e.g. hypertension, diabetes, obesity, dyslipidemia, smoking)

- Arterial stiffening results in increased pulse pressure, left ventricular hypertrophy, subendocardial ischemia, endothelial dysfunction and cardiac fibrosis

Luo J et al Cardiol J. 2014

Short-term vs. long-term MI following EVAR and Open AAA Repair

- A non-significant tendency toward more cardiovascular deaths was apparent in the EVAR trials in the endovascular group during the 24-month interval.

- Cardiovascular mortality was primarily due to the poor general health status of those patients or the required secondary interventions.

- A harmful effect of even slight alterations in aortic stiffness induced by endografts should be considered.

2. Brown LC, et al. EVAR trial participants. Does EVAR alter the rate of cardiovascular events in patients with AAA considered unfit for open repair? Results from the randomized EVAR trial 2. Eur J Vasc Endovasc Surg. 2010

EVAR and cardiovascular Outcome

- EVAR alters cardiac structure and function

- EVAR in 22 pts...

- increased baPWV and induced left ventricular hypertrophy, left atrium enlargement and impaired diastolic function

Takeda Y et al. Circ J 2014
What about.....Arterial Stiffness AND cardiovascular events after TEVAR?

Future Considerations

Arterial stiffness and NT-proBNP changes in pts following TEVAR (Prospective Study)

PWV and NT-proBNP changes

Follow-up: 23.4 ± 16.4 months (range 3-54 months). Overall Mortality: 33.3%

Conclusions (I)

• There is evidence of increased arterial stiffness after EVAR related to graft type (polyester more than PTFE). The effect of endograft type in the thoracic aorta is under investigation.

• EVAR is associated with lower perioperative mortality and morbidity rates compared to open surgical repair BUT this advantage is blunted at long term, mainly due to an increase in cardiovascular complications.

Conclusions (II)

• Arterial stiffening induced adverse cardiac events after stent graft implantation may explain this change in the long-term outcome

• Arterial stiffness should be taken into consideration by the industry when designing new endografts

Thank you for your attention