ARE ENDOLEAKS TYPE 1A PREDICTABLE?

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Disclosure

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

X I do not have any potential conflict of interest
INTRODUCTION

Aortic proximal endoleak (type IA EL) is one of the possible complications of EVAR and usually needs a further reintervention due to risk of aortic rupture.
THE PROBLEM IS

Combining data from DREAM, EVAR 1 and ACE the incidence of EL I type was 6% and reintervention require in 80%

Paravastu SCV et al, Cochrane 2014

The OVER trial enrolled 881 patients, of whom 439 received successful EVAR. During a mean follow-up of 6.2 ± 2.4 years, 135 patients (30.5%) developed 187 endoleaks. The 187 endoleaks included 12% type I, 76% type II, 3% type III, 3% type IV, and 6% indeterminate.

AIM

Assessment of any preoperative factor which could predict the development of EL Ia
METHODS

A retrospective collection of EVARs for non-ruptured AAA

• Between January 2012 and December 2015
• Demographic and anatomical factors
  • sex, age, proximal aortic neck’s diameter, angulation and length, AAA diameter, endograft oversizing
• Structural characteristics of different endografts
  • free flow, barbs and radial force
DEMOGRAPHICS

- 190 patients
- Mean age 75.7 years
- 16.8% female (32 pts)
- 66% CRF (127 pts with creatinine > 1.2 mg/dl)
- 34% COPD (65 pts)
- 14% Diabetes Mellitus (27 pts)

Mean AAA diameter 55.9 mm (30-130 mm)
ENDOGRAFTS

• Zenith 49 (25%)
• Excluder 45 (23%)
• Endurant 28 (14%)

• Zenith Flex 18 (9%)
• Endologix 14 (7.3%)
• Incraft 10 (5.2%)

Mean main body diameter: 27 mm
Mean oversize: 19.8%
RESULTS

Late EL Ia 7% (13 pts)

- Mean neck diameter 23 mm (16-36 mm)
- Mean proximal neck angle 32° (0-79)
- Mean neck length 24 mm

Mean Follow-up time: 19 months
Mean time for late EL IA: 11 months
RESULTS

• 6 proximal cuffs
• 2 open conversions and aortic-bi-iliac bypass
• 2 endovascular relining
• 2 no interventions for critical general conditions
• 1 monitoring
RESULTS

AAA diameter, proximal neck diameter and angulation, oversize of the graft >30%, radial force, presence of suprarenal free flow and barbs were not significantly associated to the development of EL Ia.
RESULTS

- Female sex $p=0.01$
- Age $> 77$ years $p=0.02$
- Neck length $< 21$ mm $p=0.02$

Statistically significant
Differences in Elastin and Elastolytic Enzymes between Men and Women with Abdominal Aortic Aneurysm

In conclusion, less elastin in the non-thrombus-covered aortic wall of women with AAA than in men and the simultaneous higher level of MMP-9 suggest differences in the elastolytic process of AAA in men and women.

Villard C et al, Aorta 2014

Alteration of Elastin, Collagen and their Cross-links in Abdominal Aortic Aneurysms

Conclusions: beside confirming decreased elastin content in aneurysmal walls, these results show a concurrent increase of collagen cross-links. Since total collagen markers were decreased (decreased 4-hypro and 5-hyllys) it is reasonable to suggest that in aneurysmal aortic walls old collagen accumulates cross-links while new collagen biosynthesis is somehow defective.

Carmo M et al, Eur J Vasc Endovasc Surg 2002

In vivo estimation of the contribution of elastin and collagen to the mechanical properties in the human abdominal aorta: effect of age and sex

A marked sex difference was observed, with a much less age-related effect on the stiffness of both elastin_{iso} and collagen_{ani} in women. Possible factors of importance could be the effect of sex hormones, as well as differing collagen isoforms between sexes (39).

Astrand H et al, J Appl Physiol 2011
**Risk Factors for Endoleak and the Evidence for Stent-graft Oversizing in Patients Undergoing Endovascular Aneurysm Repair**

**Objectives:** The aim of this study was to assess the relationship between patient factors, the anatomy of the proximal aneurysm neck; the type of endovascular graft; and the consequences of graft/neck size mismatch and the occurrence of proximal endoleak.

**Design:** Multicentre clinical study.

**Materials:** Of a total of 2194 patients, 2146 underwent successful endovascular repair of infra-renal abdominal aortic aneurysms (AAA).

**Methods:** Endoleaks were identified by radiological imaging immediately after completion of the procedure as per study protocols. Clinical and anatomical features of AAA in patients with endoleak were compared to patients without endoleak and data were analysed using the Chi-square test. A multivariate logistic regression model was constructed by selecting variables found to be significantly associated with complications in a univariate analysis.

**Results:** Intra-operative endoleak was observed in 16.7% overall, and 3.3% were noted to have proximal endoleak. Aneurysm size larger than 60 mm ($p = 0.004$), ex-smokers ($p = 0.005$) and age over 75 years ($p = 0.01$) were independently associated with endoleak of all types. Univariate and multivariate analysis revealed correlation between proximal endoleak and (i) diameter of the aneurysm neck-proximal (D2a), middle (D2b), distal (D2c), at all levels ($p < 0.005$); (ii) proximal aortic neck length ($p = 0.0001$); (iii) aortic device diameter ($p = 0.0024$). No correlation was identified for angulation and form of the aortic neck. A model of the frequency of proximal endoleak, in relation to the ratio of the aortic device diameter to the distal aortic neck diameter, revealed that endoleak decreased when the aortic device diameter became oversized by more than 10% and confidence intervals remained tight for up to and over 20% oversize.

Mohan IV et al, **Eur J Vasc Endovas Surg 2001**
CONCLUSIONS

• Preliminary study about the risk and predictive factors for developing of EL 1A and our incidence is the same of literature

• Female sex showed higher risk due to amount of elastin lesser than male

• and so more sensibility of aortic wall to radial force;

• Age induced degeneration of arterial wall due to loss of elasticity (loss of elastin)

• Neck length <21 mm represents a major risk of EL 1A
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