CHIMPS AND REGULAR ARE STILL A VALUABLE OPTION FOR ARCH REPAIR

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Disclosure

Speaker name:

........SONIA RONCHEY.................................

I do not have any potential conflict of interest
DO THEY WORK?

Born as a rescue

..unintended coverage of aortic arch branch

OUR EXPERIENCE

1. 06/2002 overstenting of the LCCA
2. 12/2002 overstenting of the IA
OVERTSENTING
INNOMINATE ARTERY

IA coverage

TRANS-BRACHIAL
WALLSTENT 11-70
DEATH AT 12 YRS

AORTIC ARCH CHIMNEY: IA
DO THEY WORK?

Chimney Technique for Aortic Arch Pathologies: An 11-Year Single-Center Experience

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- TECHNICAL SUCCESS 36/36 100%
- MORTALITY 3 8.3%
- PROCEDURE REL COMPLICATIONS 4 11.1%
  - MINOR STROKE (2 RUPT-1 ELECT) 3
  - PARAPARESIS 1
  - EARLY TYPE I EL 0

J Endovasc Ther. 2014;21:312-323
DO THEY WORK?

Chimney Grafts in Aortic Stent Grafting: Hazardous or Useful Technique?
Systematic Review of Current Data

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364 ARCH CHIMNEY

MORTALITY 4%
EARLY TYPE I EL 11%
(15 OBSERVED: 7 SELF SEALED – 17 TREATED: 14 EV+ 3 CONVERSION)
PROCEDURE REL COMPLICATIONS 8%

CH-G PATENCY (17 MTHS) 97-99%
LATE TYPE I EL (>30 DAYS) 4%
DO THEY WORK?

Chimney Grafts in Aortic Stent Grafting: Hazardous or Useful Technique? Systematic Review of Current Data

B. Lindblad, A. Bin J
Department of Vascular Disease

MORT. EARLY (15 OBSERVED) 4%
MORT. LATE (30 DAYS) 4%
CH-G PATENCY (17 MTHS) 97-99%
EARLY TYPE I EL (15 OBSERVED) 11%
CONVERSION 3%
TREATED: EV+ 14
“TECHNICAL RULES”

• GRAFT CHOICE (MAIN/PARALLEL)
• VESS TAKE-OFF ➔
  CHIMNEY/PERISCOPIES/SANDWICH
• AVOID GUTTERS
  – OVERSIZING
  – CHIMNEY LENGHT OVERLAPPING
• CHIMNEY PATENCY
  – CONFORME/REINFORCE
• SAFE LANDING ZONE (ANGLES/AORTIC WALL)
• FOLLOW UP
## MAIN GRAFT CHOICE

### THOR/ S-G radial force

| Proximal sealing zone | 100 | 30 | 40 | 38 |
| Distal sealing zone   | 42  | 30 | 43 | 15 |
| Body spring           | 41  | 31 | 9 | 23 |

CONFORMABILITY & MATERIAL FATIGUE
SURGICAL DEBRANCHING

- RCCA-LCCA-LSA : 6
- RCCA-LCCA : 2
- LCCA-LSA : 10

(9 TAG + 18 c-TAG)

18 50%
PARALLEL GRAFT CHOICE

**flexibility ≈ radial force**

**FIGURE 8.** Force (grams-force) required to compress stent radially by 25%.

LENGHT/DIAMETER & MATERIAL FATIGUE
REINFORCE THE PARALLEL GRAFT!!

ESPECIALLY IF LONG
REINFORCE THE PARALLEL GRAFT!!
WHEN IS THE ONLY FEEDING VESSEL
CHIMNEY GRAFT
(OUR EXPERIENCE)

- VIABAHN 28 (15 REINF)
- GORE LEG 3 (1 REINF)
- ADVANTA 1 (REINF)
- WALLSTENT 2
- BIOTRONIK 2
- PROTEGE’ 4
- VISI-PRO 1
CHIMNEY ORIENTATION

VESSELS TAKE-OFF

REDUCE INTERACTION IN THE ASCENDING
Aortic graft Oversizing options

1. 20%
2. 30%
3. 30% for 2 vessels
   40% for 3 vessels
4. $0.72 \sqrt{a^2 + b^2}$
Aortic graft
Oversizing options

4. $0.72 \sqrt{a^2 + b^2}$ (Lachat)

Oversizing 25-35% for double chimney
Lower for larger diameter
OSIRIX EVALUATION

GUTTERS AREA

Oversizing &

A: STENT 8 mm
B: STENT 11 mm
C: STENT 9 mm (ostio dei TSA)
GUTTERS

CHIMNEY OVERLAPPING → HOW LONG?

• Longer chimney → reduce EL (gutters)

• Bad landing zone → curvature/graft LZ
RETROGRADE TYPE A

Day 4 sudden death
FOLLOW-UP

• TYPE I EL

• CHIMNEY GRAFT COMPLICATION
FOLLOW-UP

TYPE I ENDOLEAK 6 (18.2\%)  
MEAN F-UP 39.6 MTHS (MIN 1-144)

• Ia  
  5
  
  – Sac enlargement  2 (IA 6 mths - LSA 10 mths)  
  (2 embolization + 1 ascending replacement)
  
  – w/out sac enlargement  3 (LCCA)(IA)(LCCA+LSA)  
  (91 yrs / lung K \rightarrow death / COPD & tracheostomy)

• Ib  
  1 (47 mths)
  
  (distal extension)
ENDOLEAK: GUTTERS EMB/
FOLLOW-UP

CHIMNEY GRAFT COMPLICATION. 4 (12.1%)
MEAN F-UP 39.6 MTHS (MIN 1-144)

– LSA ASYMPT OCCL 1 (11 MTHS)
– LCCA ASYMPT OCCL 1 (22 MTHS)
  (TREATED → BYPASS)

– STENT FRACTURE (ASYMPT) 1 (2 MTHS)
– VIABAHN STENOSIS 1 (24 MTHS)
LSA Stent Fracture after 2 months

PATENT AT 54 mths
VIABAHN STENOSIS
TAA – PREV TEVAR
CHIMNEYS

• OFF THE SHELF
• FEASIBLE
• SAFE

• DURABLE
CHIMNEY ROLE

✓ RESCUE

✓ EMERGENCY

✓ HIGH RISK PATIENTS

✓ CUSTOM SG LIMITATION
Aortic Arch Lesions and Dissections

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Value and limitations of chimney grafts to treat arch lesions

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Aim. The endovascular debranching with chimney stents provides a minimally invasive alternative to open surgery with readily available devices and has extended the option of endoluminal therapy into the realm of the aortic arch. But a critical observation at the use of this technique at the aortic arch is important and necessary because of the lack of long-term results and long-term patency of the stents. Our study aims to review the results of chimney grafts to treat arch lesions.

Methods. A systematic health database search was performed in December 2014 according to the Prisma Guidelines. Papers were sought through a meticulous search of the MEDLINE database (National Library of Medicine, Bethesda, MA) using the Pubmed search engine.

Results. Twenty-two articles were eligible for detailed analysis and data extraction. A total of 182 patients underwent chimney techniques during TEVAR (Thoracic Endovascular Aneurysm Repair). A total of 217 chimney grafts were implanted: 56 to the IA, 1 to the RCCA, 91 to the LCXCA and 39 to the LSA. The type of stent-graft used for TEVAR was described in 132 patients. The type and name of chimney graft was described in 126 patients. In 53 patients information was limited to the type. Primary technical success, defined as a complete chimney procedure was achieved in 171 patients (98%). In 6 patients it was not clearly reported. The overall stroke rate was 3.3%. The overall endoleak rate, in those papers it was clearly reported, was 18.4% (31 patients); 23 (13.6%) patients developed a type IA endoleak, 1 patient (0.6%) developed type IB endoleak and 7 patients (4.1%) developed a type II endoleak.

Conclusion. The total endovascular aortic arch debranching technique represents a good option to treat high-risk patients, because it dramatically reduces the aggressiveness of the procedure in the arch. Many concerns are still present, mainly related to durability and material interaction of grafts. Long-term follow-up is exceptionally important in light of the interactions of the stents, the thoracic endograft, the aortic arch, and every variation in systolic and diastolic pressure. Actually this technique has acceptable short and mid-term results. Long term data are available just from a very small number of patients and more data from a wider number are needed in order to embrace this method as a safe one.

Key words: Aortic arch syndrome - Endovascular procedures - Surgical procedures, operative.

Thoracic endovascular aortic repair (TEVAR) has been established as the preferential therapeutic modality for the treatment of intact aneurysms of the descending thoracic aorta. 1, 2 Its application has also gained wide acceptance for the treatment of acute thoracic aortic pathologies. 3, 4 Aortic arch repair is a challenge for cardiac and vascular surgeons. Open surgical arch replacement can be performed safely but it still represents a high-risk procedure with increased morbidity and mortality in fragile patients. The current choice of treatment is open graft replacement, but approximately 20% of patients are considered unfit for open surgery. 7 In these patients, deemed to be at higher risk, other...