Endovascular Treatment of Thoraco-abdominal Aneurysm Using Physician-Modified Endo-grafts

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Disclosure

Speaker name:
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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)

☒ I do not have any potential conflict of interest
Thoracoabdominal Aneurysm (TAAA)

- TAAA accounts for ~10% of all aortic aneurysms;
- Open repair is challenging and with high mortality;
- F/B-EVAR are increasingly utilized and achieved good results;
- Physician modified endografts fit for urgent setting.

References:

Largest series of Open Repair

COSELLI 2016

Outcomes of 3309 thoracoabdominal aortic aneurysm repairs

Objective: Since the pioneering era of E. Stanley Crawford, our multidisciplinary team has been treating complex aortic aneurysms. We report our outcomes from 3309 thoracoabdominal aortic aneurysm repairs and identify predictors of early death and adverse postoperative outcomes.

Methods: We analyzed prospective data (2006-2018) obtained from patients (2043 male; median age, 67 years) who underwent 914 Crawford type I, 1066 type II, 660 type III, and 694 type IV thoracoabdominal aortic aneurysm repairs, of which 732 (21.8%) were urgent or emergent repairs. Complications were recorded, and mortality was defined as death within 30 days of surgery.

Results: There were 249 operative deaths (7.5%). Permanent paraplegia and paraparesis occurred after 97 (2.9%) and 81 (2.4%) repairs, respectively. Of 189 patients (5.7%) with permanent renal failure, 107 died in hospital, and 82 died within 30 days. Permanent stroke was relatively uncommon (n = 74; 2.2%). The rate of the composite adverse event (n = 478; 14.4%) was highest after type II repair (n = 203; 19.0%) and lowest after type IV repair (n = 67; 10.2%; P < .001). Estimated postoperative survival was 83.5% ± 3.4% at 1 year, 63.6% ± 3.6% at 5 years, 63.6% ± 1.0% at 10 years, and 18.3% ± 0.9% at 15 years.

Conclusions: Repairing thoracoabdominal aneurysms poses substantial risks, particularly when the entire thoracoabdominal aorta is replaced. Nonetheless, our data suggest that thoracoabdominal aneurysm repair, when performed at an experienced center, can produce reasonable outcomes.

Mid term Survival: 65% (5 years)
Major morbidity: > 50%
Spinal Cord Ischemia: Composite 13% Permanent 8%

Largest series of Endovascular Repair

EAGLETON 2016

Outcomes of 1305 fenestrated and branched endovascular repair

Objective: Thoracoabdominal aortic aneurysm (TAAA) repair remains a challenging clinical pathology. Endovascular technology, in particular the evolution of fenestrated and branched (F/B) endografts used in endovascular aneurysm repair (EVAR), has improved the technical and clinical outcomes of F/B-EVAR for extensive type II and III TAAA. We report our outcomes from 1305 fenestrated and branched endograft (F/B) repairs in 1059 patients (94.3%) treated with F/B-EVAR.

Methods: Data from 354 high-risk patients enrolled in a prospective, randomized, multicenter, single-arm, parallel-group study with 2:1 randomization to fenestrated or branched (F/B) or branched (B) or unenhanced (E) endografts were analyzed. Technical success, perioperative clinical outcomes, and mid-term outcomes were evaluated. Technical success was defined as successful deployment of the endograft and aneurysm exclusion. Clinical outcomes were defined as any complication or reintervention occurring within 30 days of surgery.

Results: F/B-EVAR incorporating 1305 fenestrated and branched endografts were implanted with 90% of target vessels successfully. The overall 30-day mortality rate was 4.8%. The composite morbidity rate was 30.4%. Major complications included spinal cord ischemia in 13.8% and permanent paraplegia in 8.8%. The composite 30-day survival rate was 95.2%. The cumulative survival at 5 years was 67.8% (95% confidence interval [CI], 62.8-72.7%).

Mid term Survival: 57% (3 years)
Major morbidity: 40%
Spinal Cord Ischemia: Composite 8.8% Permanent 4%
Outcomes and cost of open versus endovascular repair of intact thoracoabdominal aortic aneurysm

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- 481 (55%) ER vs 398 (45%) OARs;
- Hospital stay: 11 [7-20] days vs 5 [2-9] days, \( P < .001 \);
- In-hospital mortality: 15% vs 5%, \( P < .001 \);
- All major complications were 2 to 3 times higher;
- Total hospitalization cost was significantly higher.
Endovascular repair of TAAA using PEMGs
———The Nanjing DTH Experience

From 2017.1 to 2018.9, 14 TAAAs treated with PMEGs:

- 2 elective intact aneurysms, 12 symptomatic or ruptured aneurysms;
- Technical success was 100%, 7% (1/14) in hospital mortality due to shaggy aorta syndrome, 29% (3/14) moderate to severe complications;
- 13.2 months FU, all target vessels remained patent, one early reintervention.
step 1: Planning
step 2: Modification

Reinforced Fenestrations: target vessel originating from narrow aortic diameter (<5 mm larger than the stent graft) or within the sealing zone.

Mini-cuff: aortic lumen at the origin of the target vessel is 5–10 mm larger than the diameter of the stent graft.

Directional Branches: aortic lumen is >10 mm larger than the diameter of the aortic stent graft.

Courtesy of Gustavo S. Oderich
step 3: Diameter reducing
step 4: Wires Preloaded
step 5: Access
step 6: Target vessels mark

Pre-cannulation

Fusion imaging
step 7: Target vessels cannulation
Retrograde Puncture via Laparotomy

Eric Verhoeven
step 8: Target vessels stenosis
step 9: Bridging stenting

- Cover stent vs. naked stent
- Self expanding vs. balloon expanding;
- Length, diameter;
- Flexibility, visuality, trafficability;

- Endoleak
- Occlusion
- Fracture
- Migration
step 10: Prevention of SCI

- prophylactic CFD
- MAP > 90mmHg
- Hb > 11 g/dl
- Preserve LSA and IIA
- Early restoration of pelvic and lower limb flow
- Stage operation
CONCLUSION

- PEMGs is safe and effective for selected patients with high risk of open repair;
- Precise and detailed planning are vital to successful conduct of the procedures;
- Concerns on feasibility, poor quality control, durability, and operator’s learning curve.
THANK YOU!

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