EVAR in severely angulated neck: An option with good long-term outcome

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Disclosure

Medtronic: Teaching course, Proctoring
Severely angled neck is still a challenge.

Current devices' limitation @ 60º, 75º, 90º.

More common in Asians.

Open Surgery IS the treatment of choice.
71 year-old male, symptomatic 65 mm AAA

CAD, Recent stroke

65 x 63 mm

77 year-old male, Rapidly enlarged 92 mm AAA

CAD, COPD

92 x 65 mm
Options:

1. Open repair ✗

2. Conservative treatment

3. Endovascular Repair
   “a safe, effective and durable option ???”
Prince of Songkla U. experience

January 2009 – July 2017

Reviewed all AAA patients with neck angle >60° treated with Endurant stent graft in Songklanagarind hospital

Study – demographic data
perioperative data
follow up imaging studies
RESULTS

154 patients  EVAR, neck angle > 60°

121 males, 33 females (22%)

Average age 75.8 years (56 - 91)

AAA diameter, average 69 mm (34-112)

Neck diameter, average 22 mm (16-32)

Neck length, average 27 mm (12-58)

Neck angle, average 91° (62-166)
EVAR in severely angulated neck

Endurant

Neck angle up to 75°
Our approach

**Neck length**
- Infrarenal: ≥ 15 - 20 mm
- Parallel graft: ≥ 20 - 25 mm

**Adjunct procedure**
- Proximal cuff extension
- Parallel graft (chimney, sandwich)
- HeliFx

**Deployment technique**
- Cover all neck (Just below the lowest renal a.)
- Avoid renal a. coverage (Low deployment + cuff extension)

When in doubt, deploy a little low
Proximal Endoleak treated with Proximal cuff extension & Heli-Fx

Courtesy of Kwanchai Lawanwong, MD
Police General Hospital, Bangkok
Shortened neck

3 cm-long neck

Proximal extension cuff + Sandwich procedure

1 cm-long neck
RESULTS

154 patients – 5 groups, Neck angle

- $61^\circ - 75^\circ$: 35 cases (23%)
- $76^\circ - 90^\circ$: 50 cases (32%)
- $91^\circ - 105^\circ$: 38 cases (25%)
- $106^\circ - 120^\circ$: 17 cases (11%)
- $>120^\circ$: 14 cases (9%)

119 cases (77%)
EVAR in severe angulated neck
Longest follow up

AAA 81 x 73 mm
Pre-op

1.5-year PO
AAA 77 x 74 mm
8-year PO

110°
EVAR in severe angulated neck

74 yo female, 50 mm symptomatic AAA

Pre-op 1-month PO 5-year PO

AAA 45 x 50 mm AAA shrinkage
No migration No Proximal endoleak
AAA 29 x 34 mm

94°
EVAR in severe angulated neck

77 yo male, 91 mm AAA

AAA shrinkage
No migration
No Proximal endoleak

AAA 91 x 75 mm
Pre-op

AAA 83 x 64 mm
1-month PO

AAA 83 x 64 mm
2-year PO
RESULTS

95% Technical success

Exclude aneurysm from circulation

8 proximal endoleak 5%
1 renal artery coverage (renal stent)

30-day mortality – 4 cases (2.6%)

2 MIs
1 stroke
1 ruptured AAA
RESULTS

Proximal Endoleak

- $61^\circ - 75^\circ$: 0 cases (0%)
- $76^\circ - 90^\circ$: 1 case (2%)
- $91^\circ - 105^\circ$: 3 cases (8%)
- $106^\circ - 120^\circ$: 3 cases (18%)
- $>120^\circ$: 1 case (7%)

- Total: 119 cases (77%)
RESULTS

8 Proximal Endoleaks:
1 sealed spontaneously @ 1 month
3 sealed w adjunct procedures
   Proximal extension @ 1 month
   Heli-Fx @ 1 year
   Chimney @ 2.5 years

3 ruptures @ 22 days, 1 year, & 1.5 years
1 f/u @ 12 months
Proximal Endoleak treated with Heli-Fx

BEFORE

AFTER
Proximal endoleak

- 60° - 75°
- 76° - 90°
- 91° - 105°
- 106° - 120°
- > 120°

- Fixed E1P
- Ruptured AAA
Proximal endoleak

Adjunct procedures needed: Aortic cuff, Parallel graft, HeliFx

- Fixed E1P
- Ruptured AAA
- Adjunct procedures needed

- 60° - 75°: 0%
- 76° - 90°: 20%
- 91° - 105°: 30%
- 106° - 120°: 50%
- > 120°: 60%
RESULTS

Follow up, average 25 months (1-106)

2 late proximal endoleaks
@ 3 & 5 years PO

Both from neck dilatation
Persistent type II endoleak
Late Proximal Endoleak @ 5 years PO

- Proximal aortic cuff
- Chimney R renal artery

5-year PO

3 years post 2nd procedure
RESULTS

Follow up, average 25 months (1-106)

2 late proximal endoleaks
@ 3 & 5 years PO
Both from neck dilatation
Persistent type II endoleak

No Device migration (>10 MM)
1 case - 7 mm migration
EVAR in severe angulated neck
7 mm distal migration

Pre-op
78 x 68 mm

3-month PO

3-year PO
49 x 58 mm
Options:

1. Open repair X
2. Conservative treatment
3. Endovascular Repair
   “a safe, effective and durable option ???”
71 yo male, symptomatic 6.5 cm AAA
EVAR + sandwich LRA + proximal cuff

AAA shrinkage
No migration
No Proximal endoleak

166°

65x 63 mm
Pre-op

Proximal extension cuff + Sandwich procedure

38x 36 mm
4-year PO
77 year-old male, Rapidly enlarged 92 mm AAA

EVAR

AAA shrinkage
No migration
No Proximal endoleak

92 x 65 mm
Pre-op

68 x 53 mm
1-year PO
Conclusions

- EVAR should be considered for AAA patients with severely angled neck, "who are not candidates for open repair."

- Need longer neck length (20-25 mm).

- Need adjunct procedures: Cuff, Parallel graft, Heli-Fx.

- High success rate. Once in, most likely the stent graft will stay there.

- Up to 90° angled neck may be reasonable for EVAR.
Conclusions

AAA patients with severely angulated neck:

Endovascular Repair
“is a safe, effective and durable option”
Thank you
EVAR in severely angulated neck:
An option with good long-term outcome

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