LINC 2019
Leipzig, Germany

Feasibility of aortic neck anatomy for endovascular aneurysm repair in Korean patients with abdominal aortic aneurysm

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January 22, 2019

Disclosure

Speaker name:

Deokbi Hwang

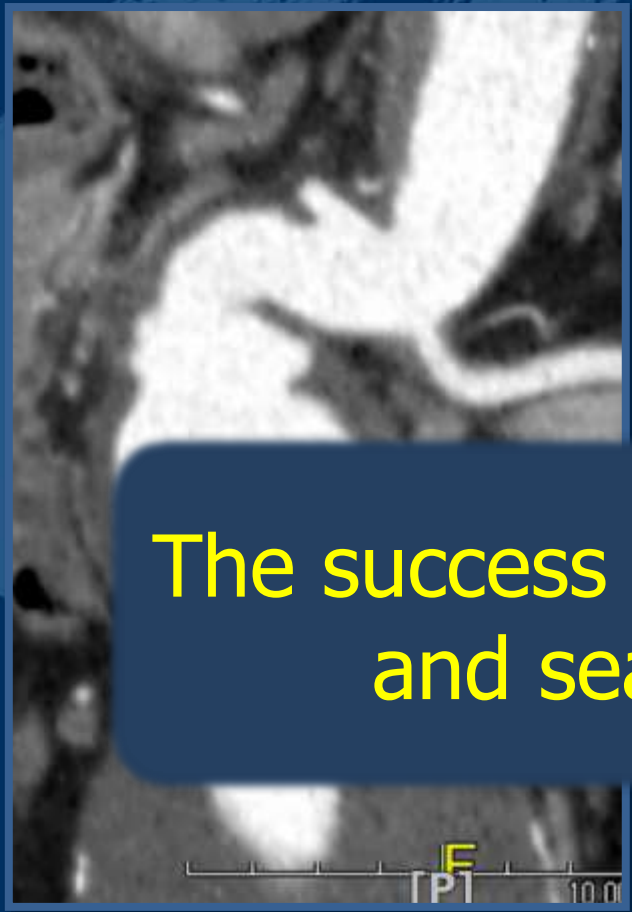
I have the following potential conflicts of interest to report:

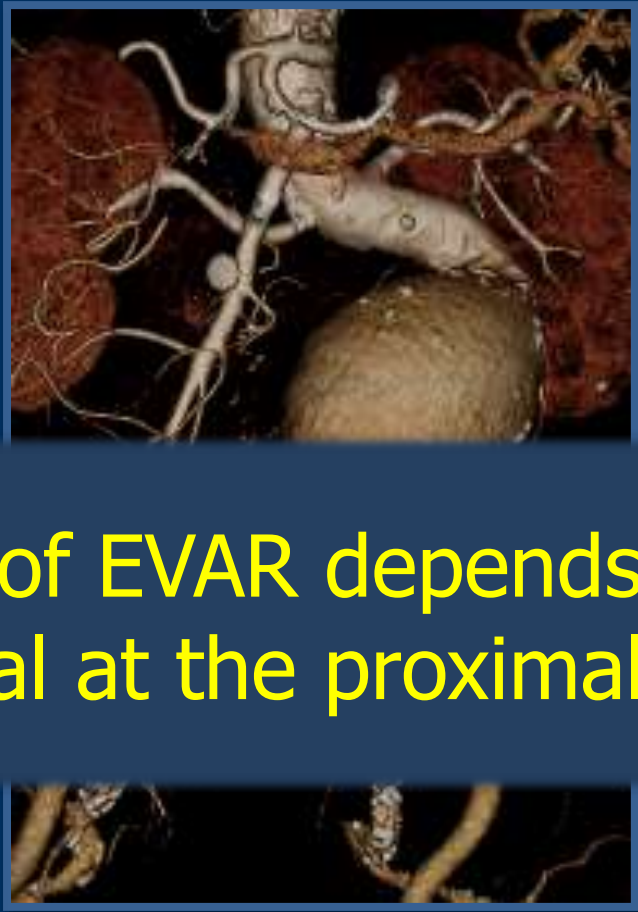
- ☐ Consulting
- ☐ Employment in industry
- ☐ Stockholder of a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)

- ☑ I do not have any potential conflict of interest

Proximal neck

- Achilles' heel for EVAR





1. Length

2. Angulation

3. Diameter

calcification)

The success of EVAR depends on fixation and seal at the proximal neck

Table 2. Aorto-iliac length and angle measurements of Asian and Caucasian patients.

Length and angle measurements	Asians (*n* = 113)		Caucasians (*n* = 183)		*p*-value
	Me	IQR	Me	IQR	
M3, aneurysm neck length	28.4	11.2	33.0	25.0	<**.001**
M5, angle between aneurysm and aortic axis	142.2	24.6	153.0	31.0	<**.001**
M6, length of infrarenal abdominal aorta	152.0	17.3	130.0	23.7	<**.001**
M8, linear renal artery − aorto-iliac bifurcation distance	143.6	21.4	116.0	22.5	<**.001**
M10, le					**.001**
M11,					**001**
M17,					**001**
M18,					**001**

Me = r ... n iliac
artery. ...
Bold ar ...

Asians – short and angulated neck

Hostile neck issue is more problematic in Asian patients

- Asians (compared with Caucasians)
  - Short neck length (28.4mm vs. 33.0mm)
  - Angulated neck (37.8° vs. 27.0°)
  - Short CIA length (33.1 vs. 65.0)
  - Small CIA, EIA, CFA

Eur J Vasc Endovasc Surg 2016;51:783-789

Purpose

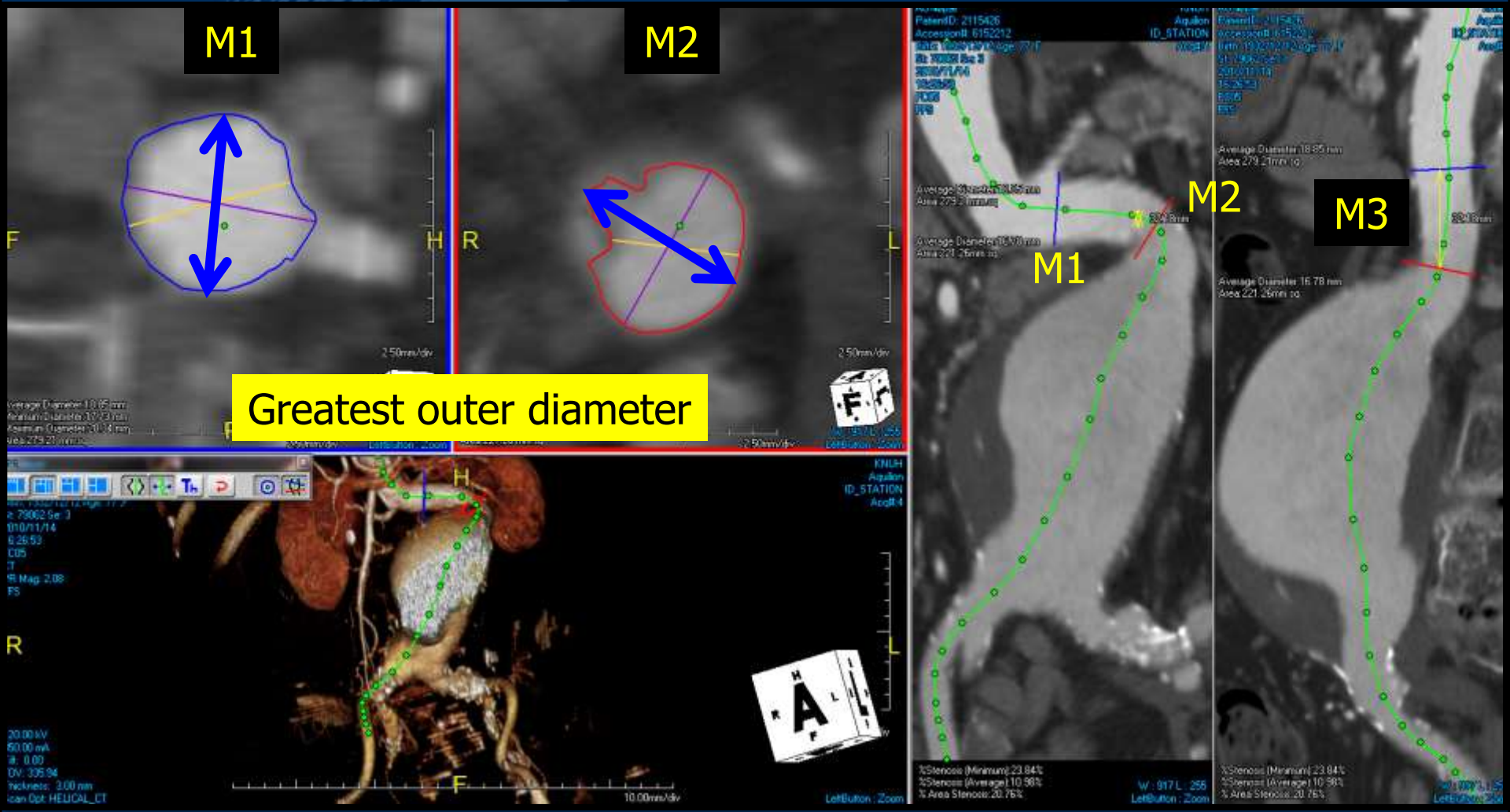
- To investigate the aortic neck anatomy in Korean patients with abdominal aortic aneurysms (AAAs)
- To compare the eligibility for on-label endovascular aneurysm repair (EVAR) according to gender and rupture status
- To provide sufficient benchmarks for future stent graft design for Asians

Methods

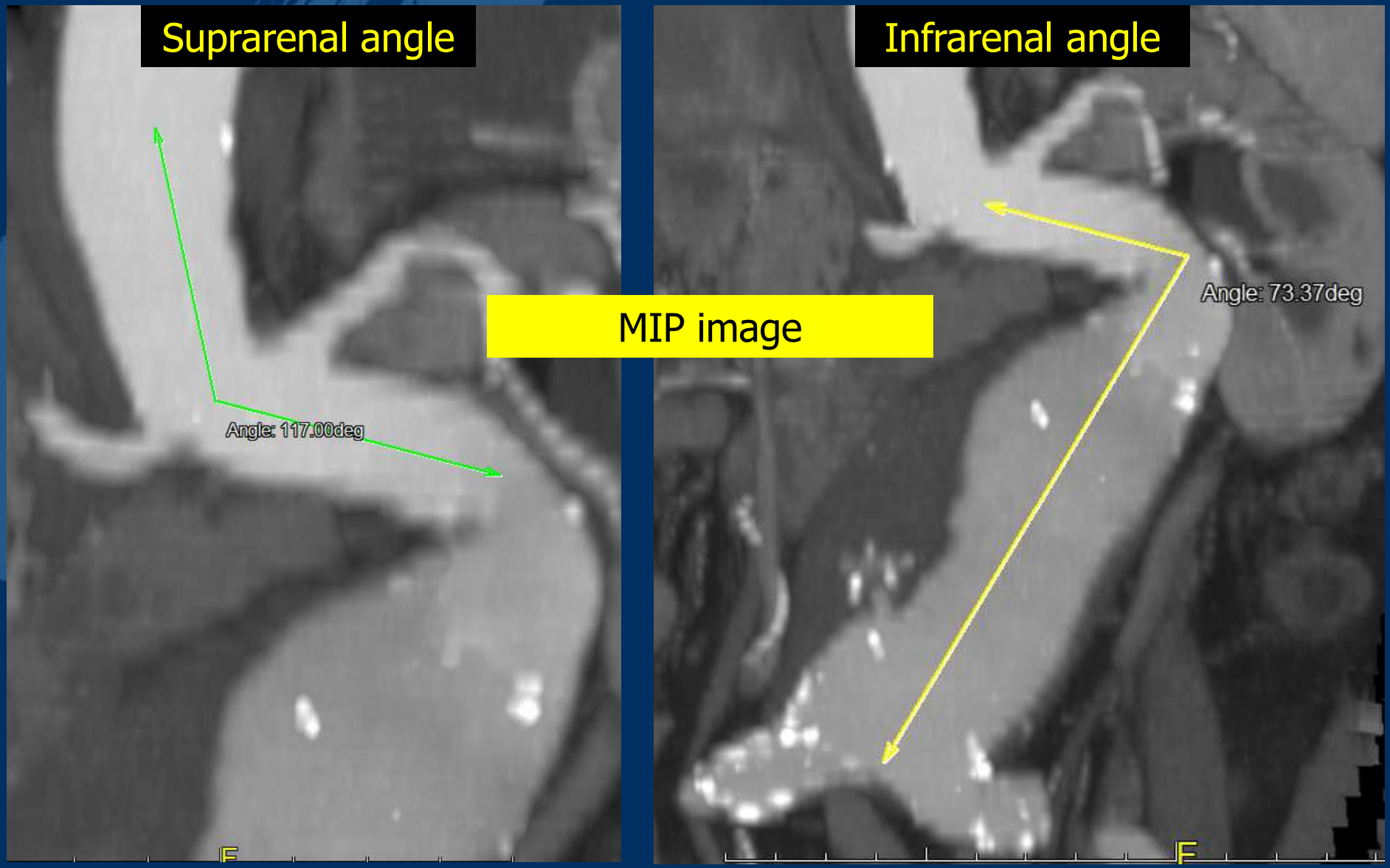
- Retrospective review
- Between January 2007 and August 2018
- 450 patients with AAA
  - Intact or ruptured AAA
  - ≥5 cm for men or ≥4.5 cm for women
  - Most recent image with CECT
  - Regardless of subsequent repair or treatment type

Neck diameter and length

Three dimensional (3D) center line reconstruction



Neck Angulation



Definitions

- Instructions for use (IFU)
  - Proximal neck length ≥15 mm
  - Suprarenal neck angulation ≤45°
  - Infrarenal neck angulation ≤60°
  - Neck diameter between 18mm and 32mm

Overall morphological data (Diameter)

Parameters	Findings
Diameter, Proximal neck	22.8 ± 3.8 (15.0-45.5)
Diameter, Distal neck	23.8 ± 3.9 (15.1-45.5)
Maximal AAA diameter	61.2 ± 11.4 (45.3-114.6)
Diameter, Aortic bifurcation	29.8 ± 10.6 (12.4-98.4)
Maximal diameter of RCIA*	19.7 ± 9.7 (8.3-72.6)
RCIA diameter > 25mm*	89 (20.2%)
Maximal diameter of LCIA*	18.3 ± 9.8 (7.3-106.3)
LCIA diameter > 25mm*	64 (14.5%)
BCIA diameter >25mm*	40 (9.1%)

* Analyzed from 440 patients

Overall morphological data (Length and angulation)

Parameters	Findings
Neck length (mm, mean ± SD (range))	27.6 ± 15.0 (0-69.9)
Suprarenal angulation (degree)	37.6 ± 26.2 (0-124.3)
Infrarenal angulation (degree)	57.2 ± 28.2 (2.0-135.1)
Length of infrarenal abdominal aorta	130.7 ± 19.7 (68.8-197.5)
Length of Right CIA*	42.1 ± 17.2 (9.5-105.9)
Length of Left CIA*	45.4 ± 18.2 (7.6-138.8)
Aortic tortuosity index	1.13 ± 0.10 (1.01-1.84)
Iliac tortuosity index (Right)*	1.41 ± 0.19 (1.05-2.32)
Iliac tortuosity index (Left)*	1.41 ± 0.21 (1.08-2.63)

* Analyzed from 440 patients

Anatomic differences (Gender)

Parameters	Men (n=373)	Women (n=77)	P value
Age	71.2 ± 7.8	76.3 ± 9.2	0.000
Maximal AAA diameter	60.9 ± 11.3	62.6 ± 12.0	0.221
Neck length	28.2 ± 15.6	24.5 ± 11.4	0.061
Diameter, Proximal neck	23.2 ± 3.7	21.1 ± 4.1	0.000
Diameter, Distal neck	24.1 ± 3.8	22.0 ± 4.3	0.000
Suprarenal Angulation	35.0 ± 25.7	50.2 ± 25.3	0.000
Infrarenal Angulation	53.3 ± 26.6	75.9 ± 28.5	0.000

Feasibility for EVAR (Gender)

Men (n=373)	Standard IFU	Women (n=77)	P value
289 (77.5%)	Neck length ≥ 15mm	65 (84.4%)	0.221
261 (70.0%)	Suprarenal angulation ≤ 45°	35 (45.5%)	0.000
236 (63.3%)	Infrarenal angulation ≤ 60°	20 (26.0%)	0.000
356 (95.4%)	18mm ≤ Neck diameter ≤ 32mm	64 (83.1%)	0.000
167 (44.8%)	**Overall IFU**	**9 (11.7%)**	**0.000**

Anatomic Differences (Status)

Parameters	Intact (n=388)	Rupture (n=62)	P value
Age	72.0 ± 8.1	72.4 ± 9.2	0.714
Maximal AAA diameter	59.3 ± 9.7	73.0 ± 13.9	0.000
Neck length	28.5 ± 14.8	21.7 ± 15.3	0.000
Diameter, Proximal neck	22.9 ± 3.8	22.5 ± 4.1	0.503
Diameter, Distal neck	23.8 ± 4.0	23.7 ± 3.8	0.867
Suprarenal Angulation	36.6 ± 25.4	43.9 ± 30.4	0.116
Infrarenal Angulation	56.8 ± 27.4	59.2 ± 33.0	0.813

Feasibility for EVAR (Status)

Intact (n=388)	Standard IFU	Rupture (n=62)	P value
316 (81.4%)	Neck length ≥ 15mm	38 (61.3%)	0.001
261 (67.3%)	Suprarenal angulation ≤ 45°	35 (56.5%)	0.113
224 (57.7%)	Infrarenal angulation ≤ 60°	32 (51.6%)	0.408
362 (93.3%)	18mm ≤ Neck diameter ≤ 32mm	58 (93.5%)	1.000
161 (41.5%)	**Overall IFU**	**15 (24.2%)**	**0.011**

Conclusions

- Neck anatomy of AAA in Koreans significantly differed from Caucasians especially regarding neck angulation.
- Women and patients with ruptured AAAs were remarkably less likely to meet the device IFU criteria for EVAR.

- Development and adoption of relevant EVAR devices compatible with angulated neck are necessary in Korean patients with AAA.

Thank you for your attention !

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