Reducing radiation exposure in endovascular surgery

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Disclosure

Speaker name:

Tishanthan Pathmarajah

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

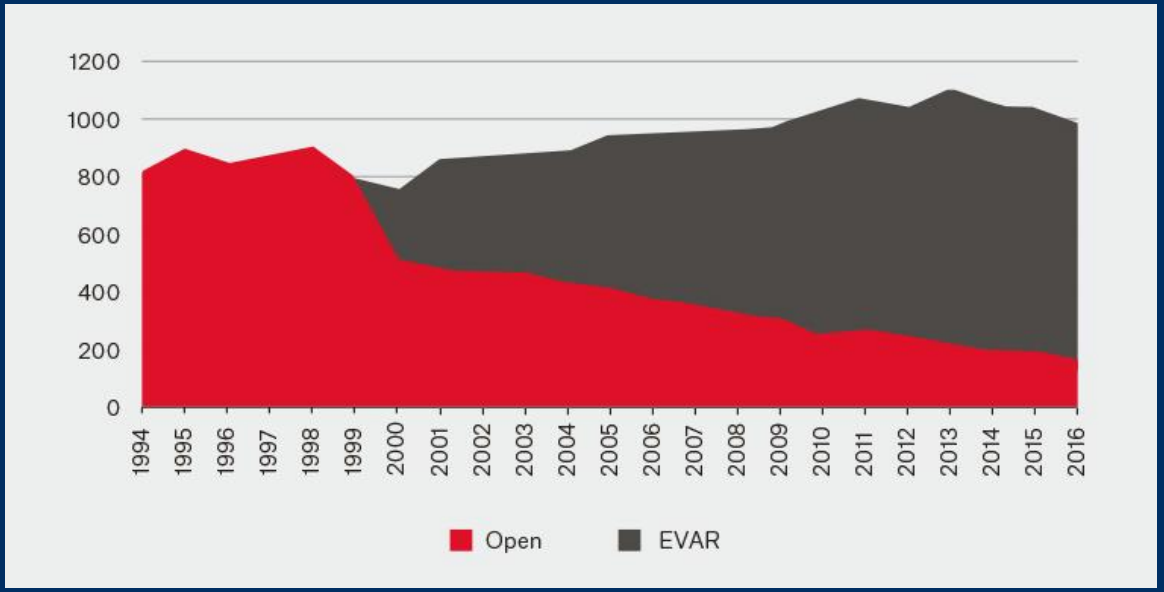
Outline

- Background
- Objective
- Methods
- Results
- Conclusion

Background

- Increasing shift towards endovascular treatment of vascular disease
- Increasingly complex procedures associated with longer procedural times
- Increasing fluoroscopic ionizing radiation

INCREASED RISK OF LONG TERM MALIGNANCY!



Australian Vascular Audit data – Open vs EVAR procedures

Radiation related toxicity

- Roguin et al – 31 brain and neck tumors in interventional cardiologists
- El-sayed et al – acute DNA damage response during fluroscopically guided procedures
- EVAR and TEVAR for aortic aneurysms present highest radiation exposure

Roguin A et al. Am J Cardiol 2013
El-Sayed T et al. Circulation 2017
Patel AP et al. Eur J Vasc Endovasc Surg 2013

CO2 angiography

- Advantages
  - Wide availability
  - Low cost
  - Non-toxicity
  - Rapid tissue solubility
  - Low viscosity

CO2 angiography associated with reduced operating and fluoroscopy time – Criado et al

Criado E et al. J Vasc Surg 2012

Objective

We sought to evaluate whether carbon dioxide (CO2) angiography in comparison to standard iodinate contrast (IC) for the repair of abdominal aortic aneurysm (AAA) was associated with reduced intraoperative radiation exposure.

Methods

Prospective review of all patients who underwent AAA repair between 2013-18.

Primary outcomes included:

- Procedure duration
- Screening time
- Number of runs
- Radiation dose

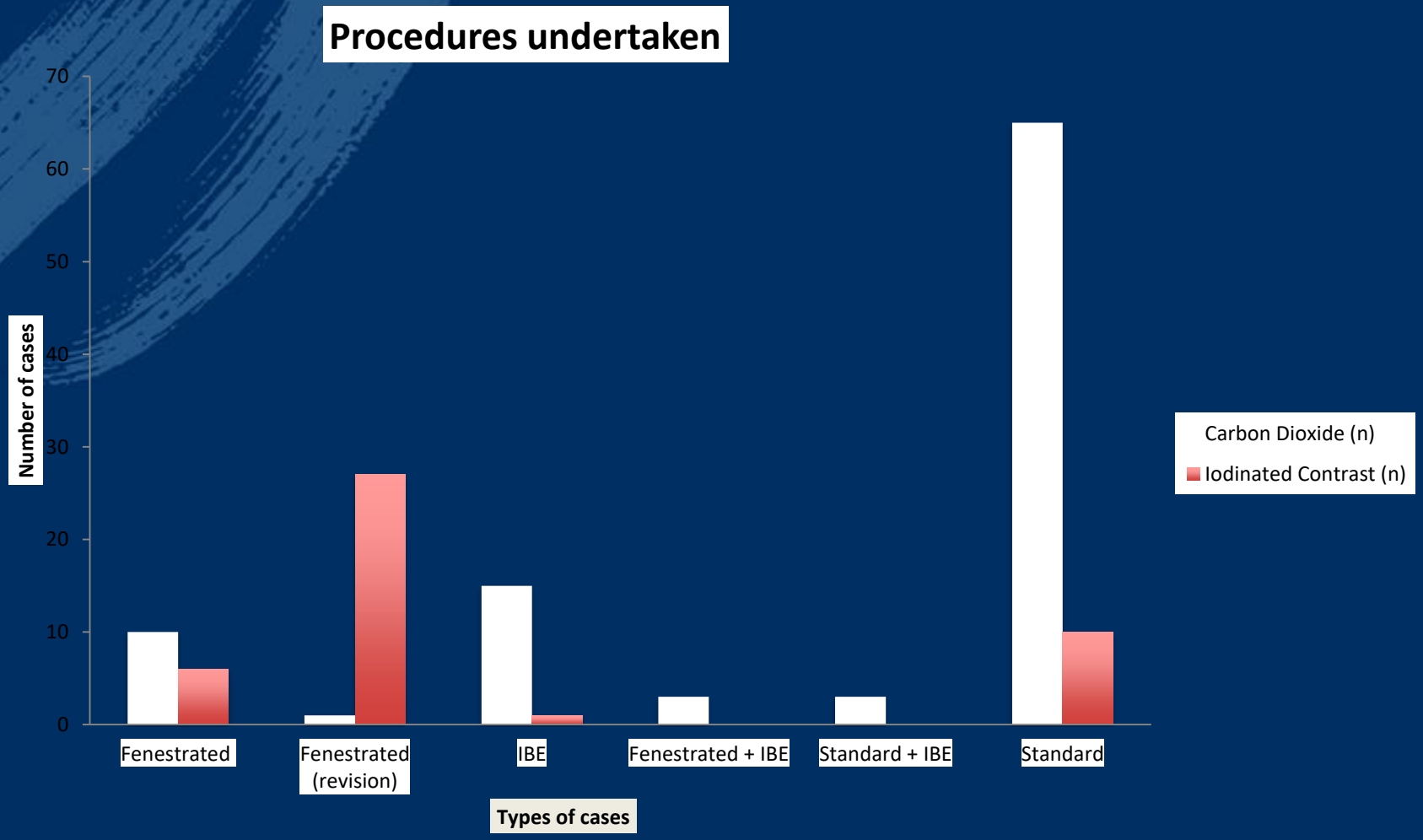
Results

- A total of 149 AAA repairs were performed
  - 96 patients underwent AAA repair using CO2 angiography
  - 44 patients underwent AAA repair using iodinated contrast

Demographic data

Patient comorbidities	CO2 angiography	Iodinated contrast angiography
Hypertension	67 (70%)	30 (68%)
Hyperlipidemia	62 (65%)	27 (61%)
Diabetes		
Type 1	2 (2%)	1 (2%)
Type 2	24 (25%)	12 (27%)
Cardiac conditions	45 (47%)	19 (43%)
Renal disorders		
Mild impairment	9 (9%)	1 (2.3%)
Moderate/Severe impairment	5 (5%)	4 (9.1%)
Renal calculi	5 (5.2%)	2 (4.5%)
Other	47 (49%)	32 (73%)

Results


Procedures undertaken
70
60
50
40
30
20
10
0
Number of cases
Fenestrated
Fenestrated (revision)
IBE
Fenestrated + IBE
Standard + IBE
Standard
Types of cases
Carbon Dioxide (n)
Iodinated Contrast (n)

Results

	Carbon Dioxide (n=96)	Iodinated Contrast (n=44)
Procedure duration (mins)	102.9 (SD 67.1)	127.1 (SD 65.5)
Screening time (mins)	35.3 (SD 26)	41.6 (SD 25.2)
Runs	13 (SD 8)	20 (SD 8)
Radiation dose (uGym2)	35001.7 (SD 31617)	112632.0 (SD 166250.5)

Results

- Technical succes – 99% (CO_2) vs. 97.7% (IC)
- Clinical success – 95% (CO_2) vs. 100% (IC)
- Median hospital length of stay – 3 days
  - ICU length of stay – 1 day

Results

Complications

CO2 angiography cases

- Limb cannulation (8)
- Endoleak (9)
- Ischaemic Limb (1)
- Puncture site bleeding (1)
- Others (12)

Contrast angiography cases

- Limb cannulation difficulty (1)
- Others
  - Loss of R) IIA wire requiring axillary approach to deliver second R) IIA stent
  - R) IIA dissection not caused by device resolved at the end of the procedure

Conclusion

- CO_2 angiography was associated with reduced intraoperative radiation exposure in comparison to standard iodinated contrast
- CO_2 is feasible in patients undergoing complex endovascular repair of AAA
- Future randomised trials evaluating the utility of CO_2 in reducing radiation exposure are warranted.

LINC


THANK YOU
Maayna
Grazie
Juspaxar
Asante
Merci
Dank Je
Obrigado
Multumesc
Spasibo
Nirrihgrazzjak
Matondo
Salamat
Arigato
Welalin
Chokrane
Kiitos
Terma Kasih
Mochchakkeram
Maake
Merci

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