

# IVUS for aorto-iliac disease: Is contrast media application and high energy radiation redundant?

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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): honoraria for presentations
  
- I do not have any potential conflict of interest

# The interdependancy of renal function, iodinated contrast and overall outcome after aneurysm repair

Acute kidney injury definition: drop in eGFR by 25% within 24h after the intervention

*Incidence in a prospective study (UK): 19-29% of patients with EVAR/f/bEVAR*

Higher then in patients presenting with acute sepsis or cardiovascular event

**Patients risk!**

Karthikesalingam A, Bahia SS, Patel SR, Azhar B, Jackson D, Cresswell L, Hinchliffe RJ, Holt PJ, Thompson MM: A systematic review and meta-analysis indicates underreporting of renal dysfunction following endovascular aneurysm repair. *Kidney Int* 87: 442–451, 2015 [PMCID: PMC5590709] [PubMed: 25140912]

# Patient radiation dose (associated with higher amounts of iodinated contrast)

European Journal of Vascular and Endovascular Surgery(2012) 43: 4: 393-397; Risk of Radiation Exposure during Endovascular Aortic Repair ; Howells P et al.

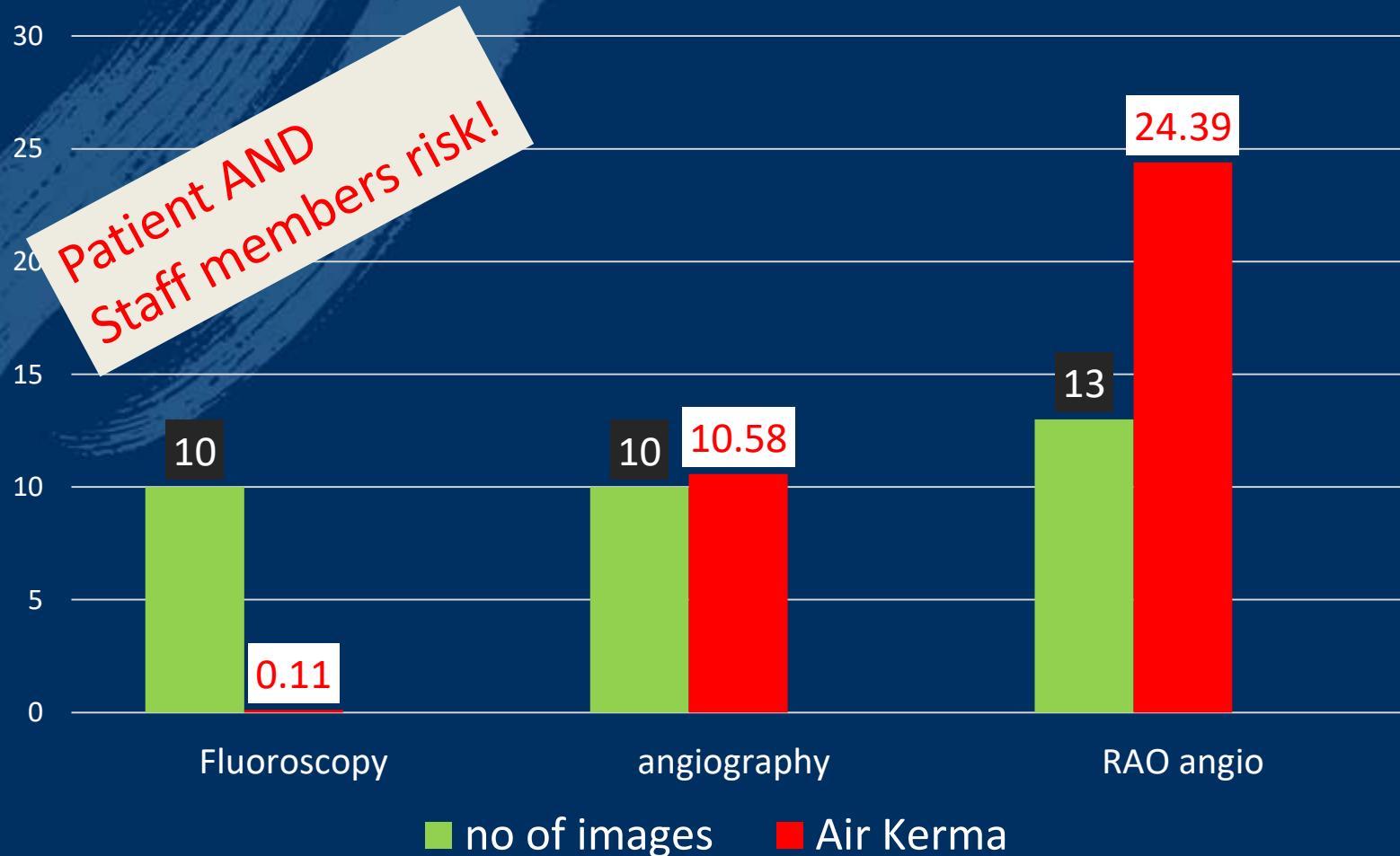
**Patient AND Staff members risk!**

	<b>BEVAR/FEVAR (n = 53)</b>	<b>TEVAR (n = 232)</b>	<b>IEVAR (n = 630)</b>
Aortic length (cm)	76 (58–85)	71 (15–89)	76 (37–93)
Contrast volume (ml)	13 (25%)	72 (31%)	67 (11%)
Fluoroscopic time (mins)	58 (6.7–212)	10 (1.5–130)	18 (2.4–161)
<b>Peak skin dose (Gy)</b>	<b>1.3 (0.7–8.7)</b>	<b>0.8 (0.46–1.44)</b>	<b>0.71 (0.44–13.7)</b>
Whole body dose (Sv)	0.096 (0.0052–0.64)	0.058 (0.034–0.11)	0.053 (0.033–1.00)
<b>Skin dose &gt;2 Gy</b>	<b>17 (31%)</b>	<b>26 (11%)</b>	<b>69 (11%)</b>

Table 1. Patient and procedure characteristics for branched/fenestrated, thoracic and infra-renal endovascular aortic repairs.

The DAP was higher ( $p = 0.004$ ) in the BEVAR/FEVAR group compared with IEVAR and TEVAR: 32,060 cGy cm<sup>2</sup> [17,207–213,322] vs 17,300 cGy cm<sup>2</sup> [10,940–334,340] vs 19,440 cGy cm<sup>2</sup> [11,284–35,101], respectively (Fig. 3).

# 100- 240fold elevation of Air Kerma (mGy) if angio is performed (10-13 frames comparison)



all data collected from a standard SID 105cm, C-arm position

RAO 2°, caudal 2°

and RAO 49°

# ROI for procedural success

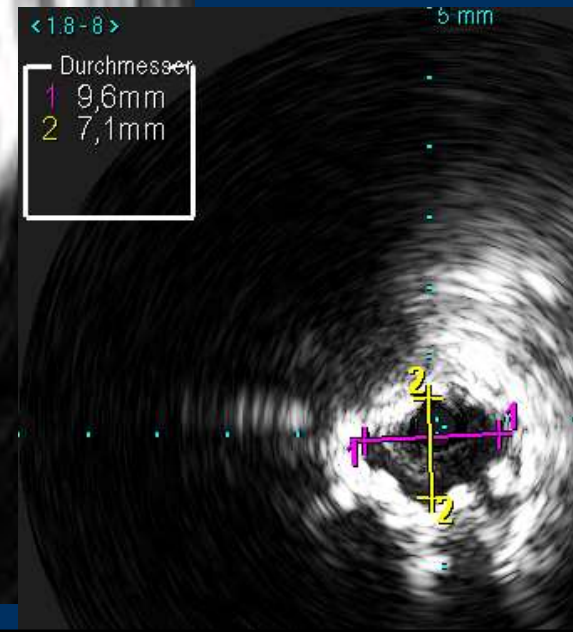
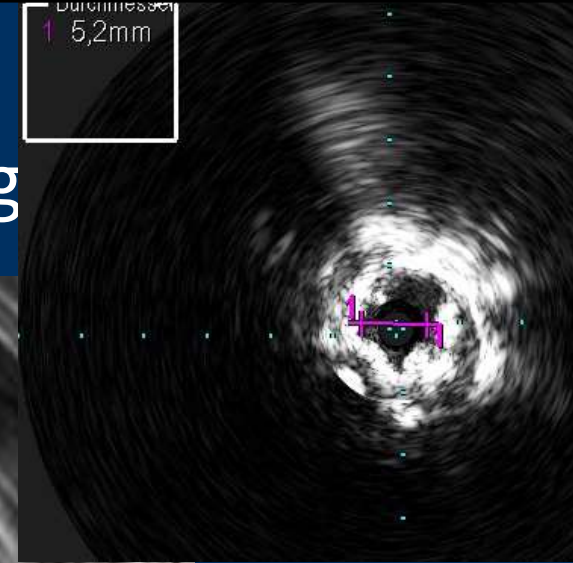
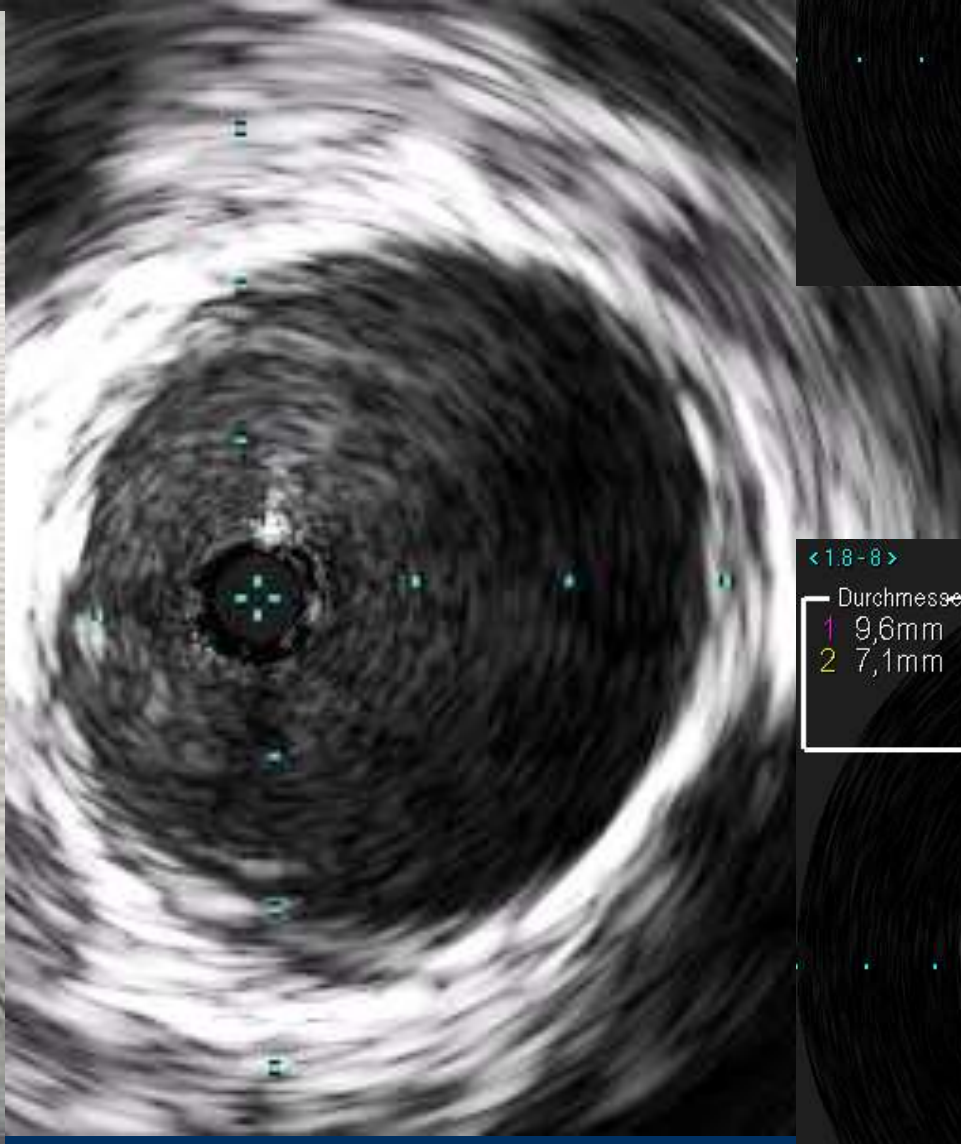
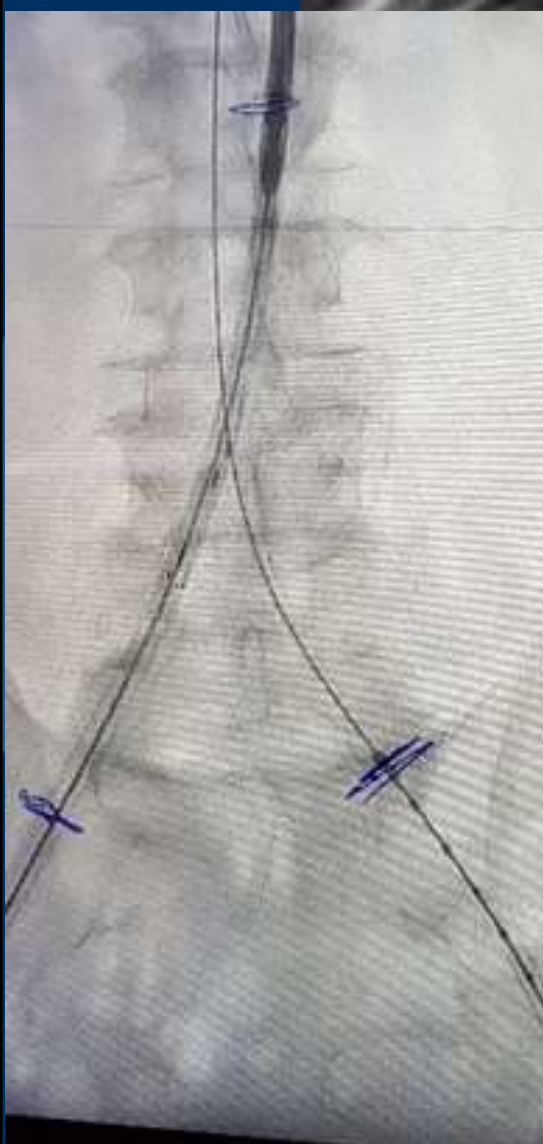
	Angio	IVUS	Image fusion
Target vessels	+	+	+/??
Patency	+	+	--
IA/IB EL	+	+	--
		(indirect)	
II EL	+	--	--
Crimping	--	+	--
Infolding	--	+	--
Stenosis	--+	+	--
Thrombus	--	+	--
No CT/MR	??	+	--
REBOA	??	+	--
Artefacts	++ (CO2)	--	??



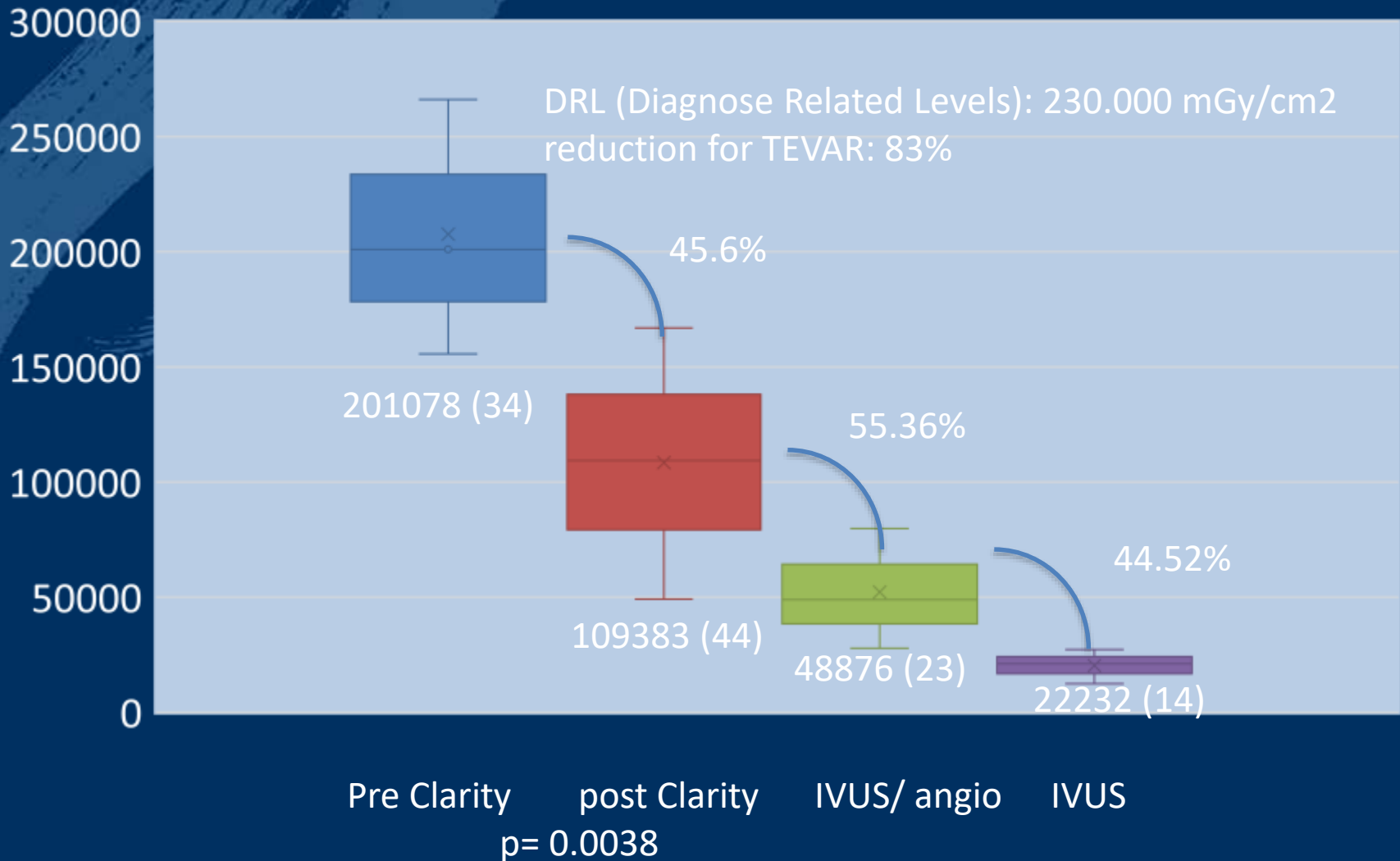


# Completion IVUS

→ and no longer completion angiog

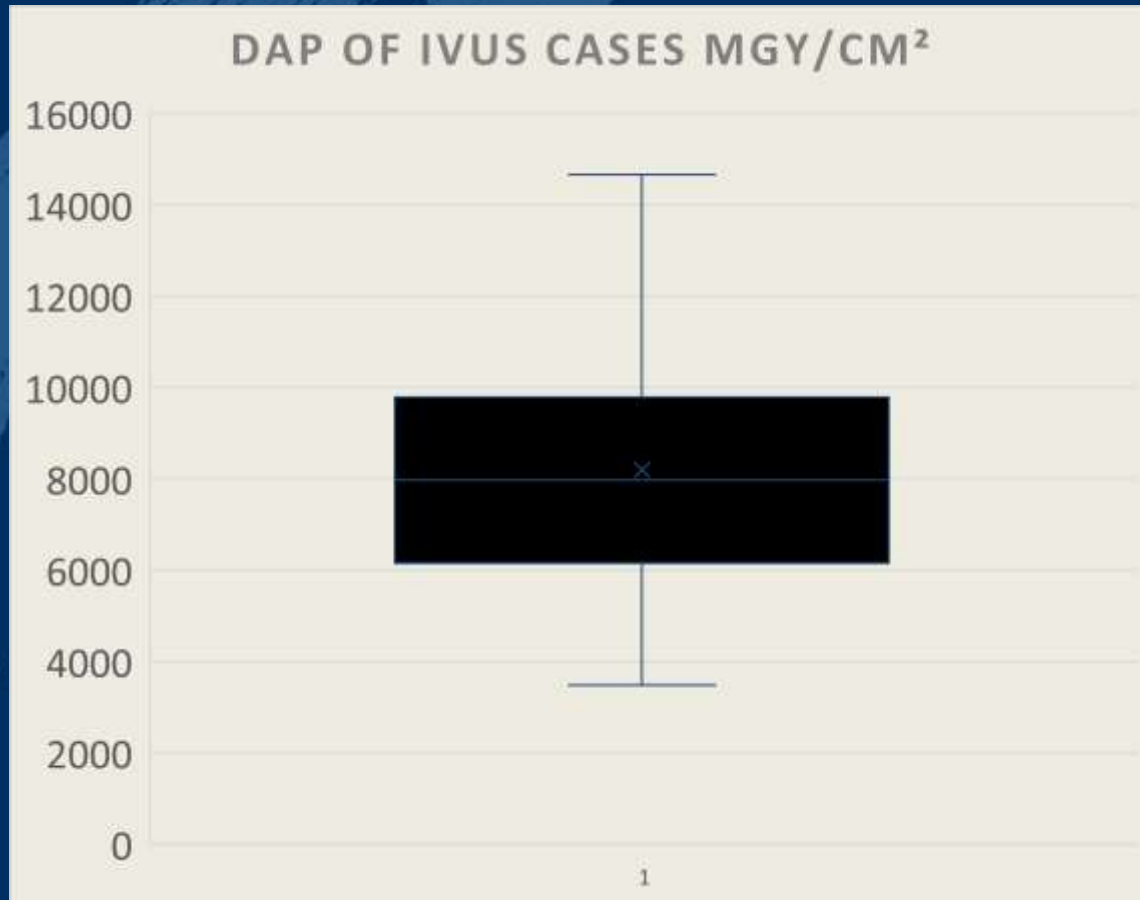


# Significant Reduction of Dose Area Product mGy x cm<sup>2</sup> (BMI adjusted) without loss of procedural safety





# Comparison of IVUS vs. Angio guidance



Compared to standard EVAR there is a reduction of  
~96.3% DRL (230.000)  
~96% for pre clarity  
~92% for clarity

~ 83.5% of mixed procedures with 2 angioruns

~60% for early IVUS cases

# 100% Procedural safety for standard EVAR, ISB...

- No difference in procedure time
- Target vessel definition reliable and safe
- 1 RA / 62 during EVAR required cannulation
- No target vessel loss
- No relevant loss of neck length (max. 4mm/ 44mm neck)
  - 1 type I EL 4 mo after implantation (FU -3 yrs)
  - Visible migration in native x-ray
  - No relevant type II EL
  
  - FU: 30 day CT; 3/6/12... mo with DUS and x-ray

# What is about PAD



# IVUS guided procedures for aorto-iliac occlusion

Preliminary results after  
11 procedures completely  
based on IVUS

Reduction of CM to zero  
Reduction of DAP about  
83%



# Concluding:

- IVUS is a well evaluated 3D imaging technique using a single projection axis/ c-arm position and optimal passive protection
- reduction of contrast media to „zero“ (no more „renal side“ )
- reduction of DAP (>95%) and Air Kerma (250 fold )
- fits to any workflow in the OR (hybrid/ mobile C-arm)
- Allows exact device placement and control
- Strong rational for IVUS guided procedures for AAA and aortoiliac PAD
- For aorto-iliac stenosis (occlusion)
- For standard EVAR as an index procedure
  - Contrast application (iodinated and CO2)
  - High energy radiation are redundant



Thank you for your attention

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