



Patient Arm Positioning to Reduce Radiation Exposure

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Disclosures

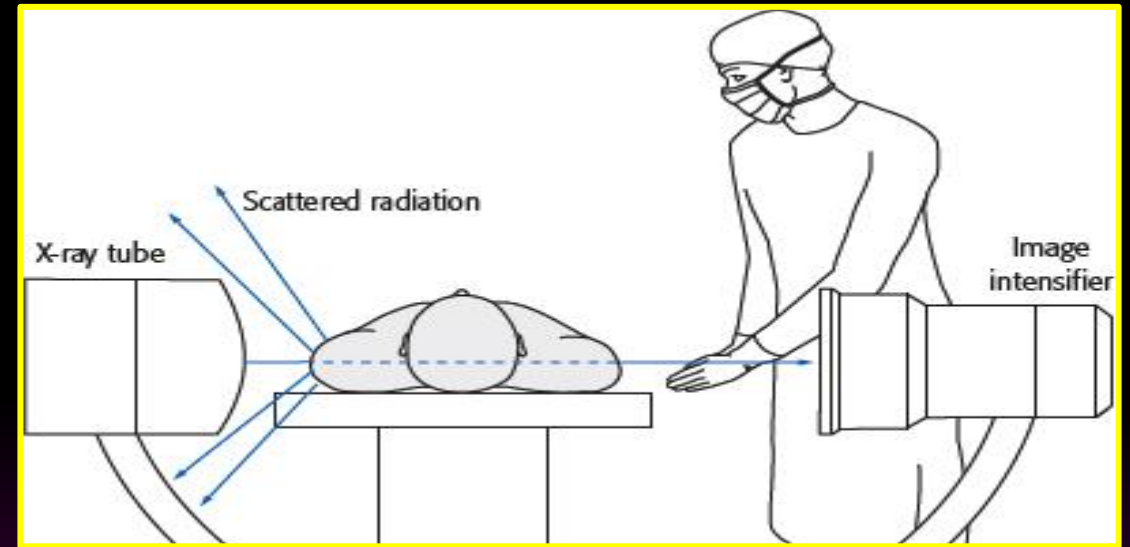


- W.L Gore – Scientific advising/Consulting
- Cook Medical – Scientific advising/Consulting
- Investigational Devices/Clinical Trials – Cook Medical, W.L. Gore, Terumo Aortic



Background

- Many techniques have been described to reduce radiation during endovascular aortic aneurysm repair beyond basic ALARA principles
 - Fusion Technology
 - Digital Zoom
 - Collimation
- These are high yield
 - Require institutional support for updated equipment and technology

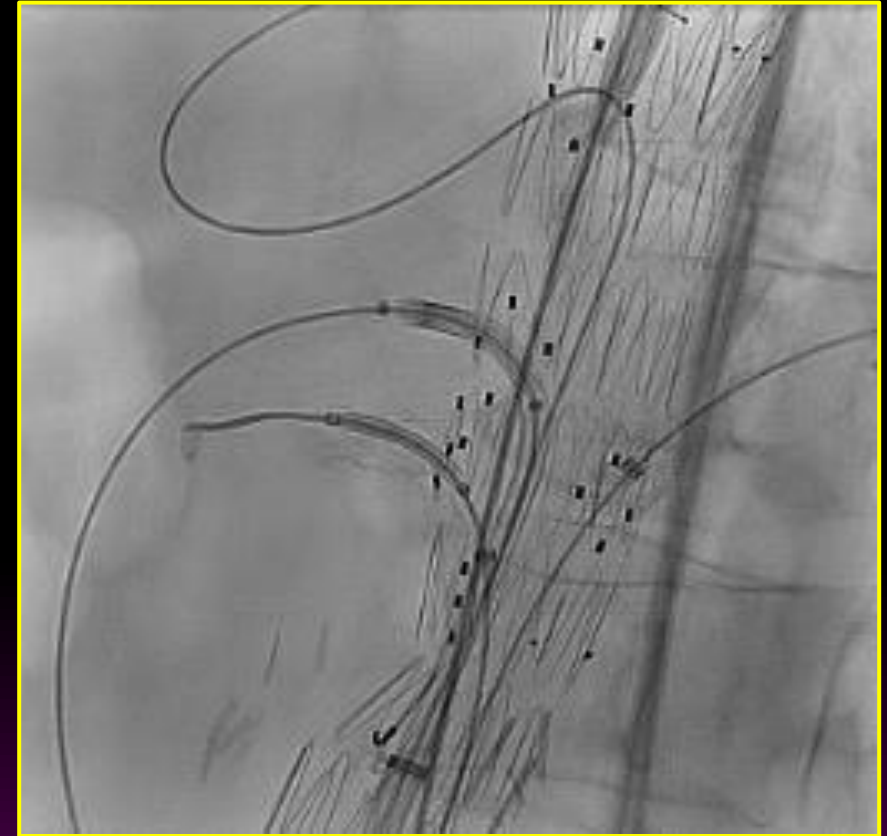




Background



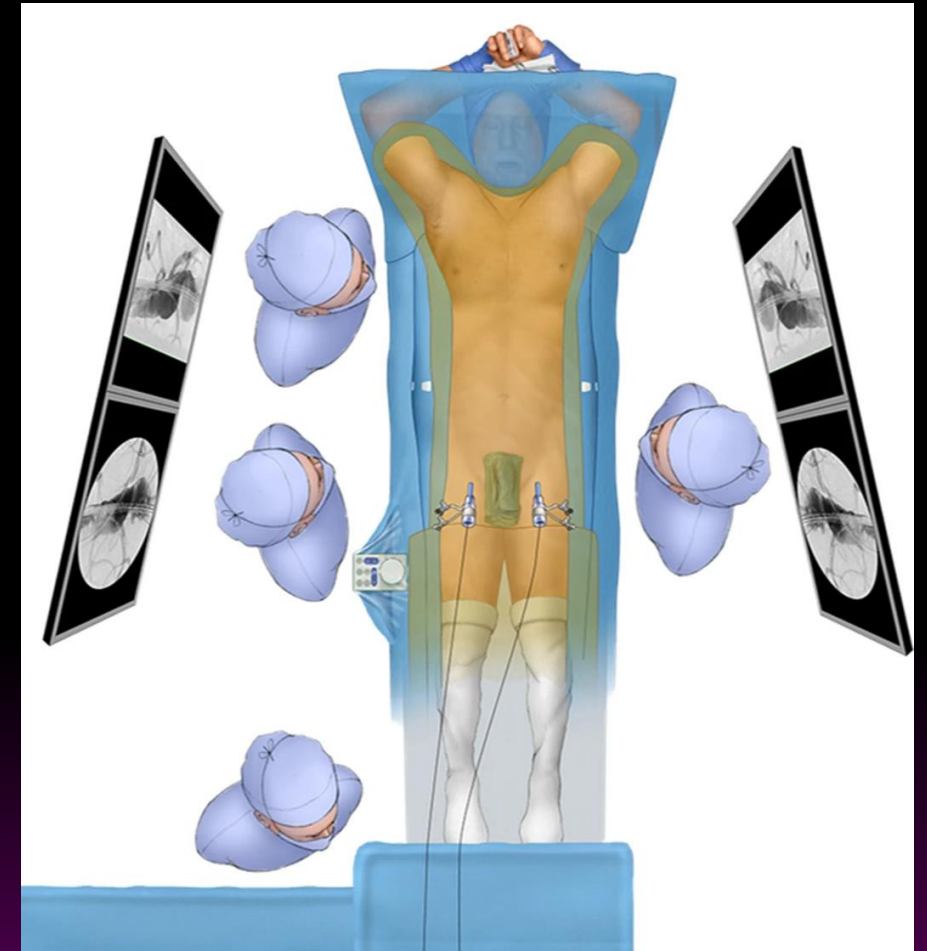
- Patient factors affect radiation requirement for optimal visualization
 - Angulation of target vessels
 - Body Habitus: Obesity
- Critical when higher degrees of C-arm angulation needed
 - F/BEVAR
 - Visceral Vessels
 - Internal Iliac Branches, Lumbar





Arm Positioning

- Overhead arm positioning decreases amount of tissue penetrance necessary for visualization
 - Low Cost
 - Easy
 - Immediate impact
- Some concern over injury to brachial plexus





Overhead Arm Positioning





Impact on Image Quality



Rotational angiography captured in a hybrid operating room with GE IGS 740 Discovery imaging equipment (GE Healthcare, Chicago, IL) from a lateral view during final technical assessment. Standard acquisition technique utilizes 90 mL of 50% Visipaque contrast agent and 200-degree rotation with 7-s spin. Female patient, 73 years old, body mass index (BMI) 22 kg/m² treated by fenestrated–branched endovascular aortic repair (FB-EVAR) with the overhead upper extremity position (A). Male patient, 71 years old, BMI 25 kg/m² treated by FB-EVAR with the standard arms by the side position (B)



Impact on Radiation Dose



Overhead arm support reduces radiation exposure during complex endovascular aortic repair

Amit Pujari ¹, Myra Ahmad ², Matthew P Sweet ¹, Sara L Zettervall ³

- Study of 145 patients who underwent F/BEVAR from 2012-2022
 - Prior to 2020 patient were treated with arms down
 - Overhead arm support universally adopted in 2020
- Compared demographics, BMI, anatomy, operative techniques
- Evaluated effect on Radiation, fluoroscopy time, brachial plexus injuries



Patient Factors

Variable	Arm elevation		P value
	No (n = 102)	Yes (n = 43)	
Age, years	72 ± 7.5	75 ± 7.4	.04
BMI, kg/m ²	27 ± 4.8	26 (3.8)	.33
Male gender	69 (68)	36 (84)	.05
Urgent indication	13 (13)	9 (21)	.21



Anatomic Factors



Variable	Arm elevation		P value
	No (n = 102)	Yes (n = 43)	
Maximum diameter, mm	68 ± 13	72 ± 12	.03
Size at celiac artery, mm	42 ± 13	42 ± 11	.91
Size at SMA, mm	42 ± 13	38 ± 9.0	.32
Extent of TAAA ^a			.74
Extent 4	42 (41)	19 (44)	
Extent 1-3	60 (59)	24 (56)	
Prior aortic intervention	55 (54)	23 (54)	.96
Brachial access	51 (50)	4 (9.3)	<.01
Dissection	8 (7.8)	10 (23)	<.01
Intravascular ultrasound	5 (5.0)	9 (21)	<.01
Target vessels	3.9 ± 0.5	3.9 ± 0.4	.82
Additional aortic grafts	87 (85)	40 (93)	.20
Proximal TEVAR	47 (46)	16 (37)	.33
Distal aortic device	73 (72)	36 (84)	.12



Impact on Radiation Dose

Variable	Arm elevation		P value
	No (n = 102)	Yes (n = 43)	
Radiation, mGy	3100 ± 1810	2261 ± 987	.01
Fluoroscopy time, minutes	56 ± 23	56 ± 19	.64
Contrast used, mL	155 ± 38	149 ± 42	.43
Brachial plexus palsy	0 (0)	0 (0)	1.00

30% Reduction in Radiation

*Persisted in subgroup analysis of patients with total femoral access

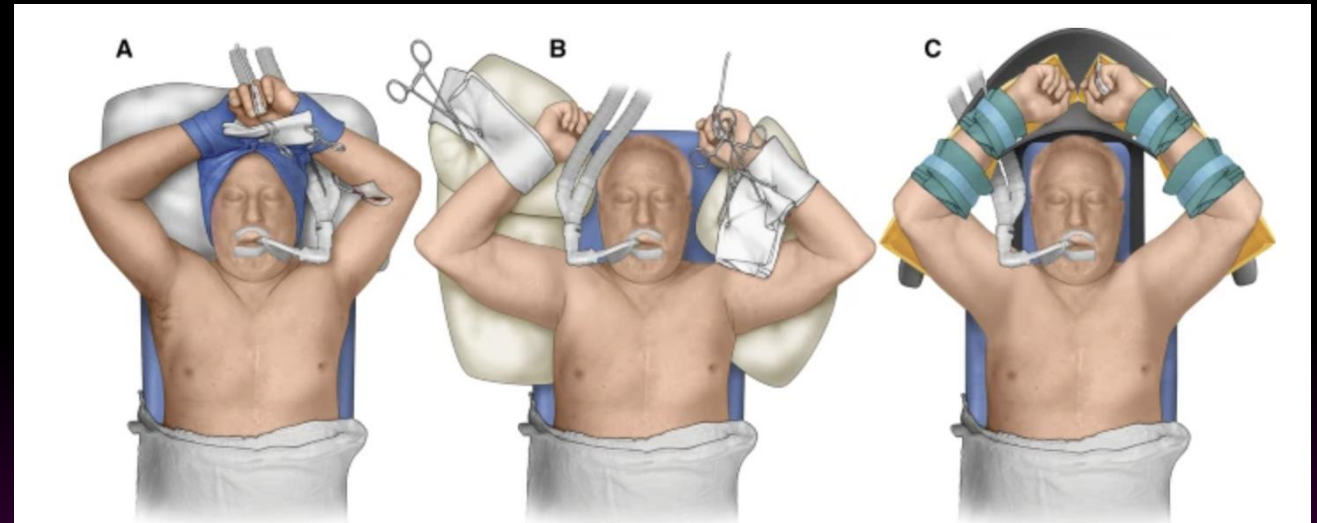


Risk for Brachial Plexus Injury

Evaluation of Safety of Overhead Upper Extremity Positioning During Fenestrated-Branched Endovascular Repair of Thoracoabdominal Aortic Aneurysms

Giulianna B Marcondes ¹, Emanuel R Tenorio ¹, Guilherme Baumgardt ¹, Bernardo Mendes ², Gustavo S Oderich ³

- Study of F/BEVAR patients
 - No injury or palsy identified
- Alterations in positioning made to account for patient mobility
- Arm positioned confirmed on awake patient



Patient with adequate shoulder mobility under overhead upper extremity positioning (A) and with limited shoulder mobility (B). Supporting device manufactured to facilitate the overhead upper extremity positioning (C)



Conclusions



- Overhead arm support significantly reduces radiation
- Can be done without injury to brachial plexus
 - Adaptions to technique for patient arm mobility
 - Trial of positioning in awake patient
- Low cost, easy to implement addition with re-usable device



Conclusions



- Overhead arm support should be standard of care for all endovascular procedures involving the visceral aorta
- Easy to implement without interruption to procedural flow
- Benefit to patients, surgeons, and staff



Thank you!

