

# EXPERIENCE AFTER 500 ENDOLUMINAL STENT GRAFTS. DEVICES SPECIFIC OUTCOME AND LESSONS LEARNED.

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# DISCLOSURE

Speaker name: Prof. B. Patrice Mwipatayi

I have the following potential conflicts of interest to report:

- Consulting – Biotronic, Medtronic
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest

# A pedigree history of initial EVAR DEVICES at RPH by the team of Michael L Brown and David Hartley

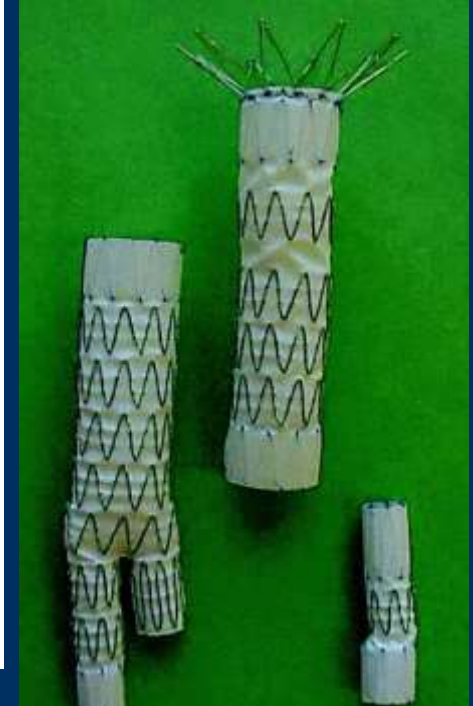
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◆ EXPERIMENTAL INVESTIGATION ————— ◆

## Analytical Modeling and Numerical Simulation of Forces in an Endoluminal Graft

Kurt Liffman, PhD<sup>1</sup>; Michael M.D. Lawrence-Brown, FRACS<sup>2</sup>;  
James B. Semmens, PhD<sup>3</sup>; Anh Bui, PhD<sup>1</sup>; Murray Rudman, PhD<sup>1</sup>;  
and David E. Hartley, FIR<sup>2</sup>



**Conclusions:** These results suggest that the downward force on a bifurcated stent-graft, which may exceed the force required to dislodge it when relying on radial attachment alone, is determined mostly by the proximal graft diameter. Curvature of the graft limbs creates an additional sideways force that works to displace the distal limbs of the graft from the iliac arteries.

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# INTRODUCTION

- Registry 2004-2018
- Registry 1998-2003 (MLB One shot, TFFB, ZALB, Zenith alpha)
- Abdominal Aortic Aneurysms (AAA) & Thoracic Aortic Aneurysms
- 3 sites – RPH, HPH, JHC
- 10 year follow up (?)

# BASELINE DEMOGRAPHICS

	<b>n = 527</b>	<b>95% CI</b>
<b>Age (years) [Mean ± SD]</b>	72.50 ± 11.52	0.50 (73.48 - 71.51)
<b>Gender [Male - n (%)]</b>	421 (79.9%)	--
<b><i>[Female - n (%)]</i></b>	<b><i>106 (20.1%)</i></b>	<b><i>--</i></b>
<b>Race n (%)</b>		
<b><i>Caucasian</i></b>	<b><i>443 (83.9%)</i></b>	<b><i>--</i></b>
Asian	72(13.67%)	--
African	4 (0.76%)	
Maori/Pacific	6(1.14%)	--
ATSI	2 (0.38%)	--

# RISK FACTORS

	n = 527 (%)
Smoker	61 (37.20)
Ex-Smoker	69 (42.07)
<b><i>Hypertension</i></b>	<b>208 (77.90)</b>
<b><i>Coronary Artery Disease</i></b>	<b>189 (60.75)</b>
CAS/CEA	25 (10.1)
CABG	15 (6.07)
Heart Failure	10 (3.92)
Arrhythmia	48 (18.60)
<b><i>Previous history of CVA</i></b>	<b>21 (8.17)</b>
PVD	55 (21.40)
Hypercholesterolaemia	148 (56.06)
<b><i>Diabetes Mellitus</i></b>	<b>61 (23.28)</b>
COPD	48 (18.53)
Renal Impairment	39 (15.23)
Dialysis	4 (1.57)
<b><i>Previous History of Malignancy</i></b>	<b>43 (43.00)</b>

# INDICATION FOR TREATMENT

	n = 527
<b>Indication n (%)</b>	
<b>Abdominal</b>	<b>385 (73.0)</b>
AAA $\geq$ 50mm	198 (37.6)
Leaking AAA	2 (1.6)
Dissection	3 (2.5)
Rupture	1 (0.8)
Tenderness	16 (13.3)
<b>Thoracic</b>	<b>142 (26.9)</b>
TAA $\geq$ 60mm	80 (15.2)
Dissection	62 (11.8))

# ANEURYSM DIMENSIONS

	<b>n = 527 (%)</b>	<b>SEM (95%CI)</b>
<b>Max. AAA Diameter (mm) [Mean ± SD]</b>	<b>57.21 ± 12.29</b>	<b>0.77 (58.73 - 55.70)</b>
<b>Infrarenal Neck Length (mm) [Mean ± SD]</b>	<b>32.54 ± 16.55</b>	<b>1.66 (35.79 - 29.29)</b>
Proximal Neck Diameter (mm) [Mean ± SD]	22.32 ± 2.69	0.29 (22.89 - 21.75)
Distal Neck Diameter (mm) [Mean ± SD]	24.90 ± 3.55	0.37 (25.64 - 24.16)
<b>Flaring Neck &gt; 1mm per 1cm [n (%)]</b>	<b>29 (38.67)</b>	--
<b>Flaring Over Proximal Seal Zone [n (%)]</b>	<b>20 (27.03)</b>	--
<b>Neck Angulation (degrees) [Mean ± SD]</b>	<b>35.30 ± 23.53</b>	<b>2.44 (40.09 - 30.51)</b>
<b>Neck Angulation &gt; 60° [n (%)]</b>	<b>85 (16.1)</b>	--
Suprarenal Neck Angulation ≥ 45° [n (%)]	12 (2.3)	--
Neck Thrombus [n (%)]	78 (14.8)	--
Neck Calcification [n (%)]	75(14.2)	--
Infrarenal Aorta Length (mm) [Mean ± SD]	121.61 ± 17.63	2.05 (125.64 - 117.59)
<b>Lumbar Vessel Patency [n (%)]</b>	<b>67 (91.78)</b>	--



# PROCEDURAL DETAILS

	n = 527	SEM (95%CI)	Min-Max
<b>LOS ICU (Days ± SD)</b>	1.1 ± 0.83	0.13 (0.82 - 1.32)	(0 - 4)
<b>LOS Hospital (Days ± SD)</b>	77 ± 0.44	0.44 (7.10 - 8.84)	(0 - 77)
<b>Procedure duration (min ± SD)</b>	113.56 ± 67.40	4.63 (104.46 - 122.65)	(10.00 - 503.00)
<b>Anaesthetic Type n (%)</b>			
Epidural/Spinal	37 (24.03)	--	--
General	117 (75.97)	--	--
<b>ASA SCORE N (%)</b>			
2	13 (16.05)	--	--
3	49 (60.49)	--	--
4	19 (23.46)	--	--
<b>PRE OPERATIVE</b>			
Creatinine [umol / L]	104.83 ± 58.40	3.41 (98.14 - 111.52)	(49.00 - 676.00)
Haemoglobin [g/L]	133.75 ± 20.35	1.43 (130.94 - 136.56)	(68.00 - 20.35)
<b>POST OPERATIVE</b>			
Creatinine [umol / L]	98.96 ± 41.00	5.31 (88.52 - 109.40)	(41.00 - 820.00)
Haemoglobin [g/L]	114.18 ± 16.83	1.29 (111.65 - 116.72)	(71.00 - 154.00)
<b>RADIATION</b>			
Radiation Dosage (microGym2)	15204.94 ± 23778.82	1531.73 (18213.99 - 12195.88)	(33.00 - 122683.00)
Fluoroscopy Time (min.)	818.04 ± 1538.48	98.69 (1011.92 - 624.16)	(0.56 - 10237.00)
Contrast Volume (ml)	169.73 ± 81.49	5.34 (159.24 - 180.21)	(15.00 - 800.00)

# STENT TYPE

Uncorrected Data	n = 527 (%)
EVAR Stent Type n (%)	
Endurant	160 (30.4)
Cook Flex	85 (16.1)
Excluder	84(15.9)
Nellix	10 (1.9)
Anaconda	25 (4.7)
AFX	12 (2.3)
Ovation Alto	16 (3.0)
Talent	65 (12.3)
Fenestrated Graft n (%)	58 (11)
Fenestrated Graft Type n (%)	
Cook Fenestrated Graft	47 (8.9)
Anaconda Fenestrated Graft	11 (2.1)
Ch-EVAR n (%)	10
Br-EVAR n (%)	12
Cook IBD n (%)	25
Gore IBE n (%)	6
Thoracic Graft n (%)	12
Thoracic Graft Stent Type n (%)	
Cook Thoracic Graft	52
Medtronic Valiant Thoracic Graft	72
Gore TAG Thoracic Endoprosthesis	18
<b>Combination n (%)</b>	<b>48</b>
Aptus Heli-Fx Anchor n (%)	25

# ENDPOINT (30 DAYS)

	<b>n = 527</b>	<b>SEM (95% CI)</b>
Successful Stent Deployment n (%)	527 (100.00)	0.00 (1.00 - 1.00)
End Point n (%)		
Death	1 (0.19)	0.00 (0.01 - 0.00)
Endoleak 1	1 (0.52)	0.01 (0.01 - 0.01)
Endoleak 2	23 (4.4)	0.01 (0.04 - 0.04)
Endoleak 3	0	0.00 (0.00 - 0.00)
Endoleak 4	0	0.00 (0.00 - 0.00)
AAA rupture during procedure	0	0.00 (0.00 - 0.00)
Conversion to Open repair	0	0.00 (0.00 - 0.00)

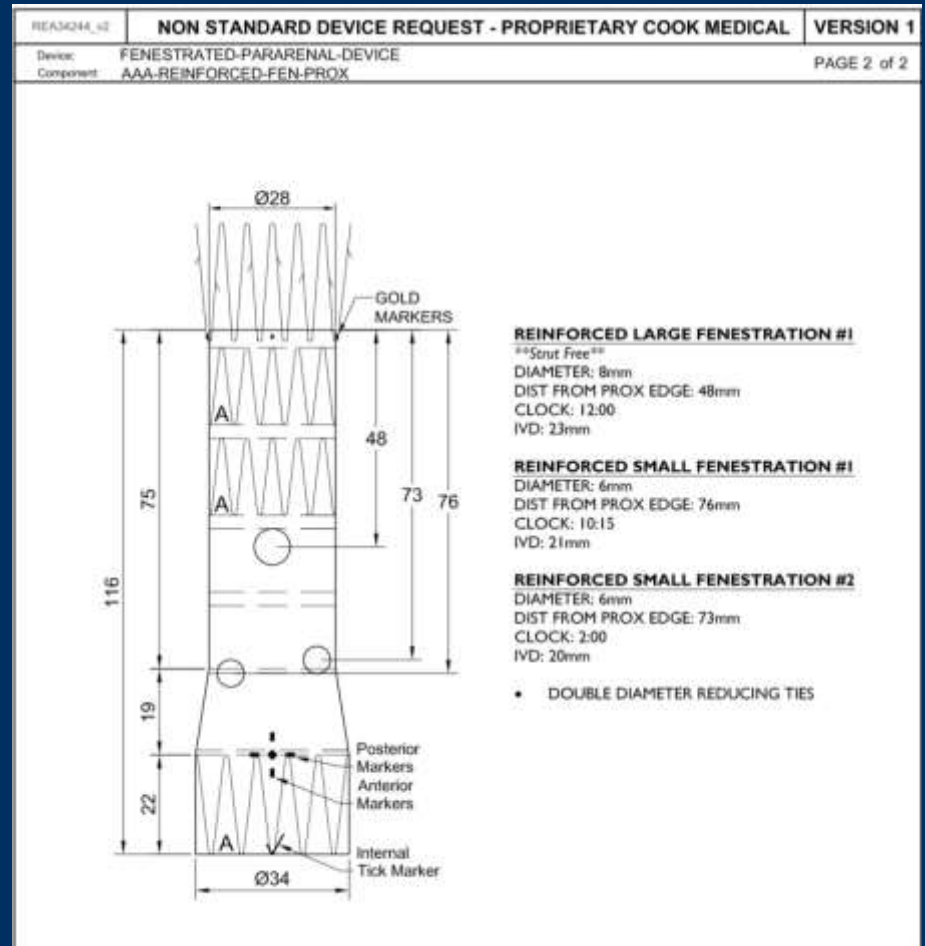
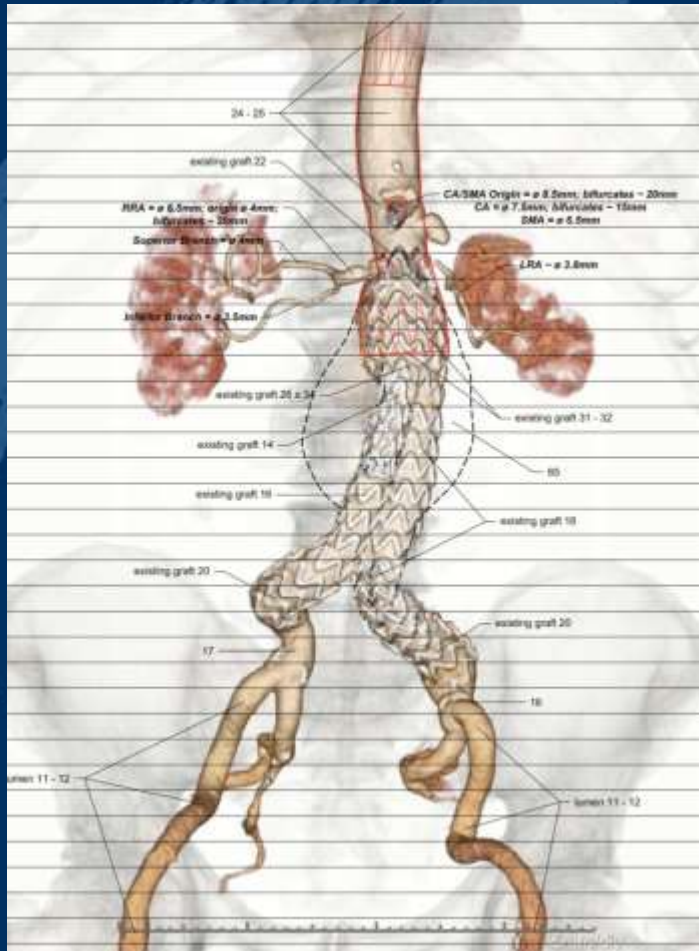
# STENT TYPE & OVERALL MORTALITY

	n = 527
<b>Total Deaths</b>	<b>60 (28.44)</b>
Procedure n(%)	
Standard EVAR	11 (18.33)
FEVAR	2 (3.33)
ChEVAR	0 (0.00)
BrEVAR	0 (0.00)
TEVAR	0 (0.00)
Stent Type n(%)	
Endurant	8 (13.33)
Cook Flex	1 (1.67)
Excluder	2 (3.33)
Nellix	0 (0.00)
Anaconda	0 (0.00)
AFX	1 (1.67)
Ovation Alto	0 (0.00)
Talent	0 (0.00)
Cook Fenestrated	1 (1.67)
Anaconda Fenestrated Graft	0 (0.00)
Cook IBD	2 (3.33)
Gore IBE	0 (0.00)
Cook Thoracic Graft	0 (0.00)
Medtronic Valiant Thoracic Graft	0 (0.00)
Gore TAG Thoracic Endoprosthesis	0 (0.00)
Combination	0 (0.00)
Aptus Heli-Fx Anchor n (%)	0 (0.00)

# COMPLICATIONS

	n = 527
Surgical Complications n (%)	
Wound Infection	5 (2.91)
Seroma	4 (2.33)
Haematoma	6 (3.51)
Access Vessel Flow Dissection	1 (0.58)
False Aneurysm	1 (0.58)
Distal Vessel Embolisation	0 (0.00)
Ischaemic Limb	2 (1.17)
Ischaemic Collitis	0 (0.00)
General Complications n (%)	
CVS (MI, Arrhythmia)	7 (4.19)
Respiratory	1 (0.60)
Renal (Contrast nephropathy)	3 (1.80)
GIT Bleed	0 (0.00)
CNS (Stroke, TIA, Amaurosis Fugax)	0 (0.00)

# TYPE I ENDOLEAK AFTER EVAR





# CONCLUSION

1. Multiple devices have been for variable indication
2. RPH still offer opportunities for teaching all staff on aortic endografts
3. Lessons have to be learned from all outcome, but this still work in progress.
4. Further analysis will be reported later this year



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