

The Vascular World Is Coming Together In New York In November 2024  
**And You're Invited!**



### How Can AI Markedly Reduce Radiation, Contrast Usage And Complications For Complex TAAA Repair With PMEGs

Mahmoud B. Melas, MD, MHS, RPVI, FACS  
Professor and Chief Vascular and Endovascular Surgery  
Vice Chair of Surgery for Clinical Research  
Director of The Center for Learning and Excellence in Vascular and Endovascular Research (CLEVER)  
University of California San Diego

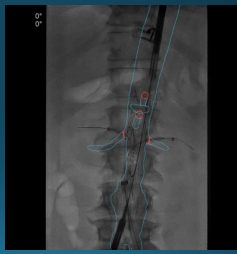

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## Disclosures

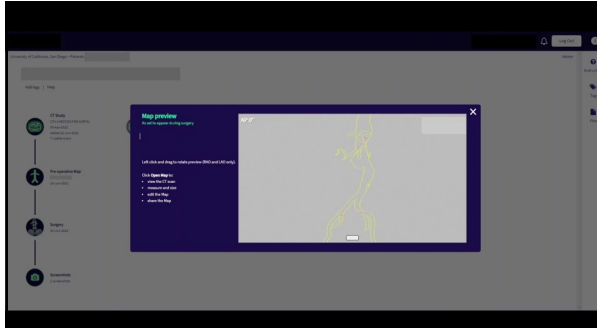
- Cydar educational grant

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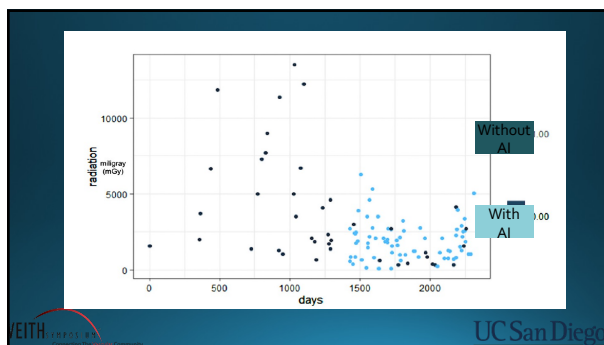
## Introduction



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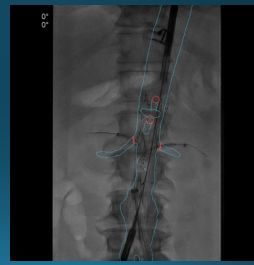


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## Methodology

- Multi institution study
- Retrospective chart review
- August 2015 - December 2022
- Fenestrated/branched EVARS
  - **Inclusion:** physician modified endografts (PMEGs)
  - **Exclusion:** Zfen



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**Primary Outcomes:**

- Operative time
- Radiation exposure
- Fluoroscopy time
- Contrast use

**Secondary Outcomes:**

- 30-day postoperative events
- 30-day mortality

**Statistical Analysis:**

- Linear regression models

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## Cohort

PMEG  
N=208

AI Map In Surgery  
N=179 (86.1)

Surgery Without AI Map  
N=29 (13.9)

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### Demographic and Clinical Risk Factors

	AI Used Intraop 179 (86.1%)	AI Not Used 29 (13.9%)	P Value
Age	72.3 ± 9.3	74.8 ± 9.0	0.185
BMI (kg/m <sup>2</sup> )	26.8 ± 5.7	25.5 ± 5.4	0.255
Male	140 (78.2)	23 (82.1)	0.636
Hispanic	16 (8.9)	2 (7.1)	0.874
Race (White)	134 (74.9)	20 (71.4)	0.743
Chronic Kidney Disease (> Stage 3)	42 (23.5)	8 (28.6)	0.801
Atrial Fibrillation	43 (24.0)	4 (14.3)	0.253
CHF	24 (13.4)	3 (10.7)	0.694
PAD	13 (7.1)	6 (21.4)	0.613
Cancer Diagnosis	19 (25.0)	7 (25.0)	1.0
History of CABG or PCI	80 (44.7)	9 (32.1)	0.212
Type 2 DM	24 (13.4)	3 (10.7)	0.054
CAD	88 (49.2)	13 (46.4)	0.788
Hyperlipidemia	34 (44.7)	18 (64.3)	0.077
Hypertension	161 (89.9)	24 (85.7)	0.500
History of Aneurysm other than Aorta	3 (3.9)	1 (3.6)	0.930
History of open AAA repair	14 (7.8)	1 (3.6)	0.664
History of EVAR	56 (31.3)	12 (42.9)	0.225
Family history of AAA	4 (2.2)	2 (7.1)	0.152

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### Aneurysm Characteristics

	AI Used Intraop 179 (86.1%)	AI Not Used 29 (13.9%)	P Value
Aneurysm Size (mm)	66.9 ± 16.4	68.0 ± 15.7	0.730
Type of aneurysm treatment			0.487
Pararenal	61 (34.3)	17 (58.6)	
Juxtarenal	14 (7.8)	0	
Type I Thoracoabdominal	9 (5.1)	2 (6.9)	
Type II Thoracoabdominal	15 (8.4)	1 (3.4)	
Type III Thoracoabdominal	14 (7.9)	2 (6.9)	
Type IV Thoracoabdominal	45 (23.2)	5 (12.2)	
Type V Thoracoabdominal	20 (11.2)	2 (6.9)	
Symptomatic	23 (12.8)	2 (7.1)	0.389
Rupture	6 (3.4)	1 (3.6)	0.952

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### Primary Outcomes – Univariate Analysis

	AI Used Intraop 179 (86.1%)	AI Not Used 29 (13.9%)	P Value
Operative Time (minutes)	256.2 ± 111.2	330.0 ± 150.0	0.016
Contrast (cc)	101.1 ± 44.1	226.0 ± 85.8	<0.0001
Radiation Exposure (mGy)	2819.8 ± 1691.9	4749.3 ± 3795.7	0.011
Fluoroscopy Time (minutes)	71.8 ± 34.5	107.4 ± 65.7	0.008

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### Linear Regression Model

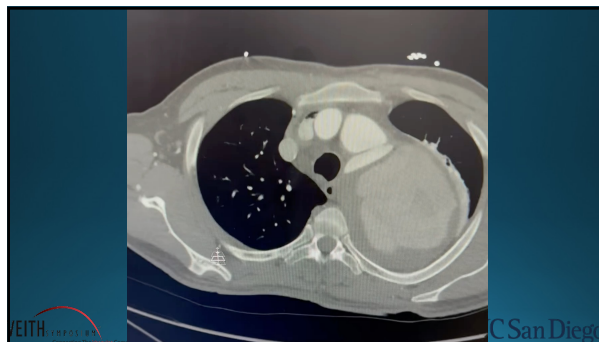
	Coefficient*	95% Confidence Interval	P Value	Adjusted R-Squared
Operative Time (minutes)	-73.4	-120.7,-26.1	0.003	0.063
Contrast (cc)	-126.6	-147.1,-106.0	<0.0001	0.448
Radiation Exposure (mGy)	-2182.1	-2934.5,-1429.7	<0.0001	0.317
Fluoroscopy Time (minutes)	-37.5	-53.8,21.2	<0.0001	0.105

Adjusted for: age at time of operation, sex, race, body mass index, smoking status, history of coronary artery disease, hypertension, previous history of endovascular aortic repair, aneurysm size at time of presentation, type of aneurysm. Each model compares individuals who underwent a procedure with augmented intelligence to procedures without augmented intelligence.  
\*Reduction in covariate with the use of fusion imaging.

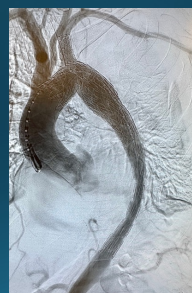
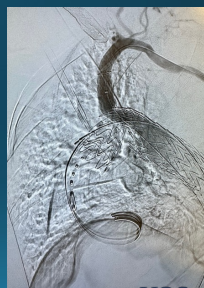
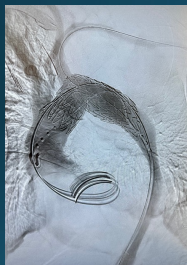
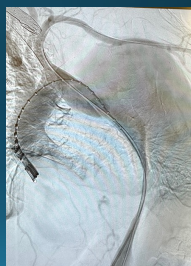
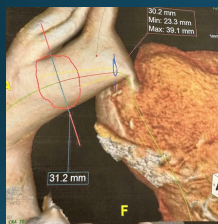
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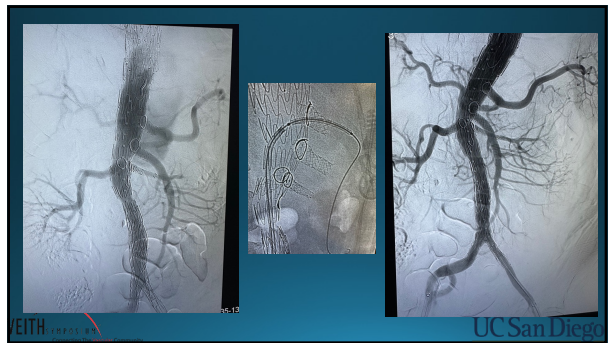
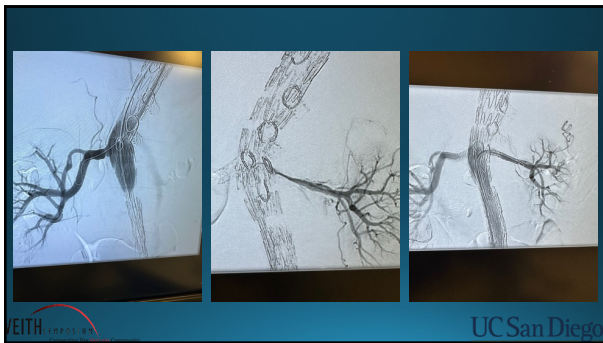
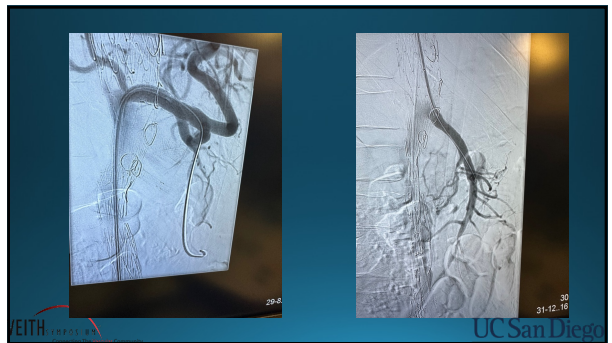
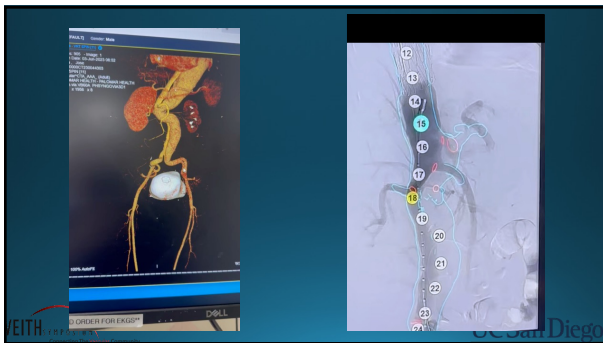
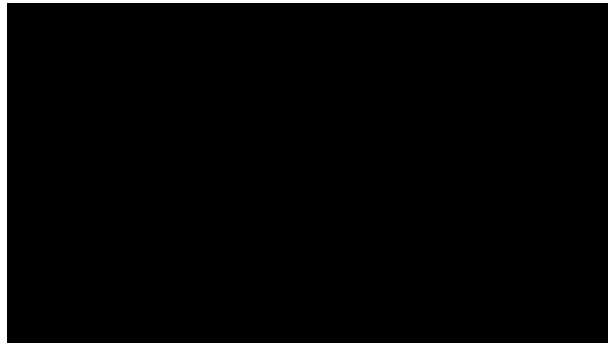
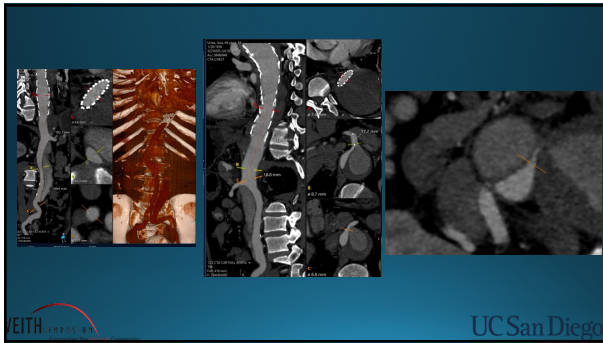
### Patient Data

- HPI: 64yM Jehovah's Witness who was transferred from OSH for Type 2 TAAA. Pt has history of TBAD discovered in 2018. CT imaging showed 8.6 cm in largest diameter in thoracic portion. 7.2 cm in abdominal portion. Upon arrival to UCSD, was HDS endorsing L shoulder pain and dysphagia for several months.
- PMH/PSH: HTN, HLD
- Allergies: NKDA
- Meds: ASA 81, statin
- Social Hx: Jehovah's Witness
- Physical exam: palp fem, pop, pedal pulses bilat
- Labs: Hgb 12.4, Cr 1.15
- Plan for staged repair of TAAA



### Stage 1: TEVAR

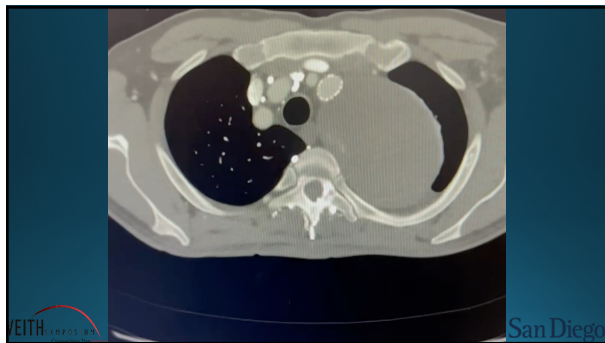






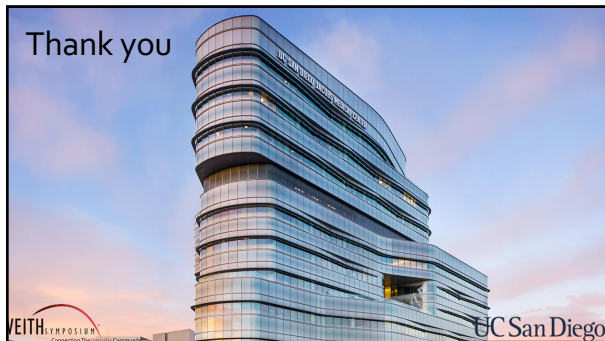
### Post Operative Course

- Post-operative course unremarkable
- Discharged on POD<sub>4</sub>, CTA showed stable T<sub>2</sub> EL
- One month CTA showed exclusion of the aneurysm with small EL<sub>2</sub>



### Conclusions

- AI fusion mapping:
  - ↓ operative time
  - ↓ contrast use
  - ↓ radiation exposure
  - ↓ fluoroscopy time
- AI → increased safety and efficiency in the hybrid room for both patients and staff
- Further prospective studies are needed to extrapolate this benefit



Thank you