

**20th VASCULAR SOCIETY OF EGYPT
INTERNATIONAL ANNUAL CONFERENCE**

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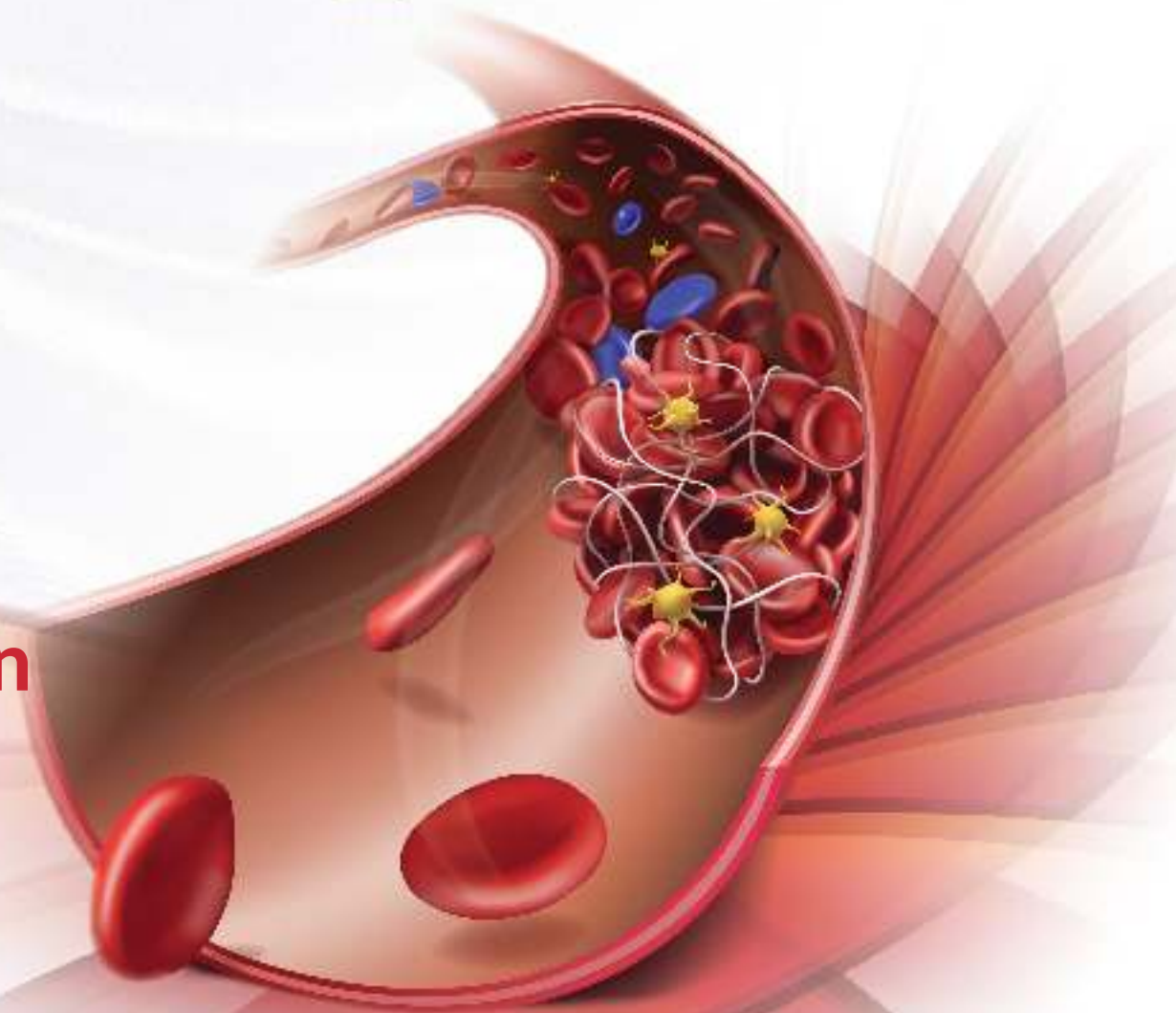
**7th ANNUAL AL-AZHAR VASCULAR
SURGERY CONFERENCE**

**EVIDENCE BASED
VASCULAR PRACTICE**



Impact of Artificial Intelligence on aortic interventions

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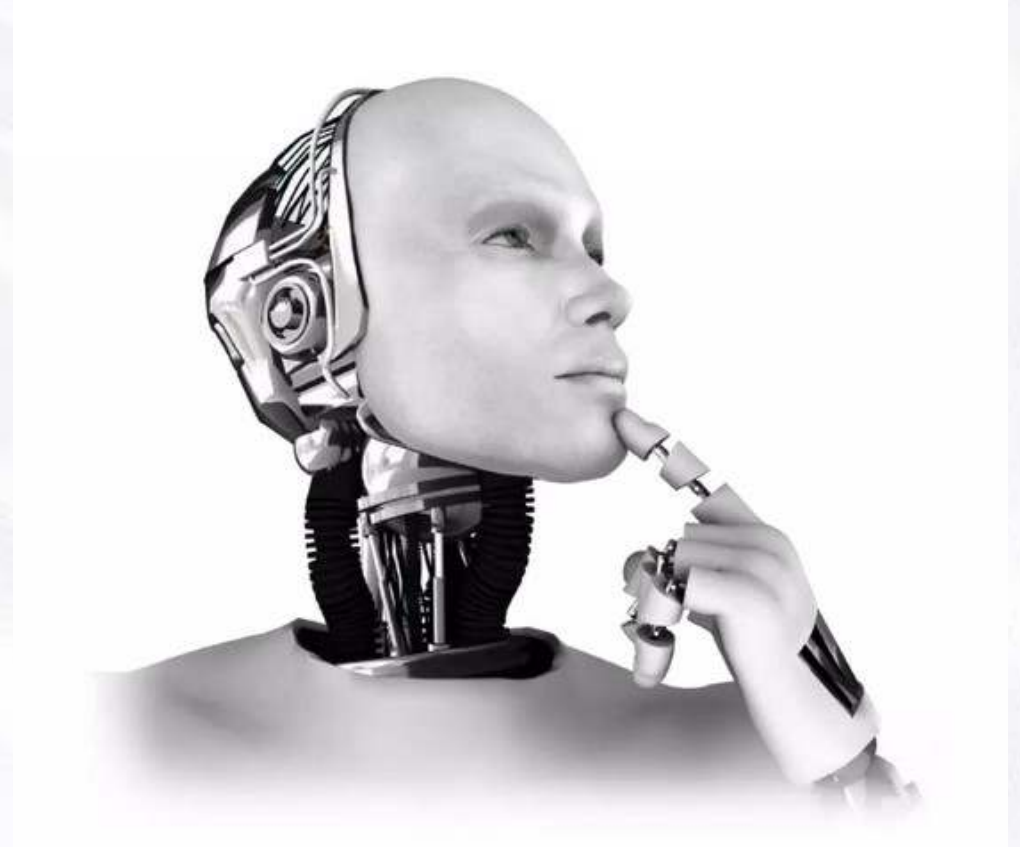
Contents

- Definition of AI
- Examples of AI
- Applications of AI in aortic disease

Pre operative
intra operative
post operative

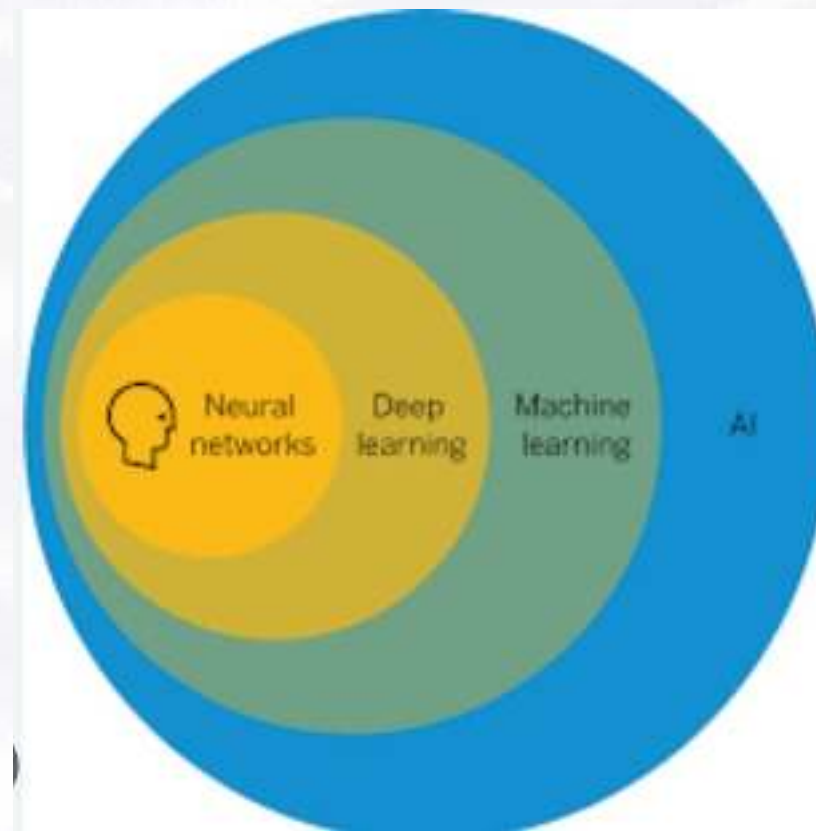
What is artificial intelligence

- Definition:
- The capability of a machine to imitate intelligent human behavior

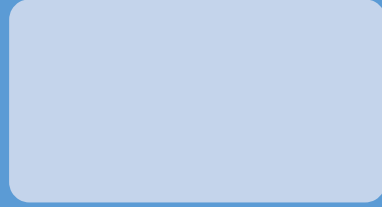


AI ,ML ,DL , and NN

- They are different levels of AI levels



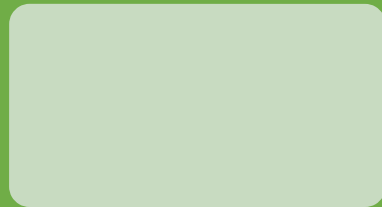
AI tools in aortic disease



1-Preoperative AI tools



2-Intraoperative AI tools



3-Postoperative AI tools

Preoperative AI

- Prediction of growth of AAA
- Prediction of post operative mortality after open AAA repair
- Prediction of rupture of AAA
- Automatic measurements of CTA of AAA using endosize software

Can we predict growth of AAA?

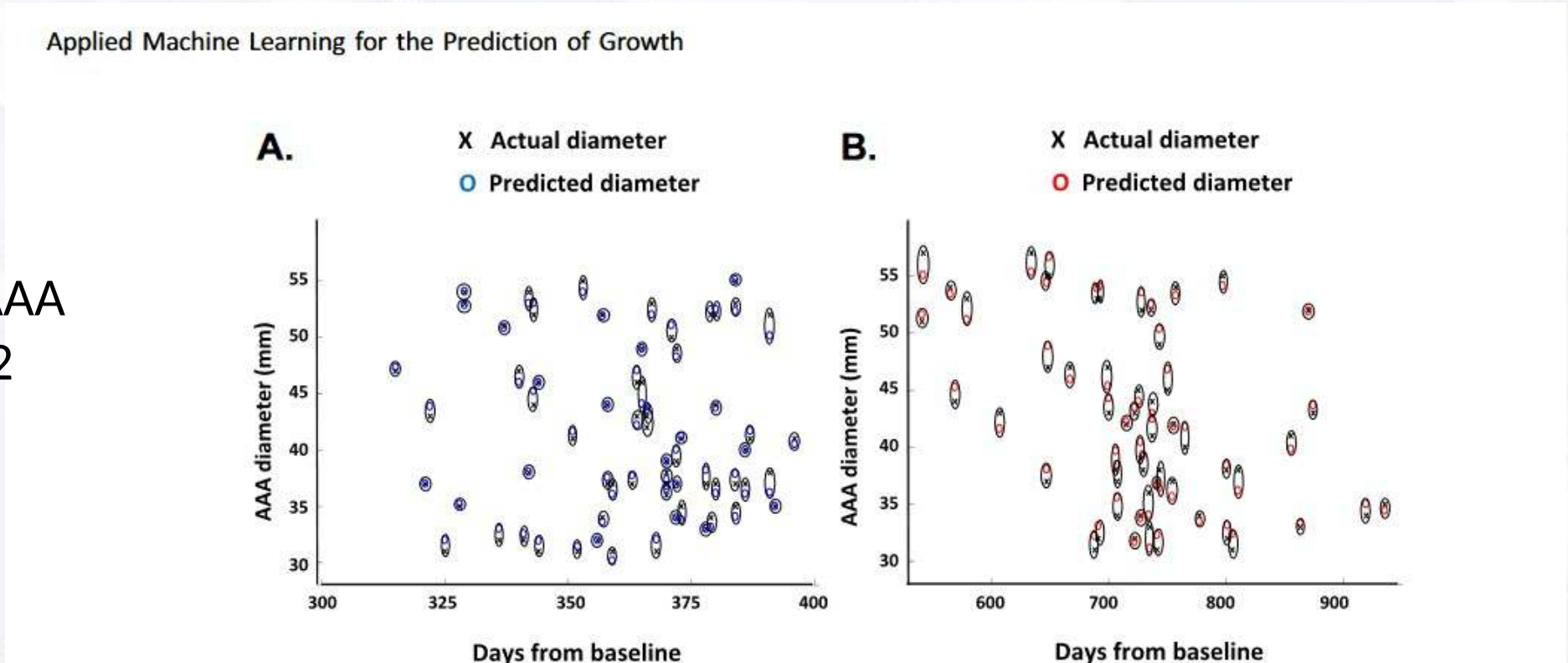
ORIGINAL RESEARCH

Applied Machine Learning for the Prediction of Growth of Abdominal Aortic Aneurysm in Humans

R. Lee ^{a,*†}, D. Jarchi ^{b,†}, R. Perera ^c, A. Jones ^a, I. Cassimjee ^a, A. Handa ^{a,†}, D.A. Clifton ^{c,†}, on behalf of the Oxford Abdominal Aortic Aneurysm Study and the Oxford Regional Vascular Service



Actual and predicted diameters

Can predict the AAA diameter within 2 mm in 85% of patients



Can we predict mortality?

FULL TEXT ARTICLE

Prediction of in-hospital mortality after ruptured abdominal aortic aneurysm repair using an artificial neural network  

- An ANN-based predictive model may represent a simple, useful, and highly discriminant adjunct to the vascular surgeon in accurately identifying those patients who may carry a high mortality risk from attempted repair of rAAA, using only easily definable preoperative variables.

Ruptured Abdominal Aortic Aneurysm Survival Estimator

Information about the patient's age, mentation, shock and CPR can provide an optimized estimate of likelihood of in-hospital mortality after attempted repair of a ruptured abdominal aortic aneurysm

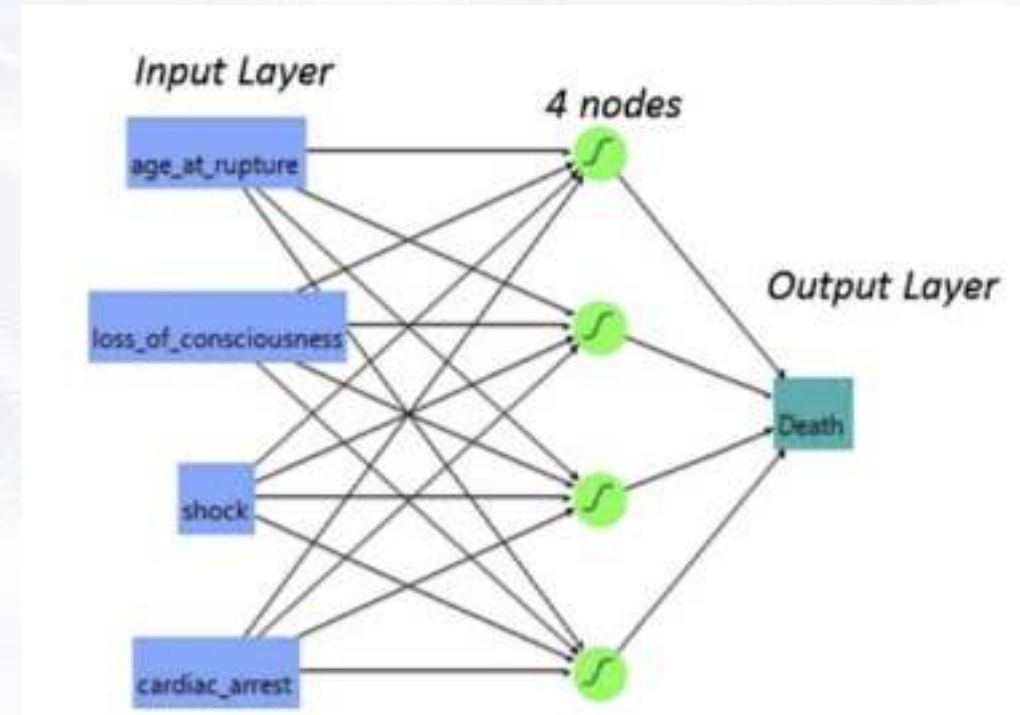
Thank you for using our Survival Estimator for patients with ruptured abdominal aortic aneurysm.
Eric Wise, MD; Kyle Hocking, PhD; Colleen Brophy, MD

- 1 Please enter the patient's age, in years
* must provide value
- 2 Please write "1" if the patient experienced shock (SBP<90, HR>120, diaphoresis and/or pallor). Otherwise, please write "0"
* must provide value
- 3 Please write "1" if the patient has necessitated cardiopulmonary resuscitation (CPR) and/or went into cardiac arrest for any period of time. Otherwise, write "0"
* must provide value
- 4 Please write "1" if the patient experienced loss of consciousness or decreased mentation (GCS< 15) for any period of time. Otherwise, write "0".
* must provide value

Percent Likelihood of In-Hospital Mortality after Operation

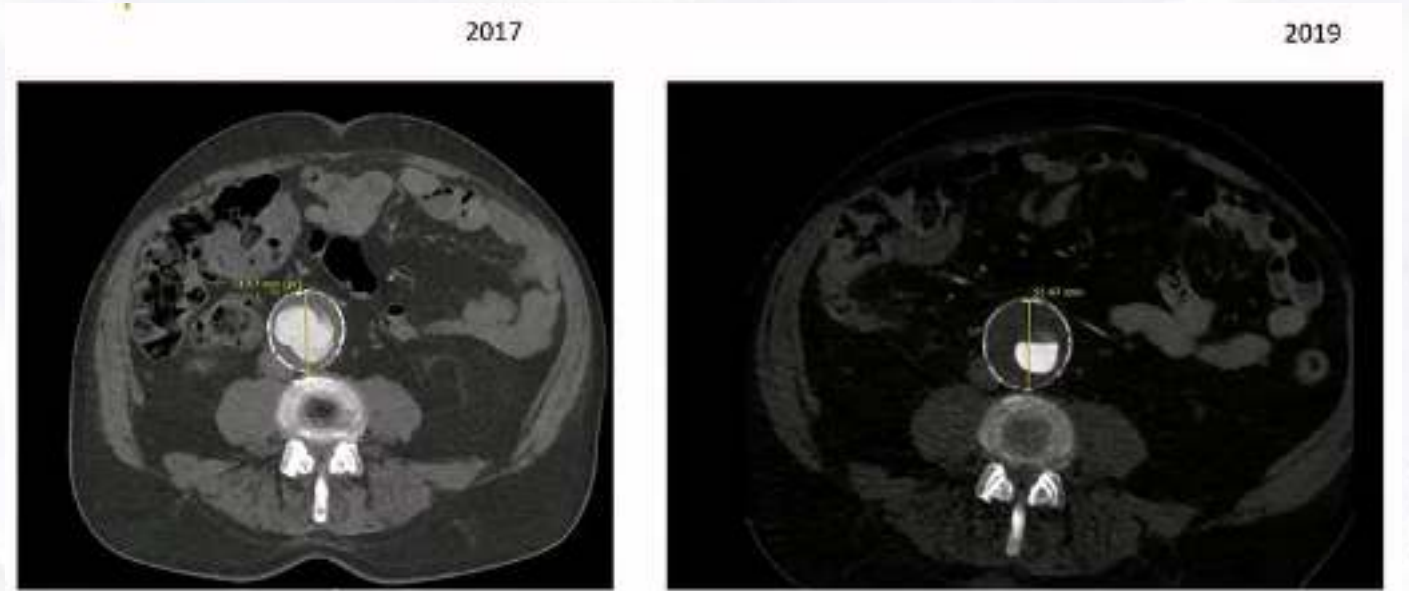
Submit

- Artificial neural network for death in rAAA



Automatic segmentation of AAA thrombus

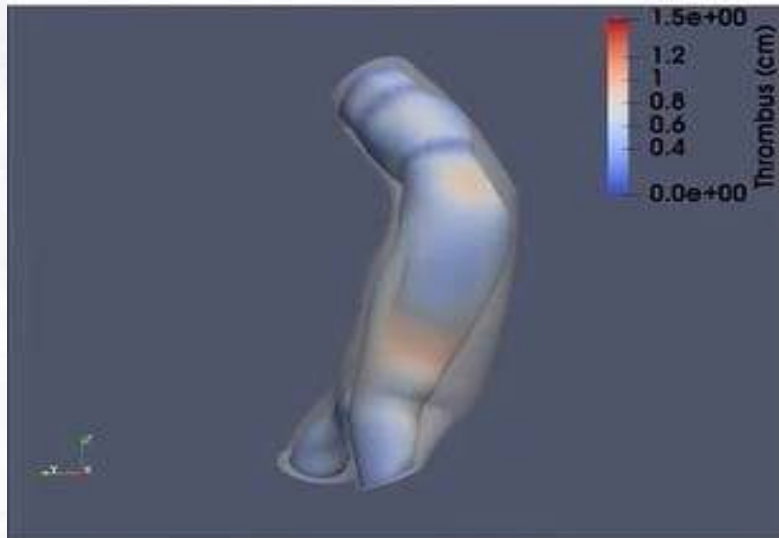
- AAA have the same size 51 mm but increase aortic thrombus



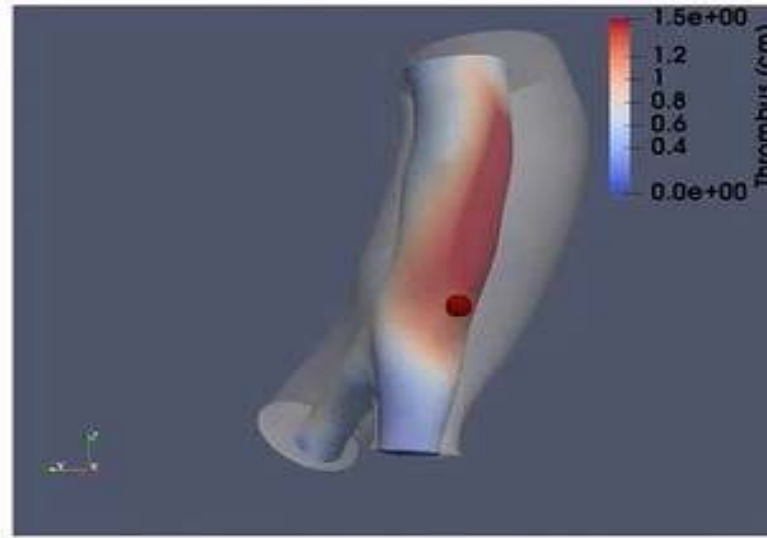
AAA thrombus segmentation

Automatic analysis of thrombus

2017



2019



2020



Data Amsterdam UMC

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And guess what ?

- It ruptures at the exact point of the thickened thrombus



Intraoperative AI

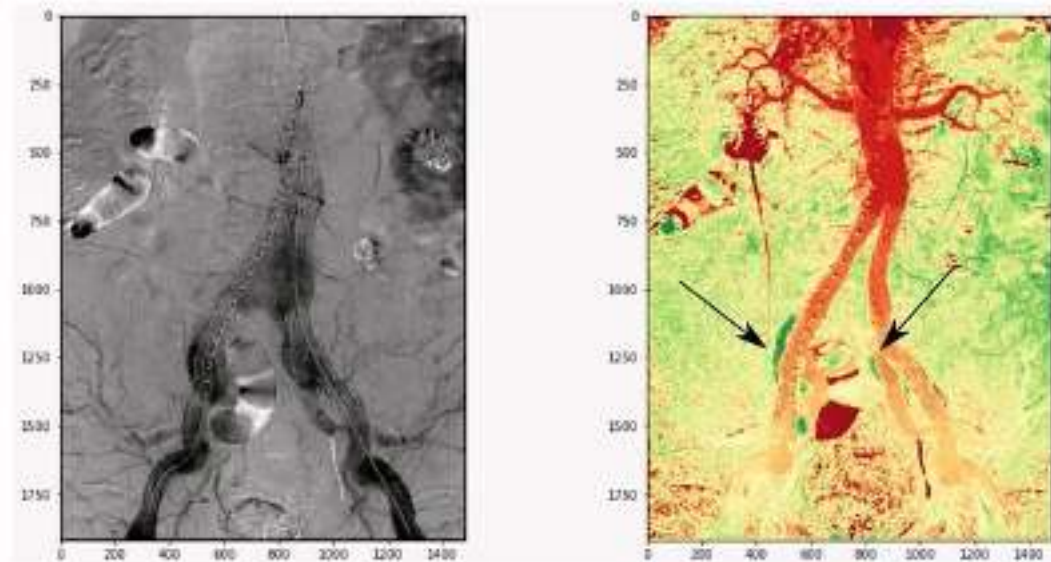
2-Intraoperative AI tools

Detection of endoleaks type 2 during EVAR

- AI can look at each pixel of the image and detect endoleaks type 2

Advanced intraoperative imaging Perfusion DSA

Analysis of each individual pixel
Time to peak (TTP) and arrival time (AT).



Postoperative AI

3-Postoperative AI tools

- Can create a custom made , postoperative follow-up scheme using big data model

Medtronic AI tools

The screenshot shows the Medtronic 75 website header with navigation links: Home, Press releases, Business & regional news, Stories, Podcast, Medtronic.com, and Media. The main content area features the date **MAR 22, 2023** and the headline **Medtronic to boost AI innovation with new platform introduction**. A blue button labeled **Medical Surgical Portfolio** is positioned below the headline.

Which AI tools can be used in Aorta?

- 1. Medtronic's AI-assisted tools:** These tools can analyze imaging data to provide recommendations for the best treatment options based on patient-specific anatomy.
- 2. Cerenovus:** Offers AI solutions for surgical planning and vascular assessment.
- 3. Quanta:** Uses AI algorithms to help predict patient outcomes and recommend appropriate interventions.
- 4. HeartFlow:** While primarily focused on coronary artery disease, it involves decision-support systems that can sometimes be adapted for vascular applications.
- 5. Varian's AI tools:** These offer insights into vascular pathologies that can guide treatment strategies.

Future is here



Conclusion

- AI will surely play a great role in all vascular surgery fields
- AI can use big data with the large processing power
- AI will improve vascular services and help clinicians to improve vascular services
- We all must use AI every day

• Thank you