Cydar Fusion adaptable to any operating theatre

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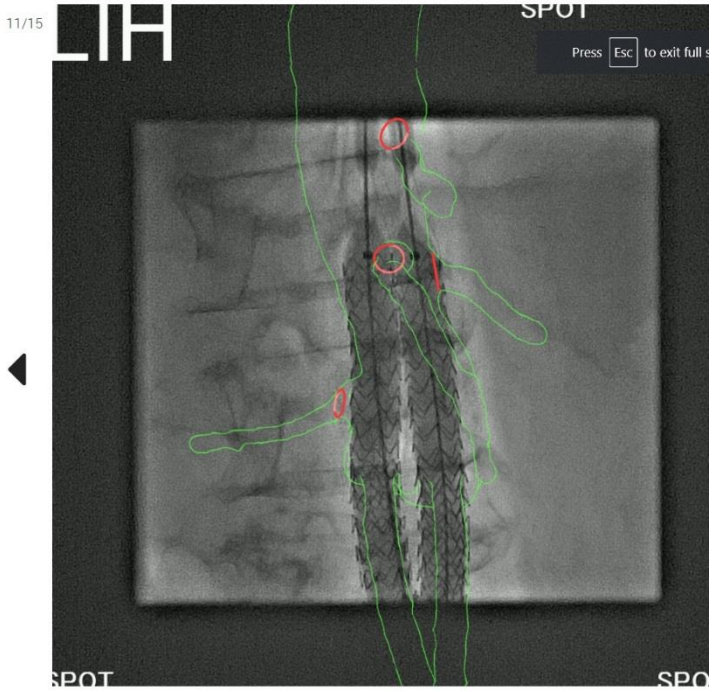
Disclosures

I have no relevant conflict of interest.

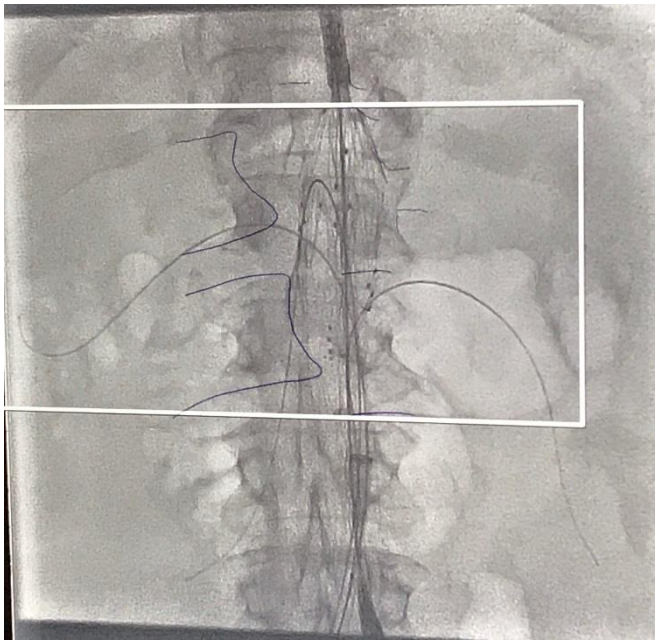
Royal Liverpool Hospital

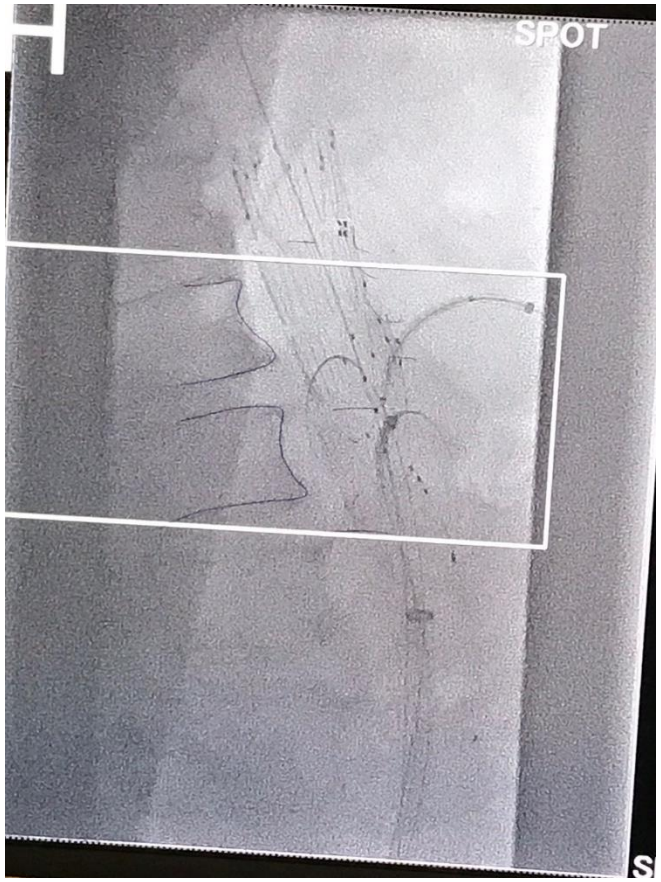
CT- Fusion



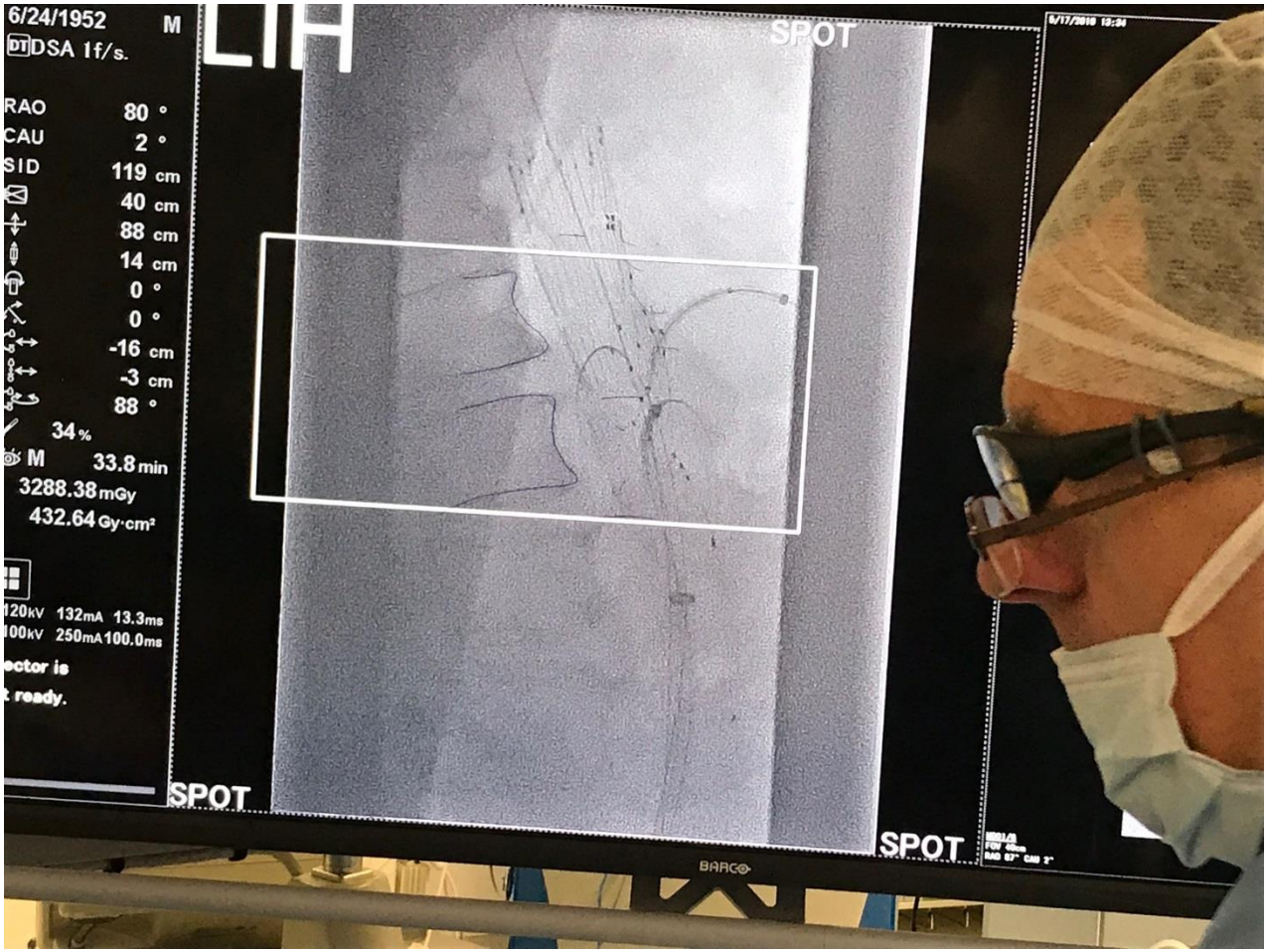
- Harness 3-dimensional information from pre-op CT
- Pan/zoom/rotate
  - Reduce radiation dose
  - Reduce contrast load
  - Reduce length of procedure

Fusion imaging in Liverpool





Spot Quiz? Who is the operator



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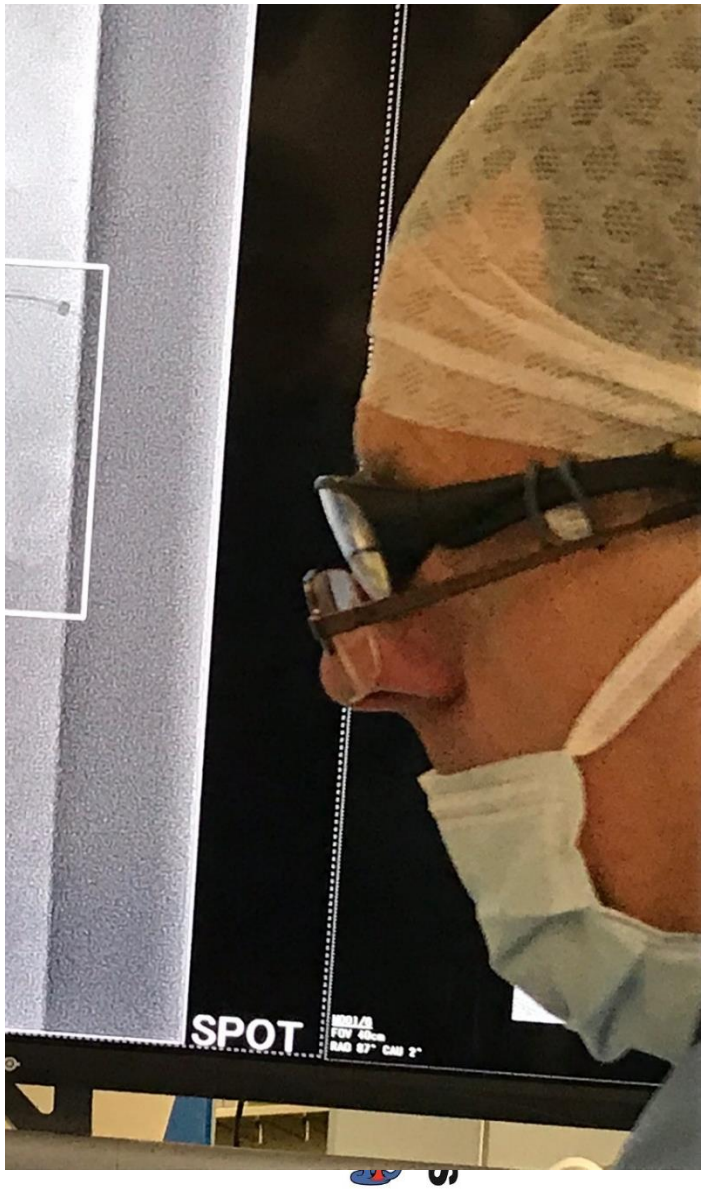


CT Fusion in EVAR

- reduction in radiation and use of iodinated contrast
- May improve speed of procedure.

J Vasc Surg. 2016 May;63(5):1147-55. doi: 10.1016/j.jvs.2015.11.033. Epub 2016 Jan 6.

The effects of combining fusion imaging, low-frequency pulsed fluoroscopy, and low-concentration contrast agent during endovascular aneurysm repair.

Dias NV[1], Billberg H[2], Sonesson B[2], Törnqvist P[2], Resch T[2], Kristmundsson T[2].

J Vasc Surg. 2018 Dec;68(6):1706-1713.e1. doi: 10.1016/j.jvs.2018.04.015. Epub 2018 May 24.

A prospective observational trial of fusion imaging in infrarenal aneurysms.

Maurel B[1], Martin-Gonzalez T[2], Chong D[2], Irwin A[2], Guimbretière G[3], Davis M[2], Mastracci TM[4].

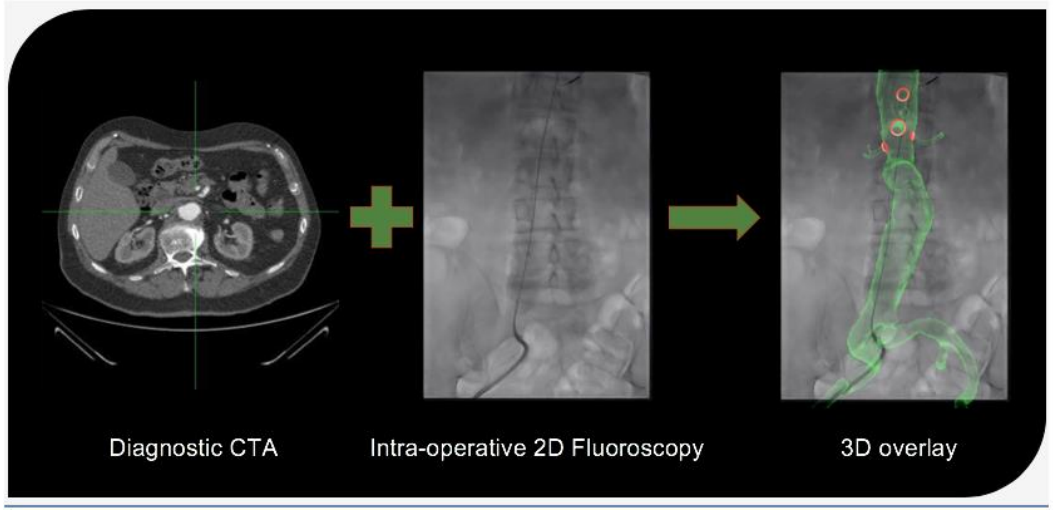
Ann Vasc Surg. 2018 Oct;52:302-311. doi: 10.1016/j.avsg.2018.03.032. Epub 2018 May 22.

Image Fusion and 3-Dimensional Roadmapping in Endovascular Surgery.

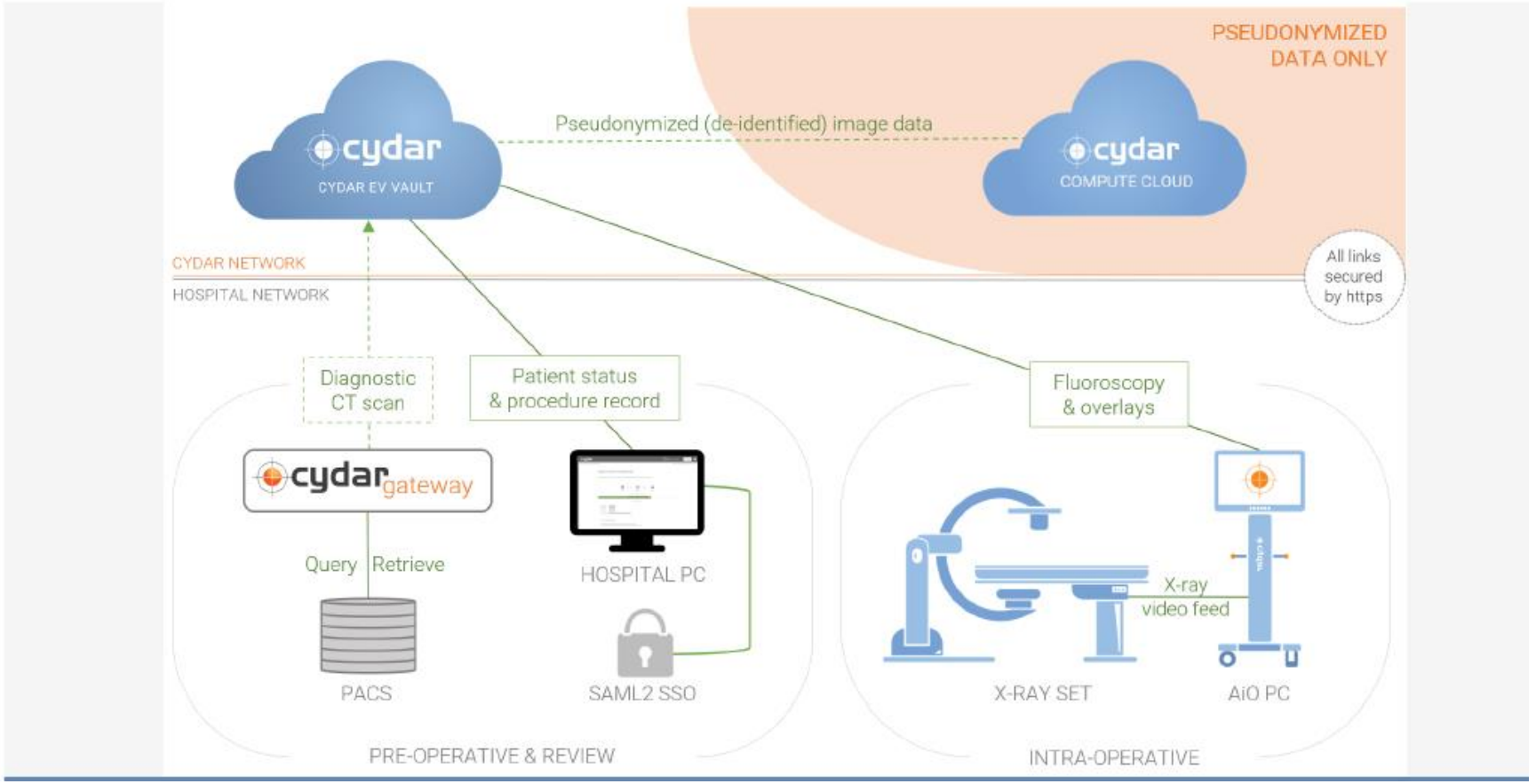
Jones DW[1], Stangenberg L[2], Swerdlow NJ[3], Alef M[4], Lo R[3], Shuja F[5], Schermerhorn ML[6].

CT-Fusion

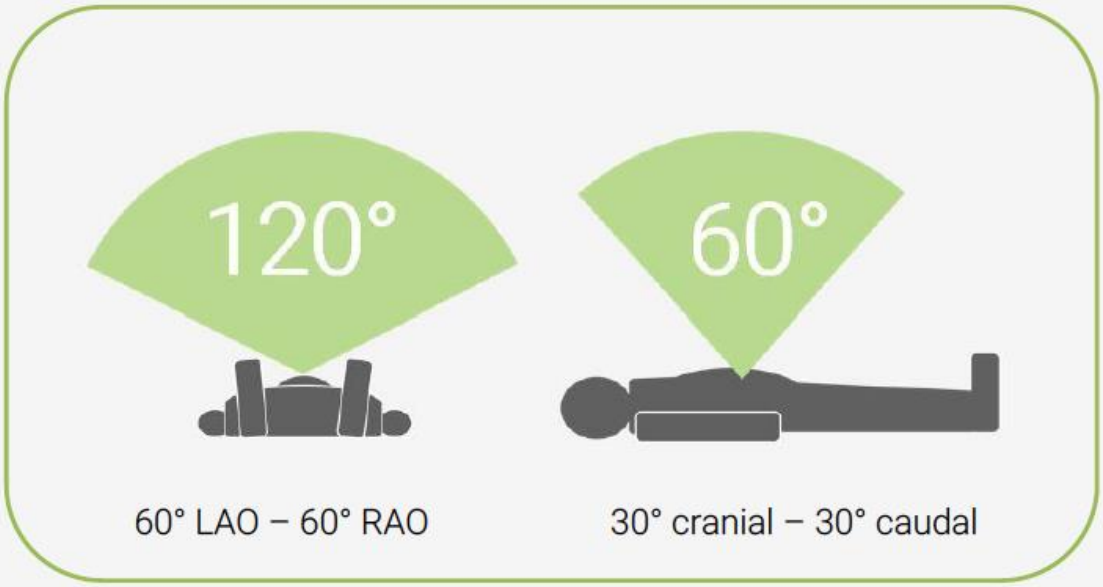
- Mechanical Fusion systems
  - Manual image registration in AP and Lateral +/- cbCT
- Computer Image based Fusion
  - Artificial intelligence registration (CYDAR)



Cydar, Cloud based Fusion system

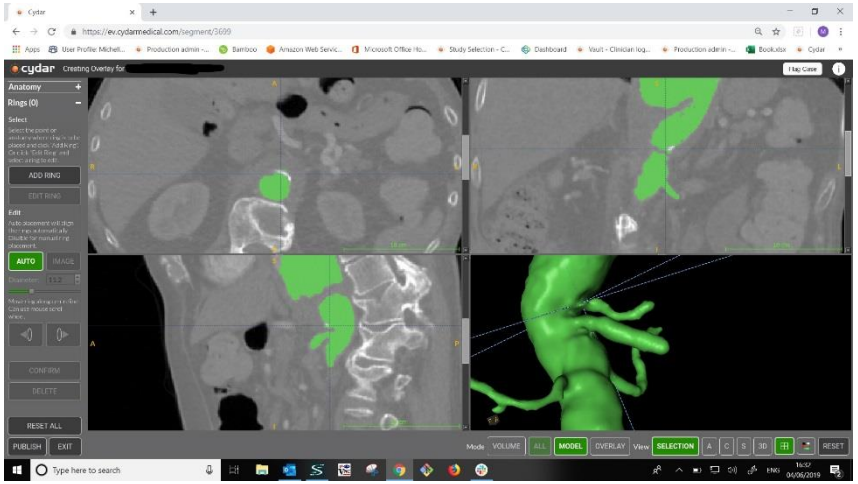


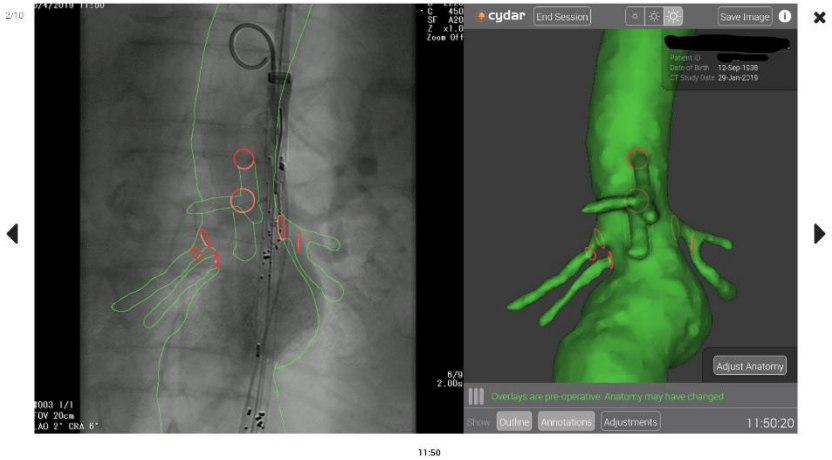
Working Range Cydar



Body region working range: T10 – L5

Mechanical v Cydar





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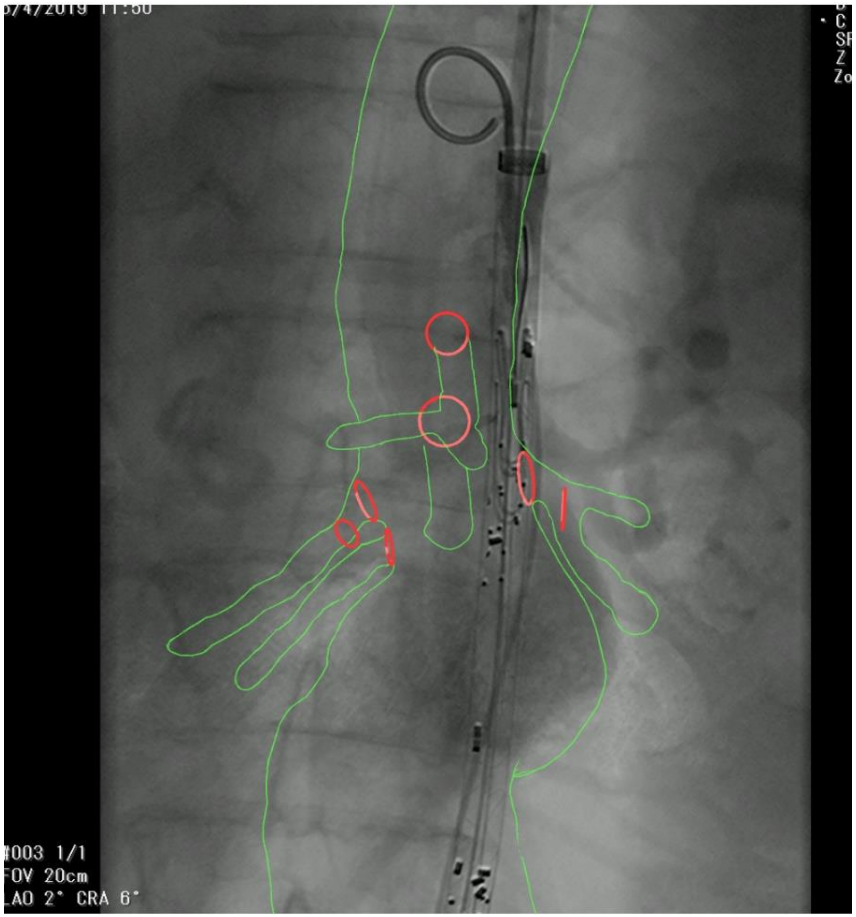
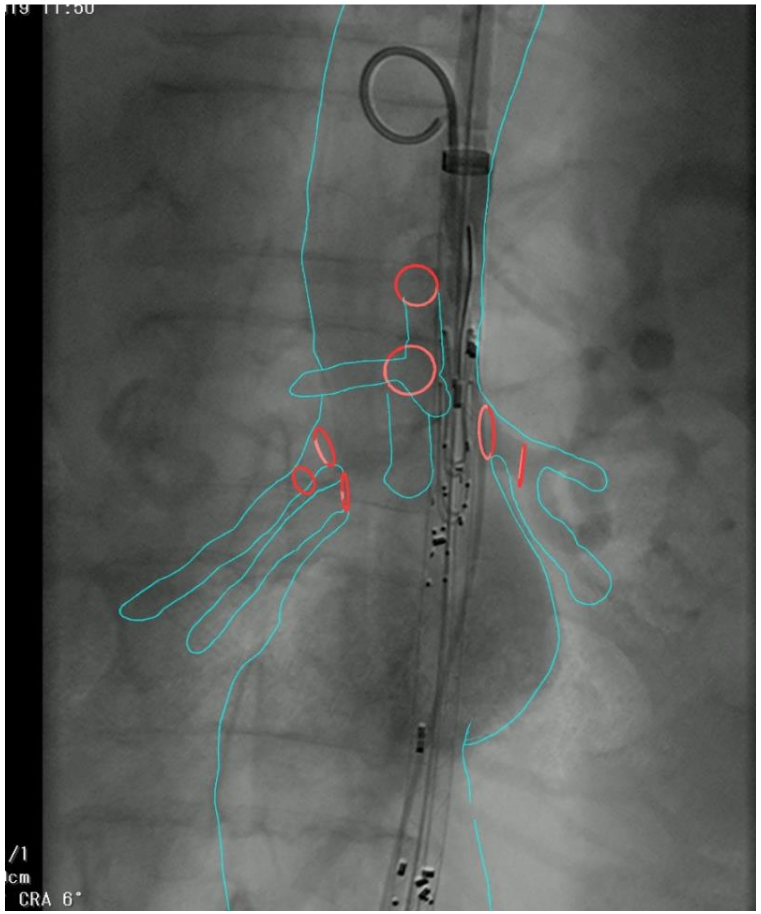
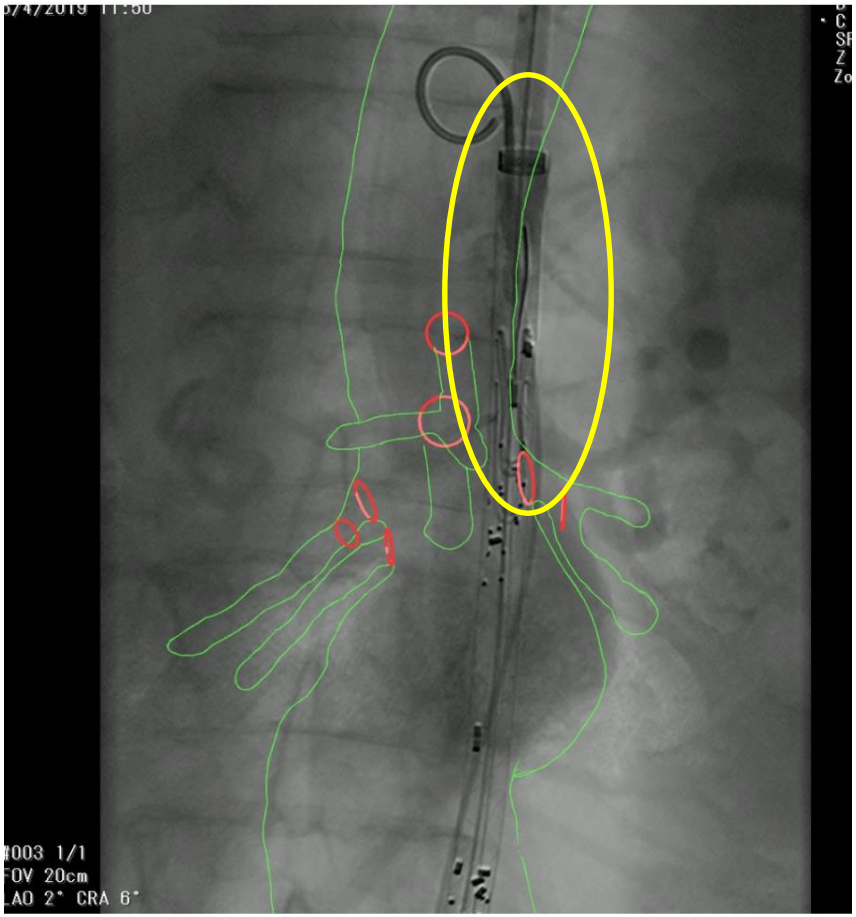
Correction of Mask, Mechanical

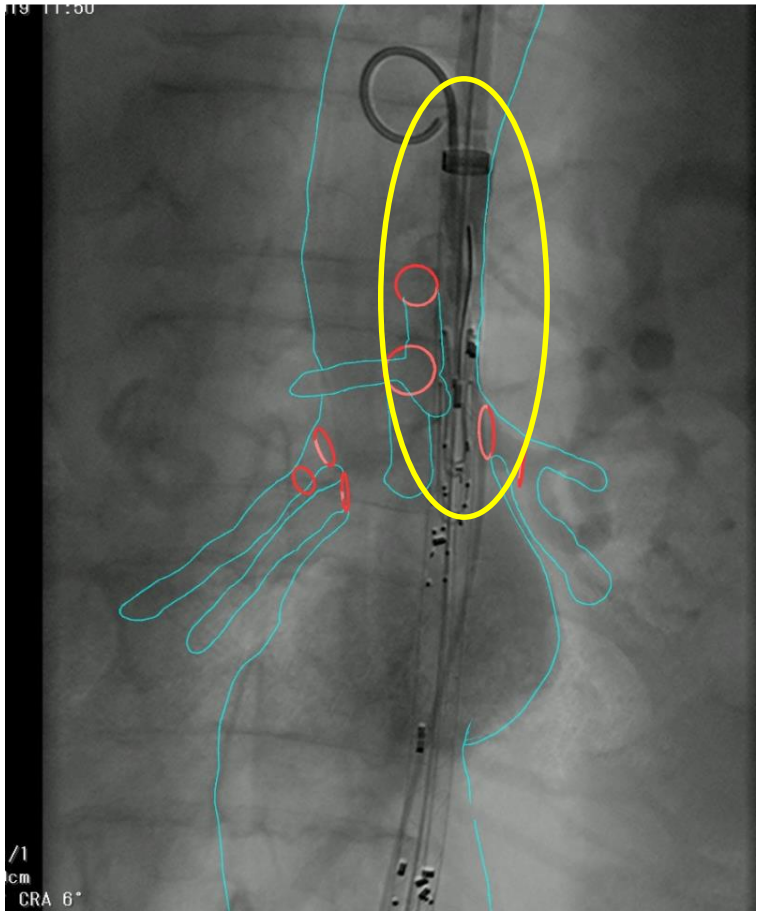
Correction of Mask, Cydar



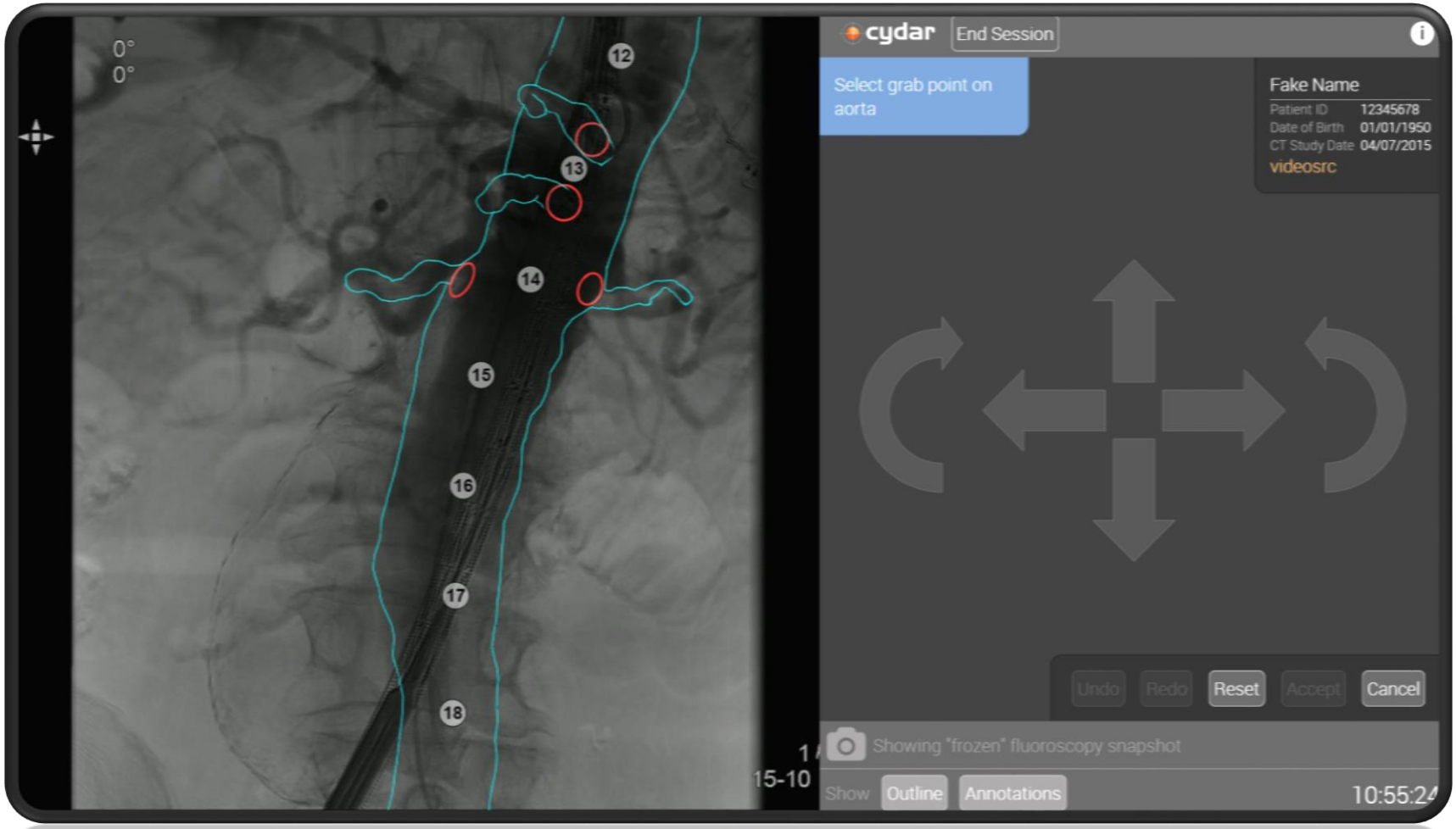


Correction of Deformation, Cydar





Deformable Anatomy Tool (Cydar)



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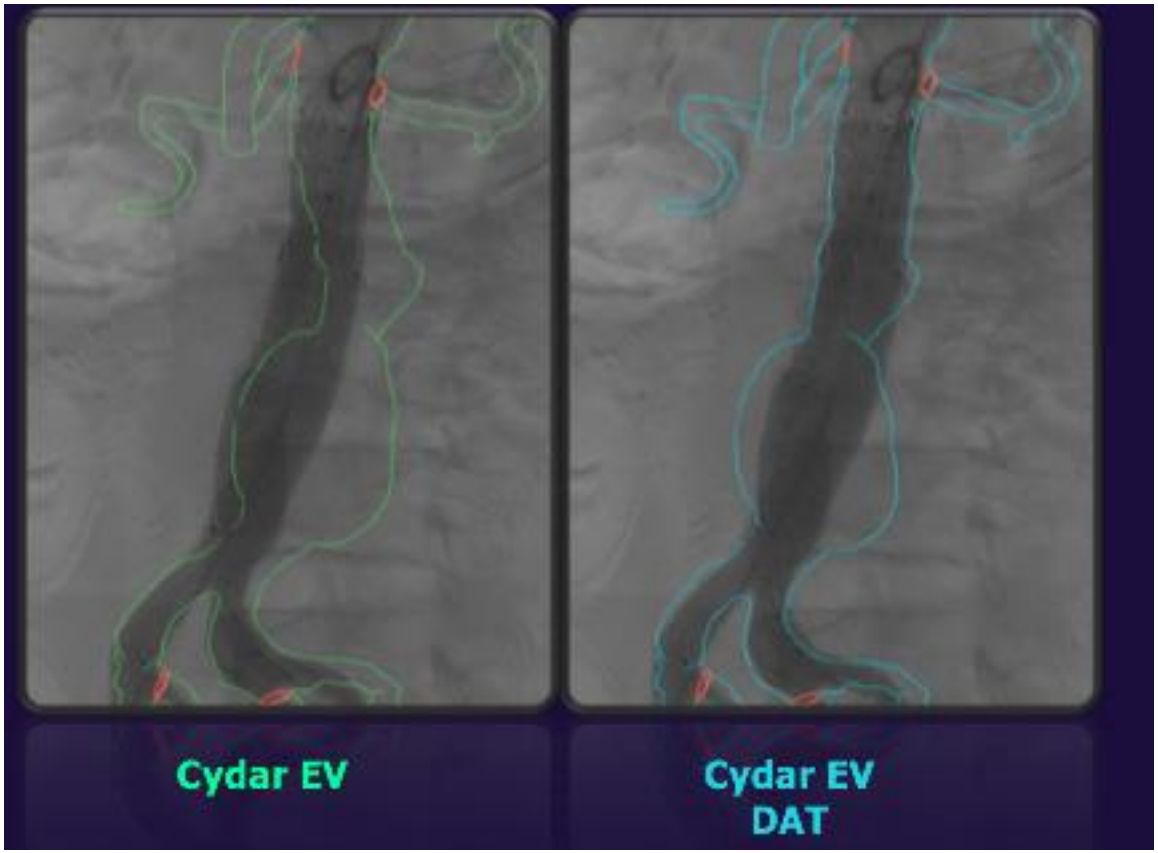
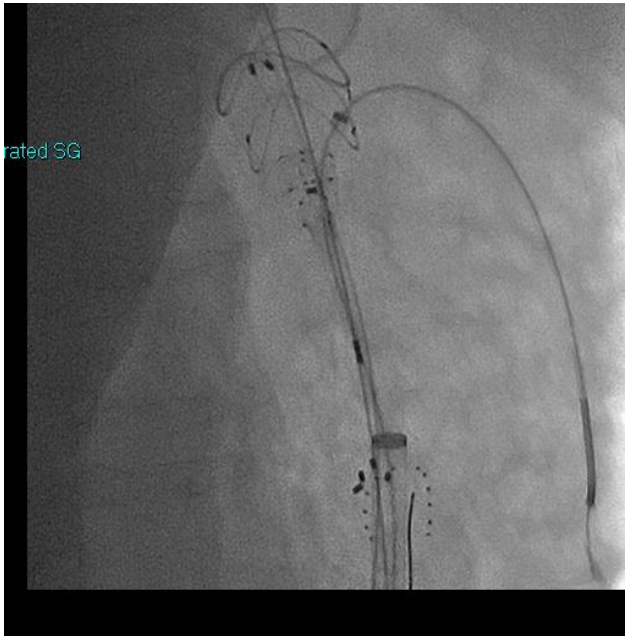


Posture change: Intervertebral movement

Mechanical v Cydar

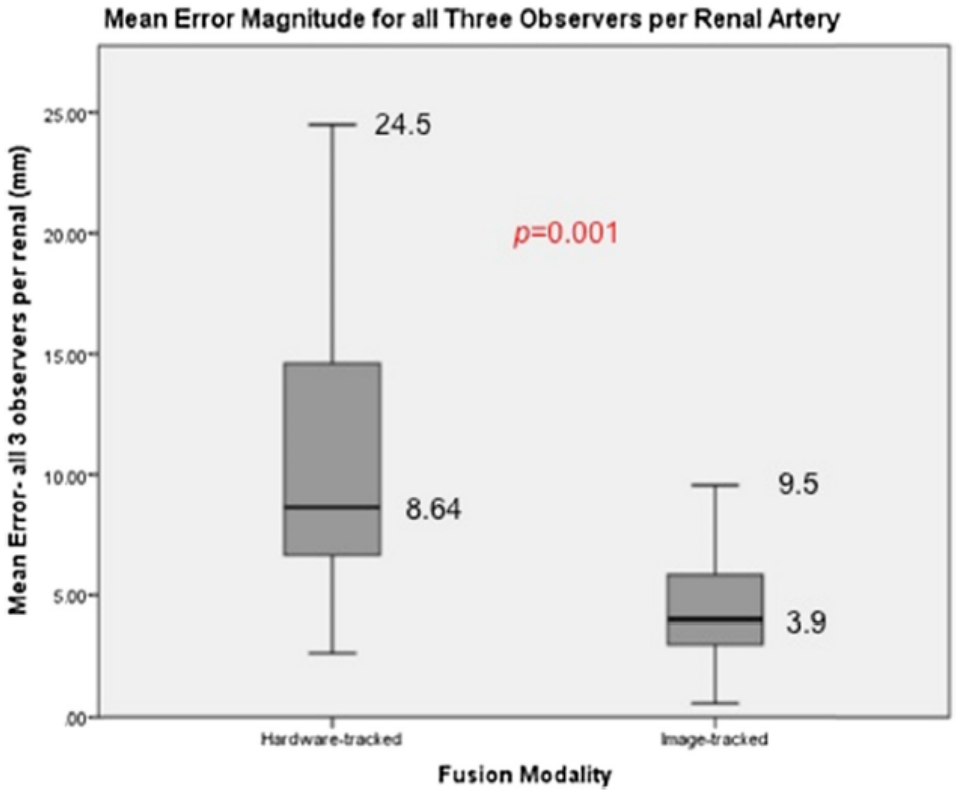


Eur J Vasc Endovasc Surg (2016) ■, 1–9

A Comparison of Accuracy of Image- versus Hardware-based Tracking Technologies in 3D Fusion in Aortic Endografting

A.E. Rolls [a,b], B. Maurel [a], M. Davis [a], J. Constantinou [a], G. Hamilton [a], T.M. Mastracci [a,b,*]

[a] Aortic Team, Department of Vascular Surgery, Royal Free London Foundation Trust, Pond Street, London, UK
[b] University College London, London, UK



	Pro	Cons
Mechanical Fusion • **AP + Lateral registration** • **Manual correction for position**	Standard Package (Free)	Registration errors Manual Re-registration Technician training No correction for Deformation -
Artificial Intelligence (Cydar) • **No Registration step** • **Automatic corrections for posture** • **Manual correction for position** • **Correction for Deformation**	Automatic image registration Ease of use Machine Learning Developed for EVAR Vessel Deformation function	Cost Lateral imaging not possible Delay for registration Additional equipment installation

Pesapane et al. European Radiology Experimental (2018) 2:35
https://doi.org/10.1186/s41747-018-0061-6

European Radiology Experimental

NARRATIVE REVIEW Open Access

Artificial intelligence in medical imaging: threat or opportunity? Radiologists again at the forefront of innovation in medicine

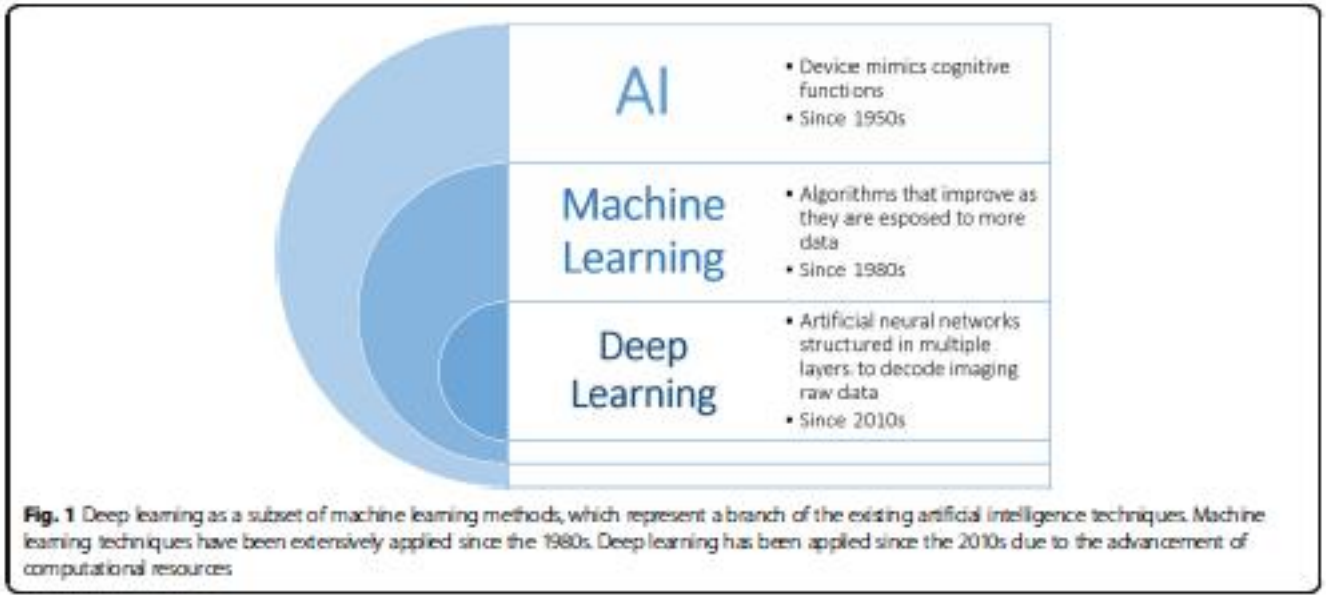
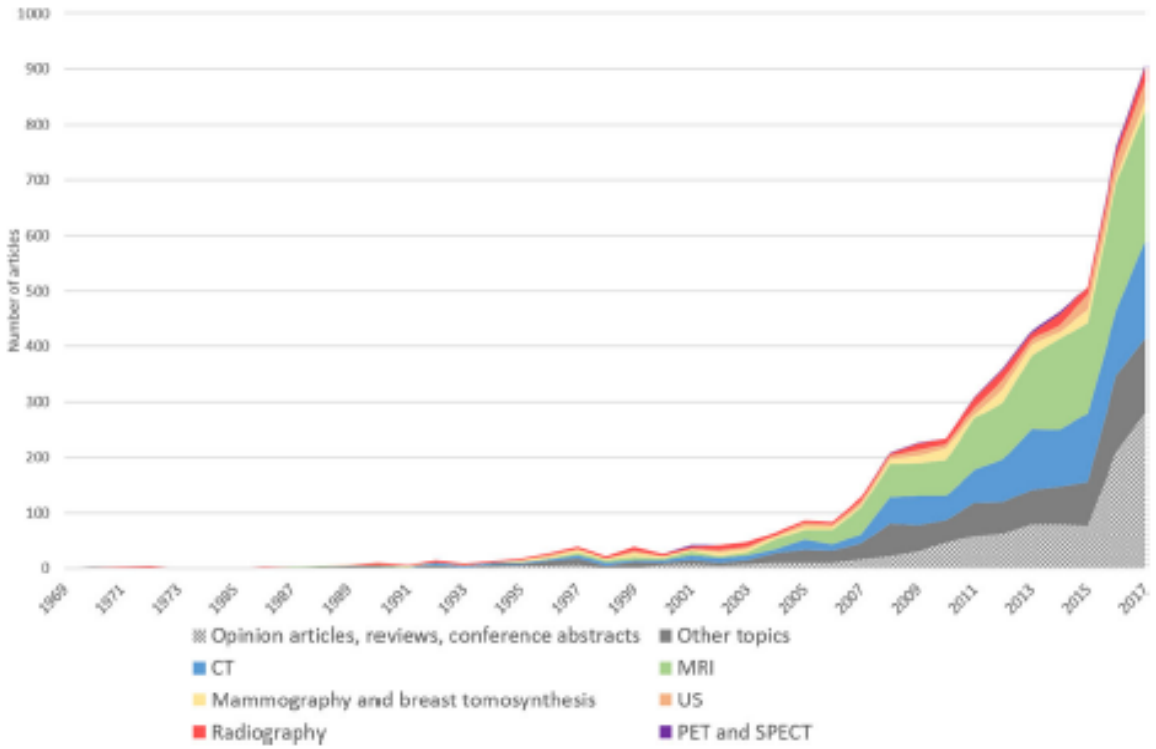


Fig. 1 Deep learning as a subset of machine learning methods, which represent a branch of the existing artificial intelligence techniques. Machine learning techniques have been extensively applied since the 1980s. Deep learning has been applied since the 2010s due to the advancement of computational resources

Artificial intelligence in medical imaging: threat or opportunity? Radiologists again at the forefront of innovation in medicine

Filippo Pesapane[1†], Marina Codari[2*†] and Francesco Sardanelli[2,3]

Eur Radiol Exp. 2018 Dec; 2: 35



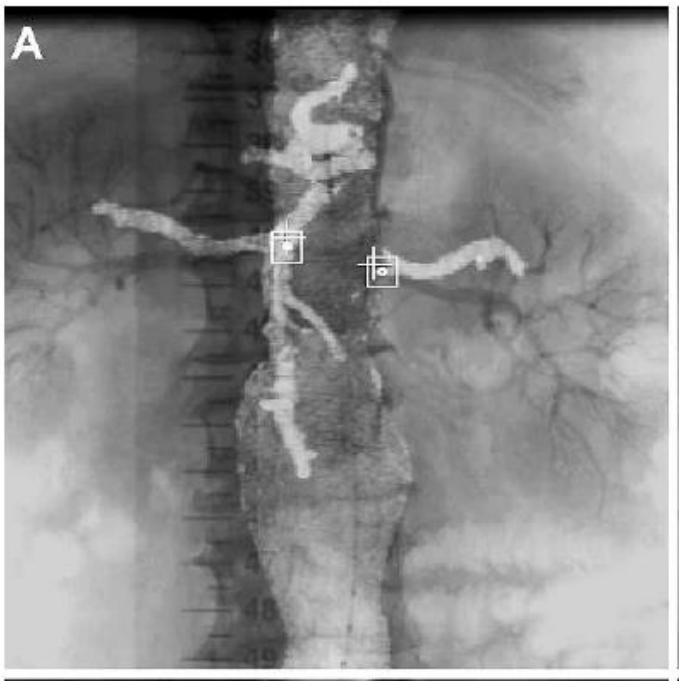
EMBASE publications using the search query (‘artificial intelligence’/exp. OR ‘artificial intelligence’ OR ‘machine learning’/exp. OR ‘machine learning’ OR ‘deep learning’/exp. OR ‘deep learning’) AND (‘radiology’/exp. OR ‘radiology’

J ENDOVASC THER
2010;17:527–533

◆ CLINICAL INVESTIGATION ◆

Feasibility and Limitations of an Automated 2D-3D Rigid Image Registration System for Complex Endovascular Aortic Procedures

Tom W. G. Carrell, MA, MChir, FRCS[1–3]; Bijan Modarai, PhD, FRCS[1–3]; James R. I. Brown, MSc, FRCS[1,4]; and Graeme P. Penney, PhD[1,3]



- Retrospective application of image based Fusion.
- 100 % accurate in AP following image registration
- Accuracy diminished
  - Lateral imaging
  - aortic angulation
  - Deformation by stiff endovascular tools

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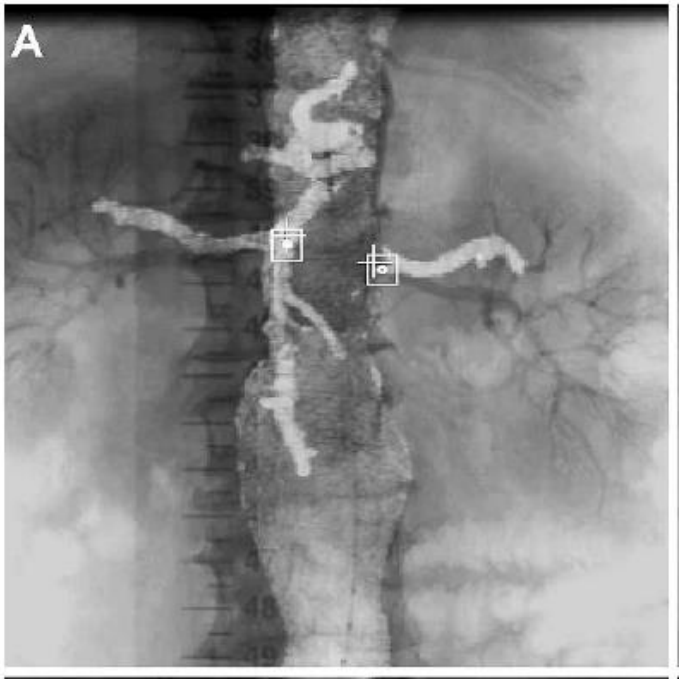

- Lateral imaging
  - 60 degree oblique
  - 30 degree CC tilt
- Aortic angulation
- Deformation by stiff endovascular Instruments
  - Vessel deformation tool

Conclusion

- Artificial intelligence is here to stay.
- We are still learning how this tool will help us in Endovascular Surgery
- Cydar is a promising new Tool.
  - Lateral Imaging ?
  - Thoracic applications??
  - Increased automation??
- Cost is a major issue in the short term

Thank You