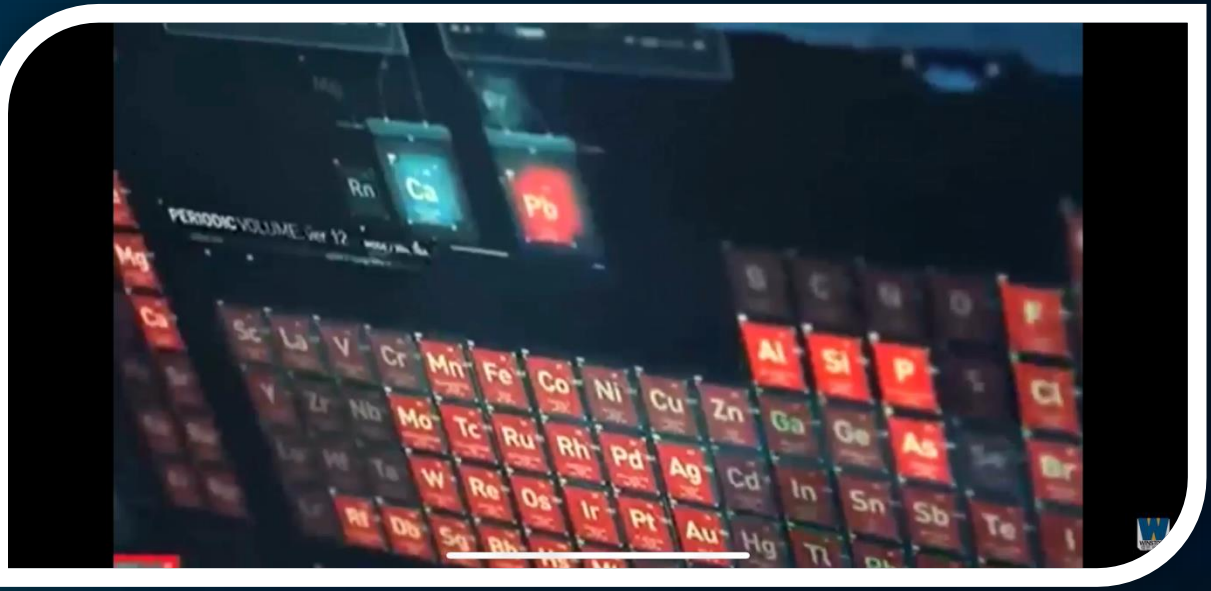
李旭東 醫師

- 臺中榮總 神經外科 主治醫師
- **臺中榮總「第一人體研究倫理審查委員會」主任委員**
- 國防醫學院醫學系 副教授
- **臺中榮總 癌症中心主任**
- 美國約翰霍普金斯大學醫院藍茲功能性神經實驗室研究員
- **美國約翰霍普金斯大學醫院神經外科 主治醫師/研究員**


AR in Neurosurgery
擴增實境影像導引在手術中應用
AUGMENTED REALITY
MACHINE
EARNING,
A SCIENCE
STRIAL
RNET
HINGS
BLOCKCHAIN
臺中榮民總醫院
Taichung Veterans General Hospital
SURGLASSES
Taiwan Main Orthopaedic Biotechnology Co., Ltd.
Upwork 2017
大甲李綜合醫療體系
總院長
台中榮總神經醫學中心
神經外科主治醫師
李旭東
mobidev


SERVICE &MAINTENANCE AUGMENTED REALITY

元宇宙



VR: 虛擬實境(virtual reality）

AR: 擴增實境（Augmented Reality)

MR: 混合實境（Mixed reality）

XR: 延展實境（Extended reality）

擴增實境（Augmented Reality，簡稱AR）

是指透過攝影機影像的位置及角度精算並加上圖像分析技術，
讓螢幕上的虛擬世界能夠與現實世界
場景進行結合與互動的技術。
這種技術於1990年提出。
隨著隨身電子產品運算能力的提升，
擴增實境的用途也越來越廣。

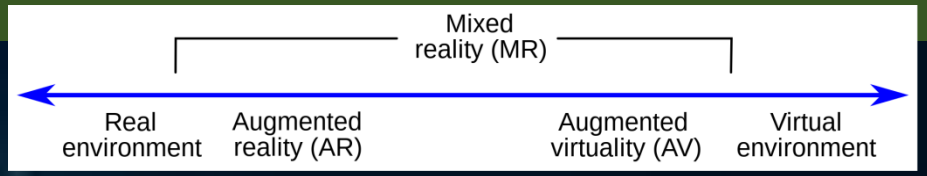
維基百科

AR

最早被前波音公司研究員
Tom Caudell在1990年所使用

一是北卡大學教授羅納德·阿祖瑪（Ronald Azuma）
於1997年提出
增實境包括三個方面的內容:
- 將虛擬物與現實結合
- 即時互動
- 三維標記

另一種定義是1994年保羅·米爾格拉姆（Paul Milgram）和岸野文郎（Fumio Kishino）提出的現實-虛擬連續統（Milgram's reality-virtuality continuum）
將真實環境和虛擬環境分別作為連續系統的兩端，位於它們中間的被稱為「混合實境」。其中靠近真實環境的是擴增實境（augmented reality），靠近虛擬環境的則是擴增虛境（英語：Augmented virtuality）



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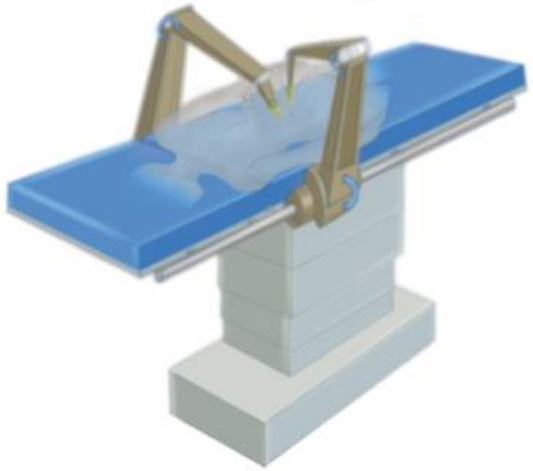
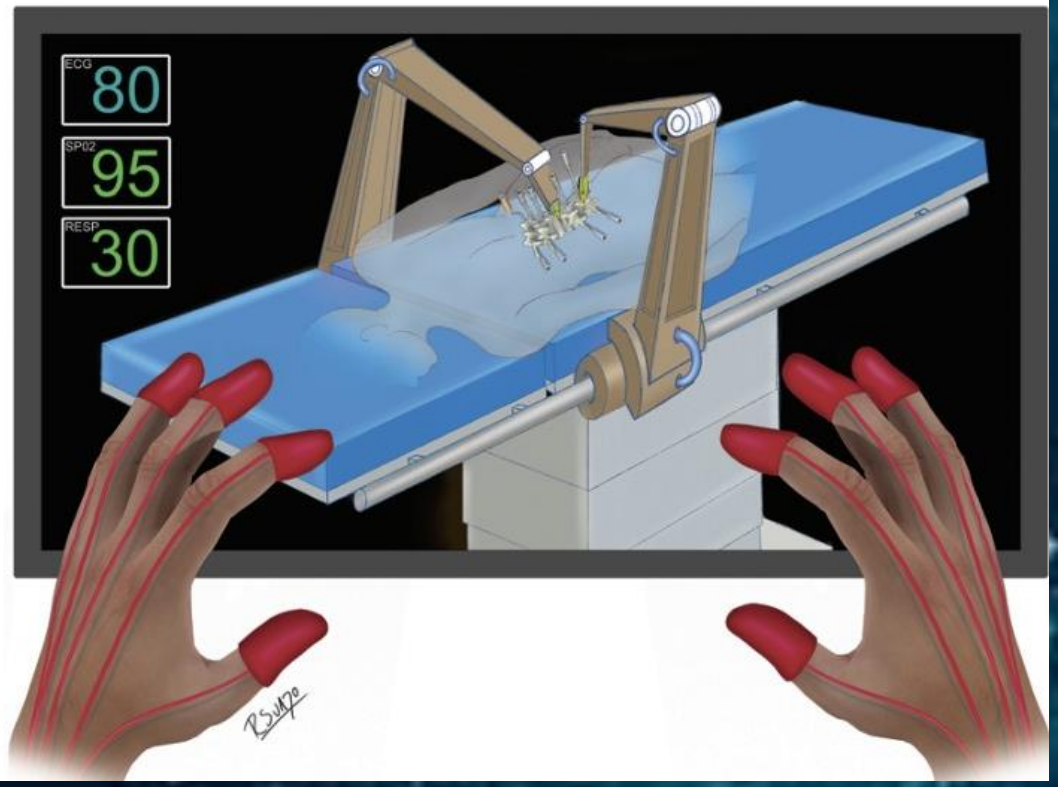




NEUROSURGICAL FOCUS

Neurosurg Focus 42 (5):E3, 2017

Augmented-reality integrated robotics in neurosurgery: are we there yet?

Karthik Madhavan, MD, John Paul G. Kolcun, BS, Lee Onn Chieng, BS, and Michael Y. Wang, MD

Department of Neurological Surgery, University of Miami Miller School of Medicine, Miami, Florida

World Neurosurgery
Volume 161, May 2022, Pages 459-464

Neurosurgical Study Design: Past and Future - Special Section

Virtual and Augmented Reality in Neurosurgery: The Evolution of its Application and Study Designs

Walter C. Jean [1, 2]

[1] Division of Neurological Surgery, Lehigh Valley Health Network, Allentown, Pennsylvania, USA

[2] Department of Neurosurgery and Brain Repair, University of South Florida Morsani College of Medicine, Tampa, Florida, USA

As the art of neurosurgery evolves in the 21st century, more emphasis is placed on minimally invasive techniques, which require technical precision.

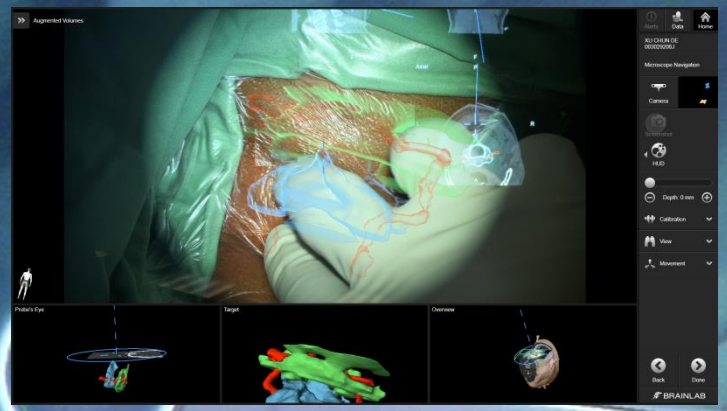
Teachers of neurosurgery faces "double jeopardy"--with harder skills to teach and less time to teach them.

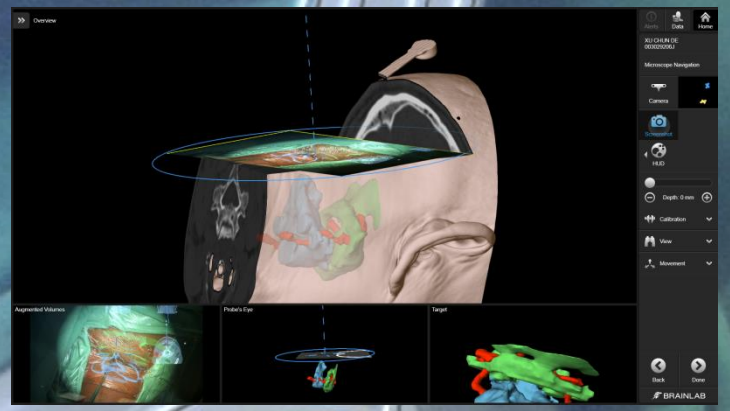
Mixed reality appears as the neurosurgical educators' natural ally:
Virtual reality facilitates the learning of spatial relationships and permits rehearsal of skills, while augmented reality can make procedures safer and more efficient.

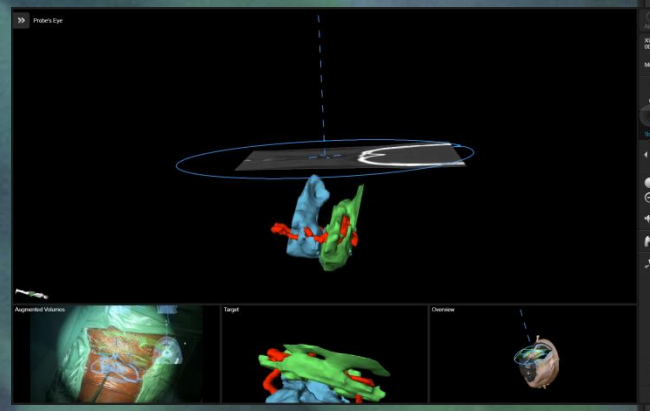
futurism.com

Surgeons Use VR Headsets to Separate Conjoined Twins

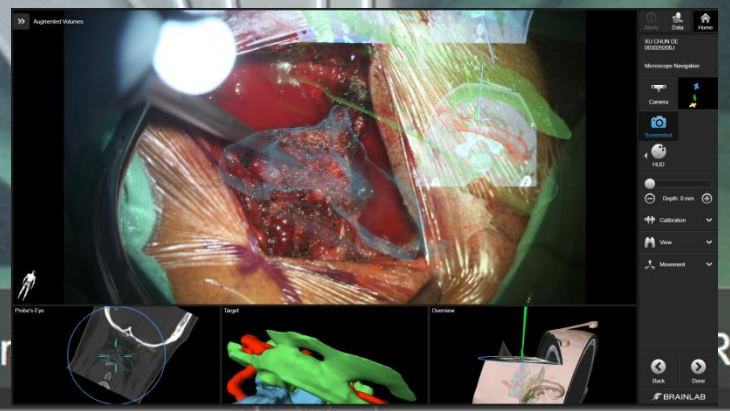
C1-2 Surgery

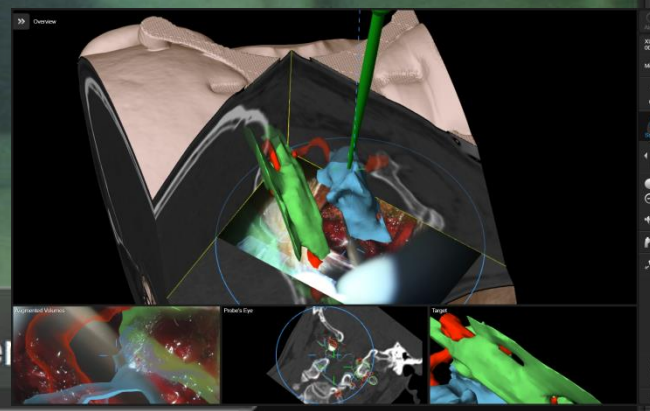

Augmented Volumes
Probe's Eye
Target
Overview
BRAINLAB


Overview
Augmented Volumes
Probe's Eye
Target
BRAINLAB


Probe's Eye
Augmented Volumes
Target
Overview
BRAINLAB


Patient Reference Array not visible
BRAINLAB


Augmented Volumes
Probe's Eye
Target
Overview
BRAINLAB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Augmented Volumes
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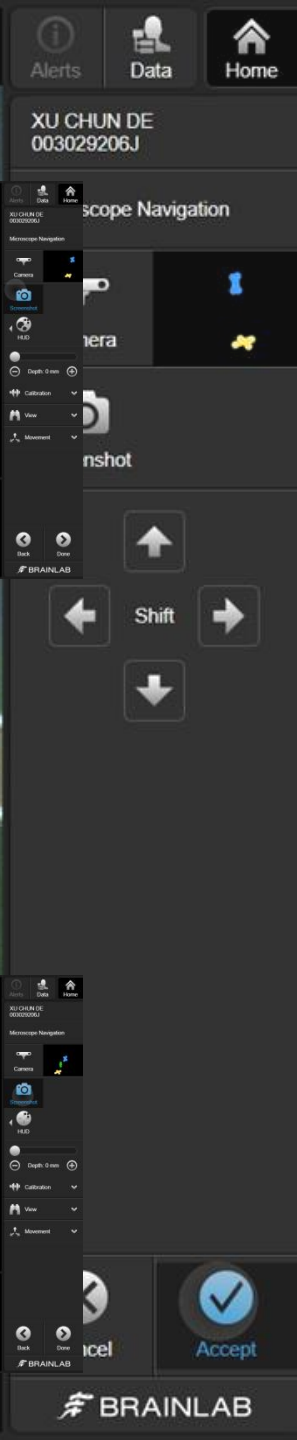
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Accept
BRAINLAB

Alerts | Data | Home

XU CHUN DE
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Microscope Navigation

Camera

Screenshot

HUD

Depth: 0 mm

Calibration

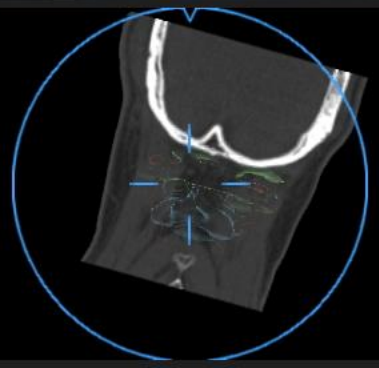
View

Movement

Back | Done

BRAINLAB

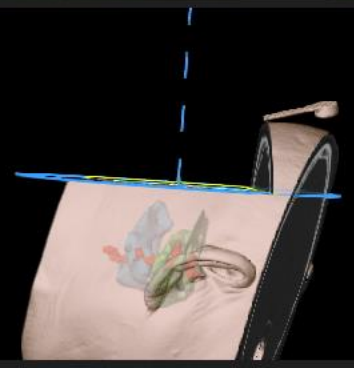
Probe's Eye

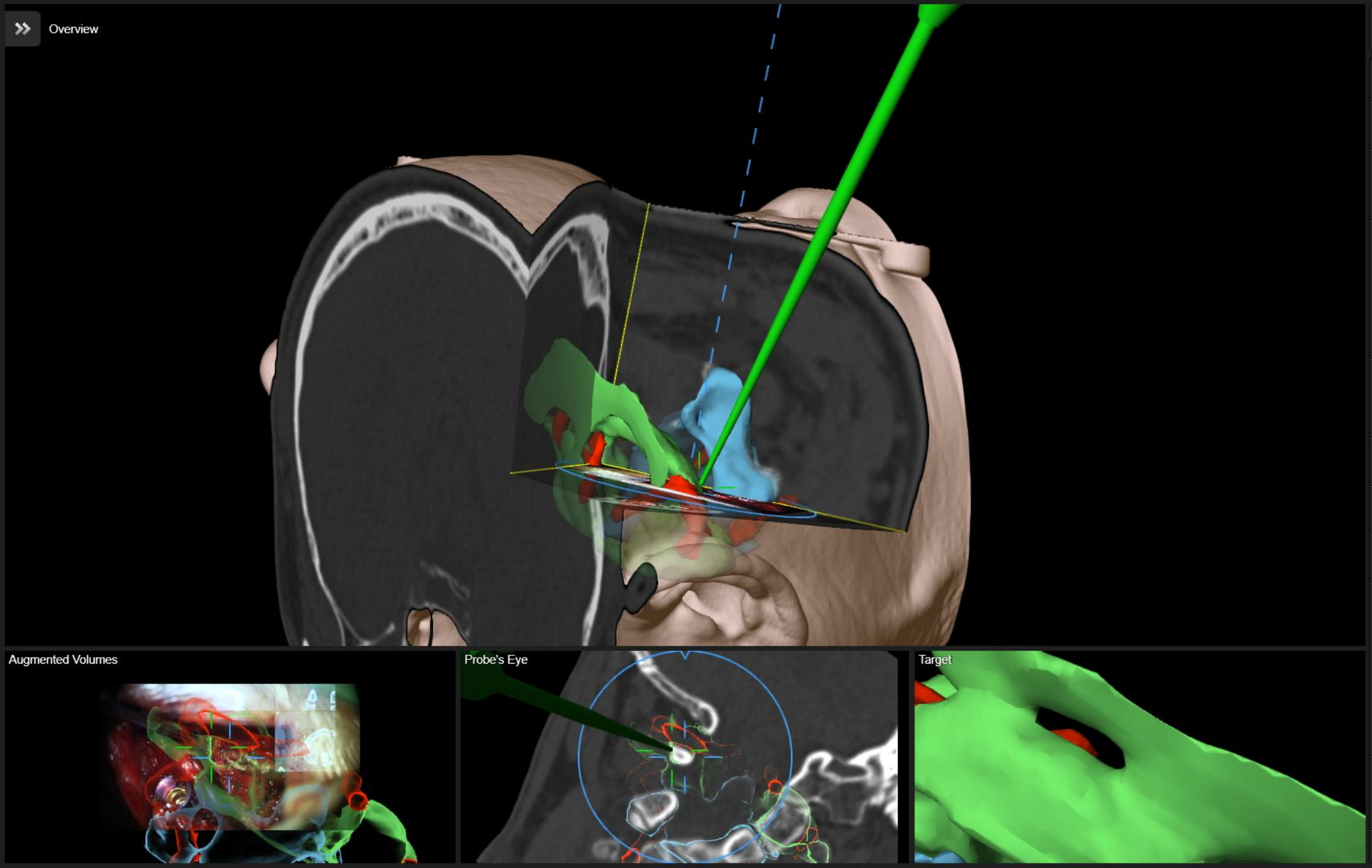


Target

Patient Reference Array not visible

Overview





Alerts
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Home

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Microscope Navigation

Camera

Screenshot

HUD

Depth: 0 mm

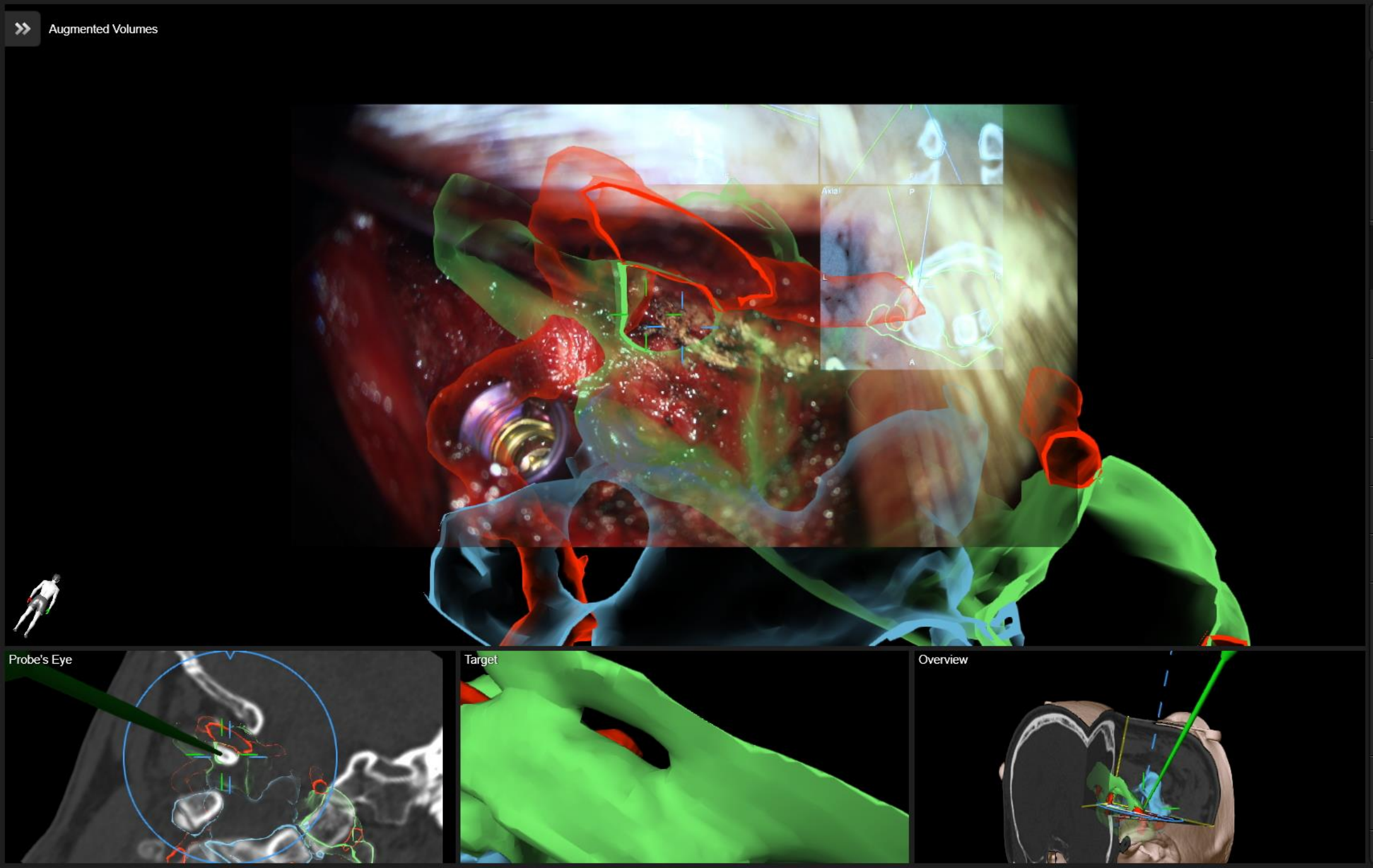
Calibration

View

Movement

Back
Done

BRAINLAB


Augmented Volumes
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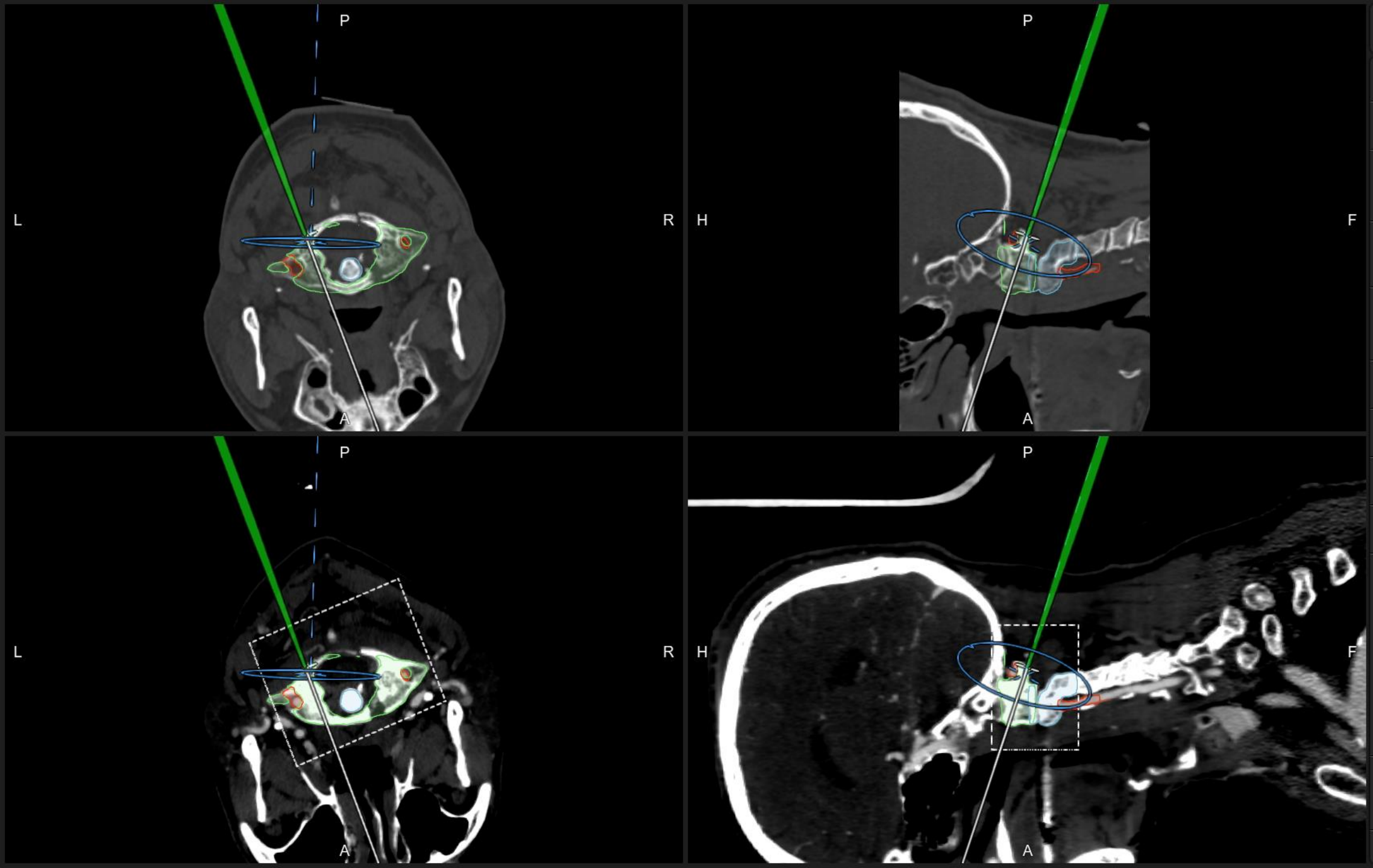
Depth: 0 mm
Calibration
View
Movement
Probe's Eye
Target
Overview
Back
Done
BRAINLAB



Alerts | Data | Home

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Spine & Trauma 3D Navigation

Camera

Screenshot

Zoom: 112 %

View

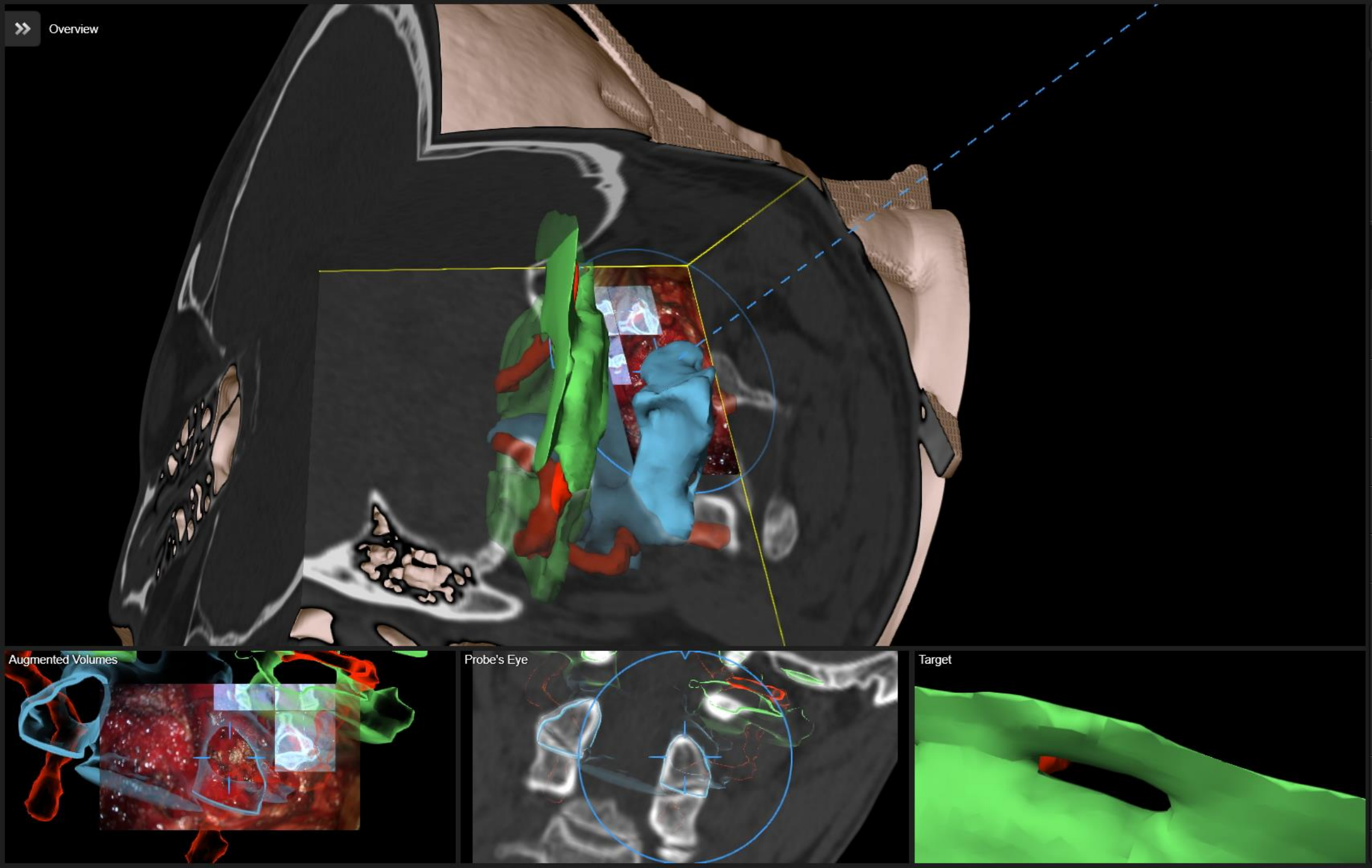
Orientation

Ruler

Screw Planning

Back | Done

BRAINLAB



Alerts
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Microscope Navigation

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HUD

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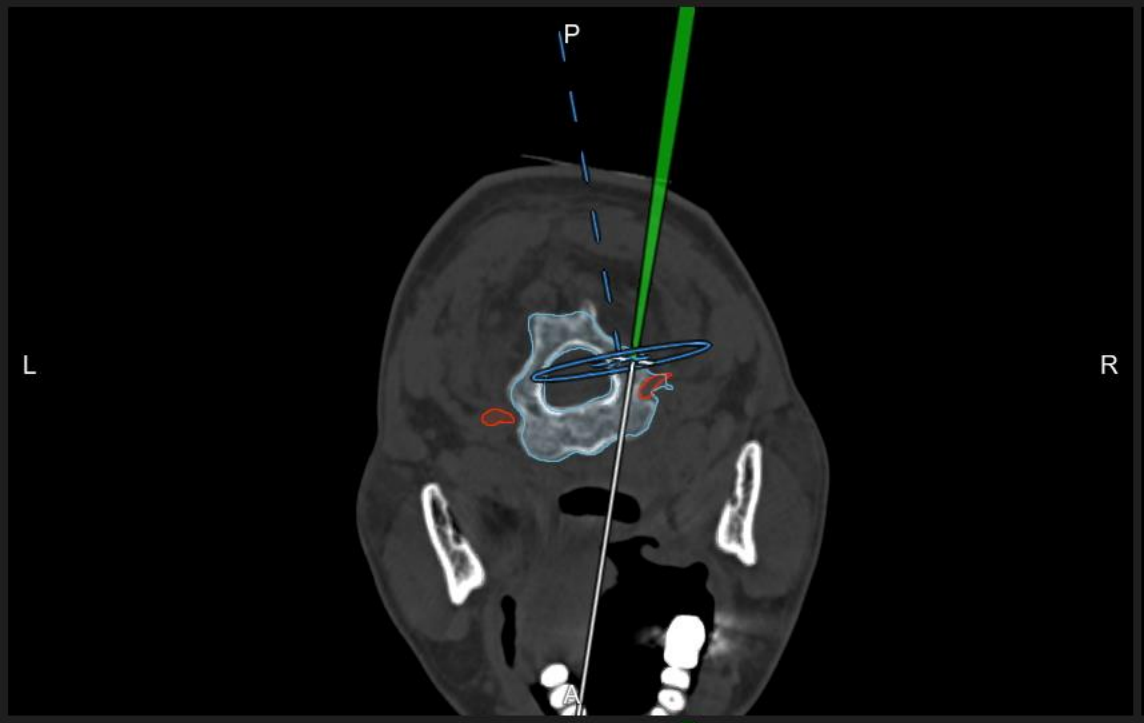
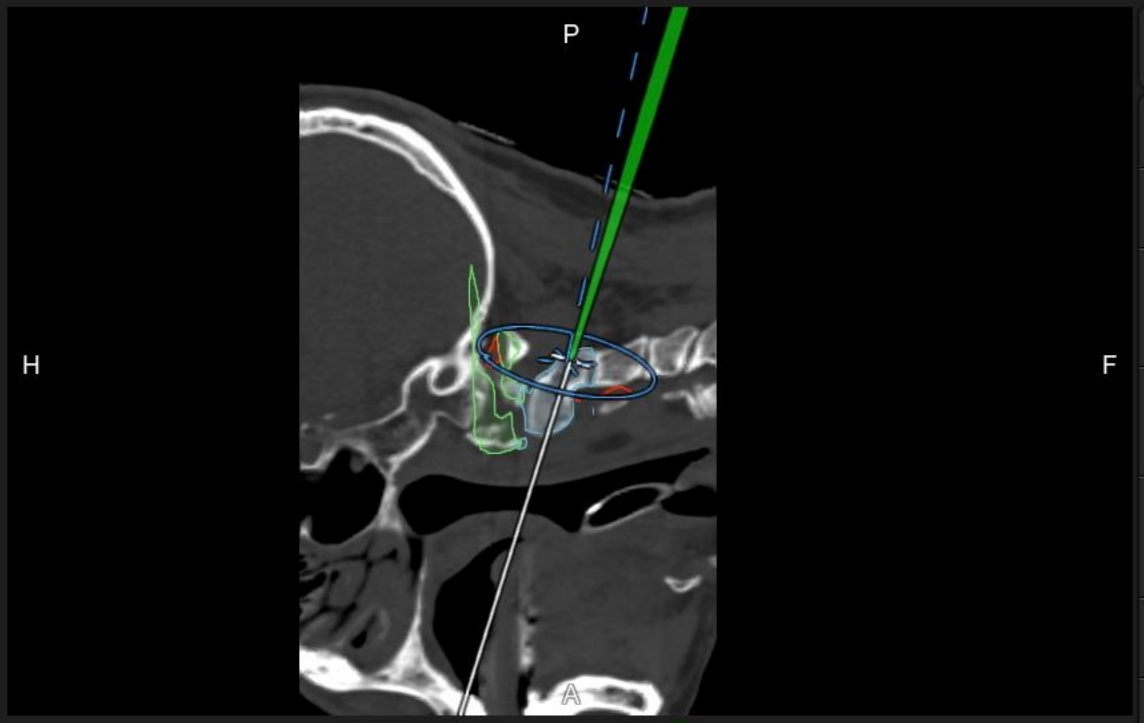
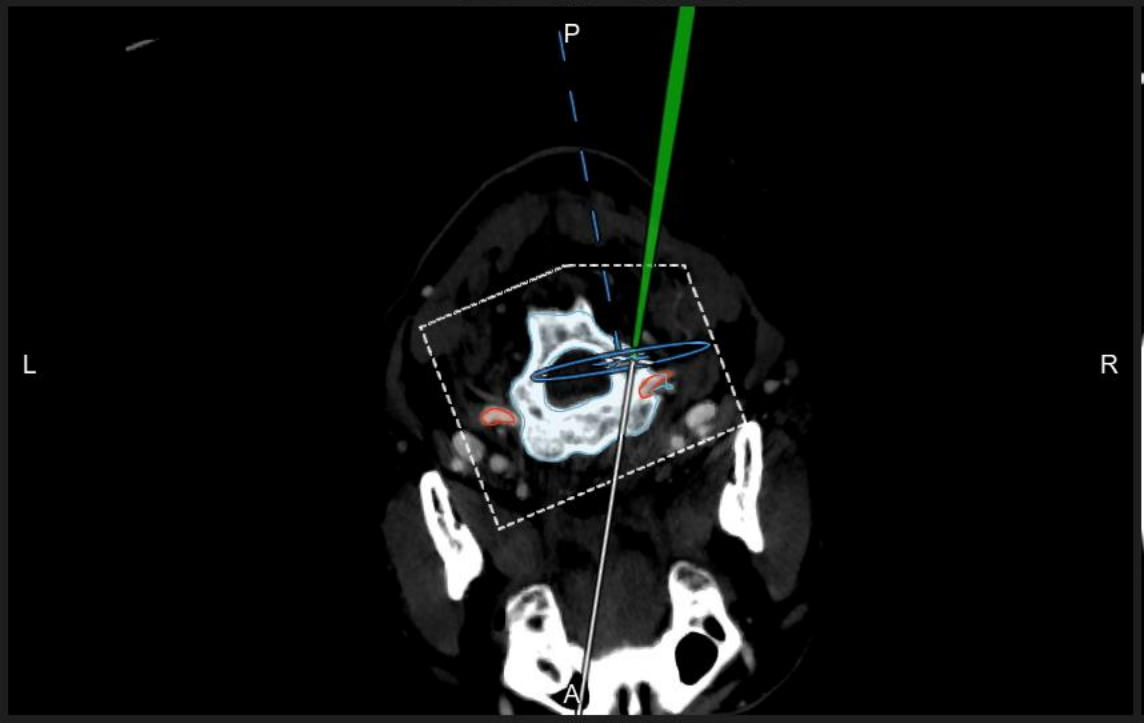
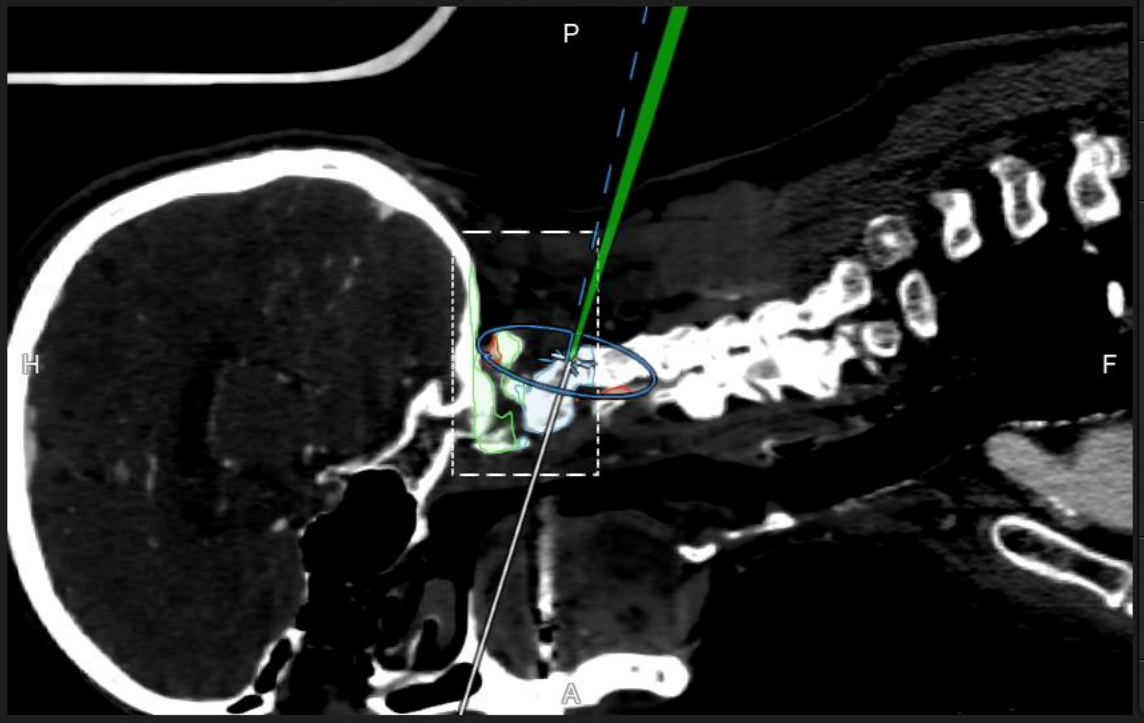
BRAINLAB









Alerts
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Spine & Trauma 3D Navigation

Camera

Screenshot

Zoom: 112 %

View

Orientation

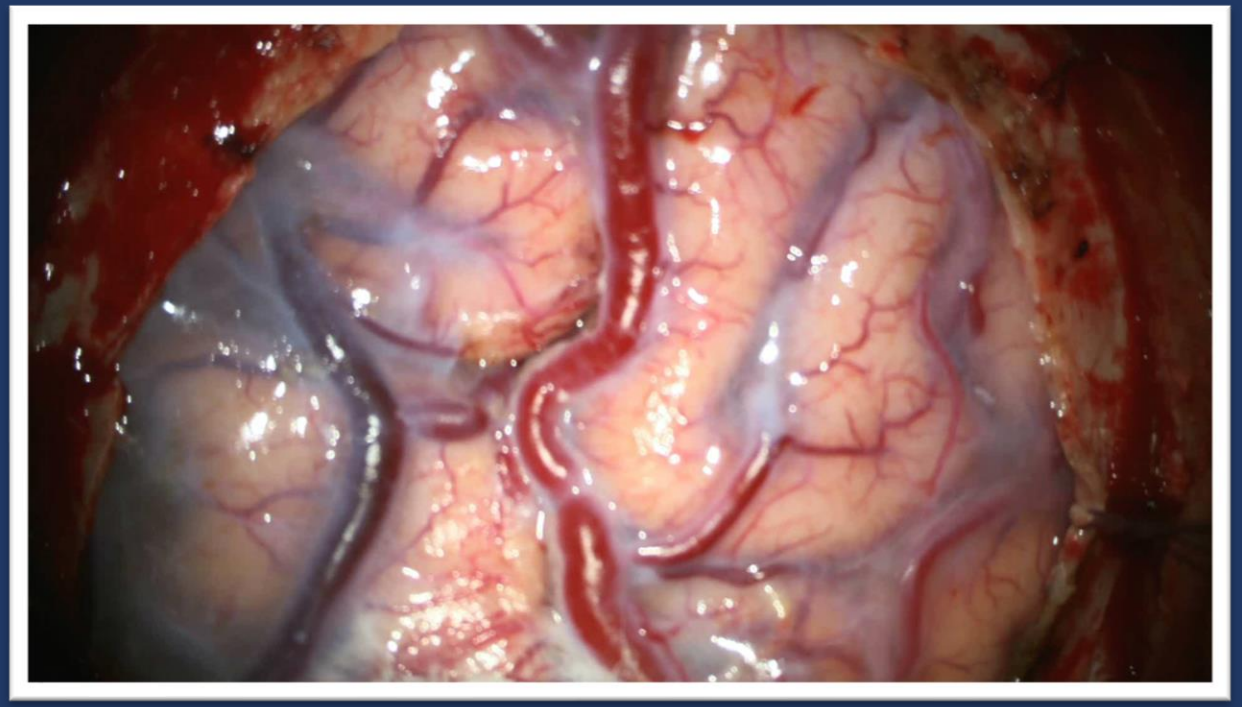
Ruler

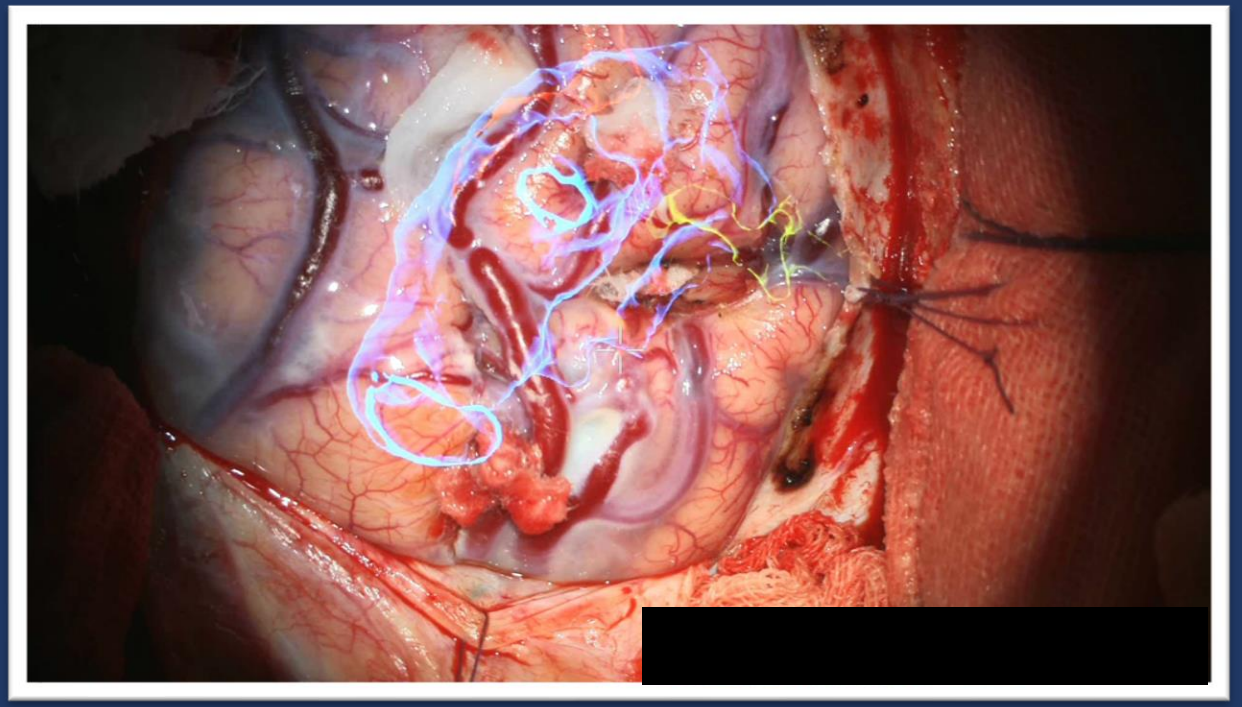
Screw Planning

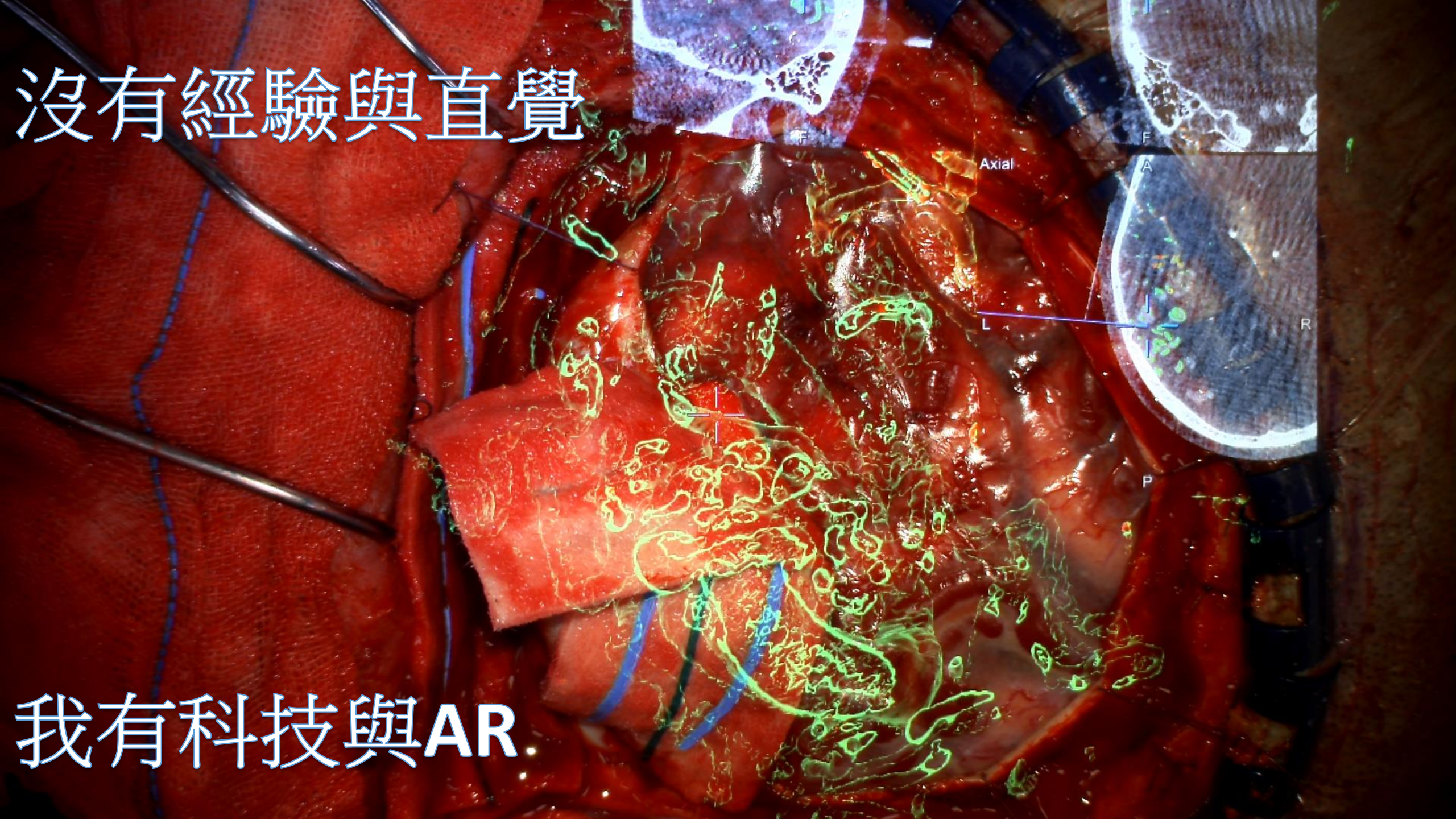
Back
Done

BRAINLAB

AVM






沒有經驗與直覺
Axial
我有科技與AR


Healthineers
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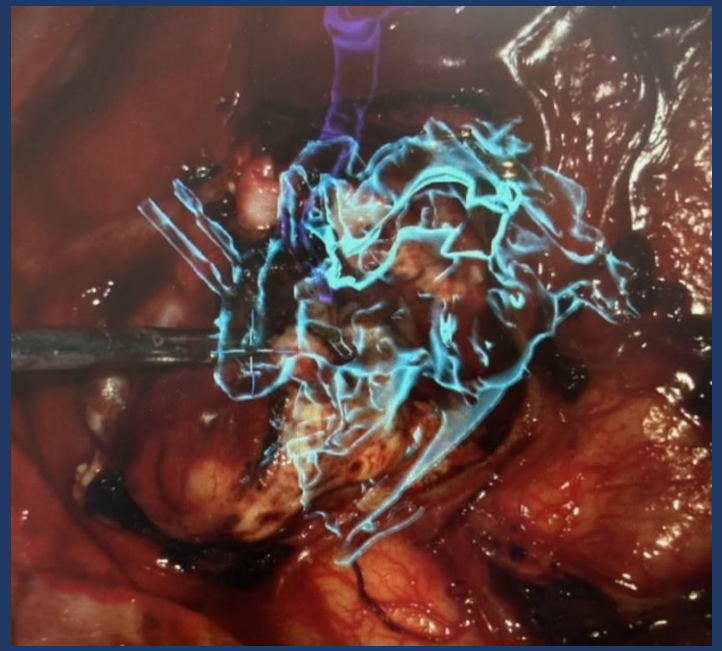

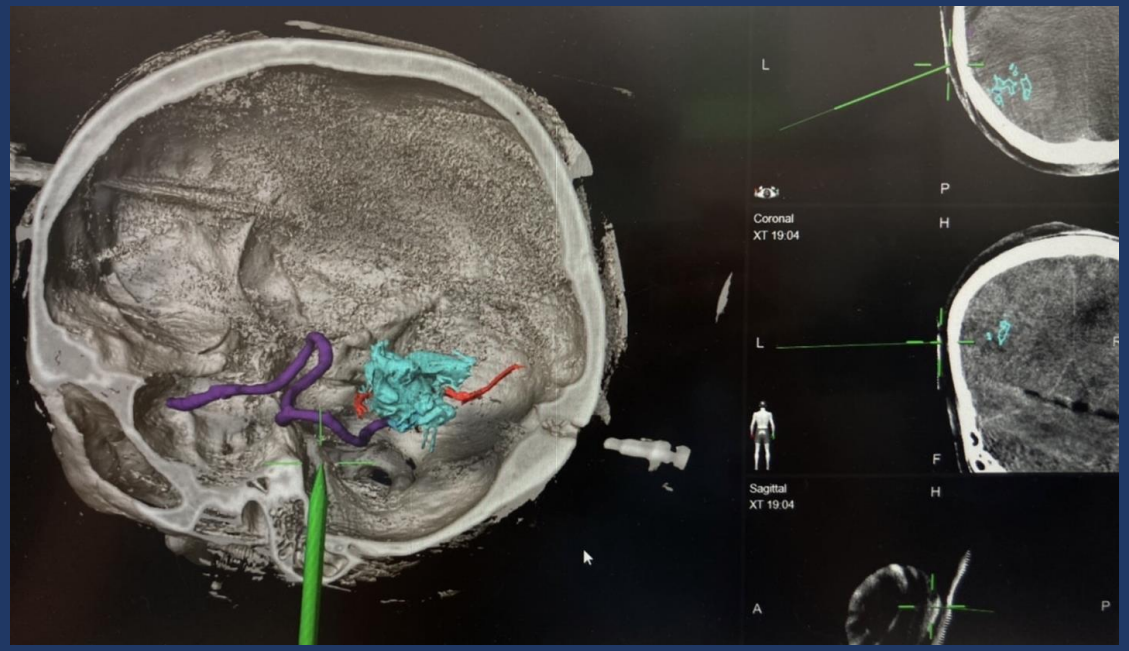
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Facilities and Team Members

BrainLab Navigation

Pt

Pheno

Microscope

Radiation Technologist

Nurses

Surgeon


Thank You

Q&A

- 腦傷病人包括腦中風(栓塞或出血)、外傷及缺氧，其中腦缺氧造成病人昏迷，似乎都與植物人劃上等號，但實際上卻不是，所以腦缺氧發生的狀況，什麼情況下是有機會恢復的?

- 大腦、小腦、腦幹梗塞或出血病變，其危險因素為何?預後是否有差異?

- 腦傷病人的恢復，除了緊急的住院必要處理，在幫助恢復的路程上，目前有高壓氧、針灸等方法，對腦部的復原不知效果如何，是否可以建議給病人參考?