

Virtual interactive presence in global neurosurgical education: international collaboration through augmented reality

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Disclosures

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Vietnam

Population: 92 million

10 neurosurgeons in South Vietnam who treat pediatric patients, with varying levels of subspecialty training

2 pediatric neurosurgical training programs – one in Ho Chi Minh City, the other in Hanoi





Trip details



Local neurosurgery team

2 week trip in January 2015

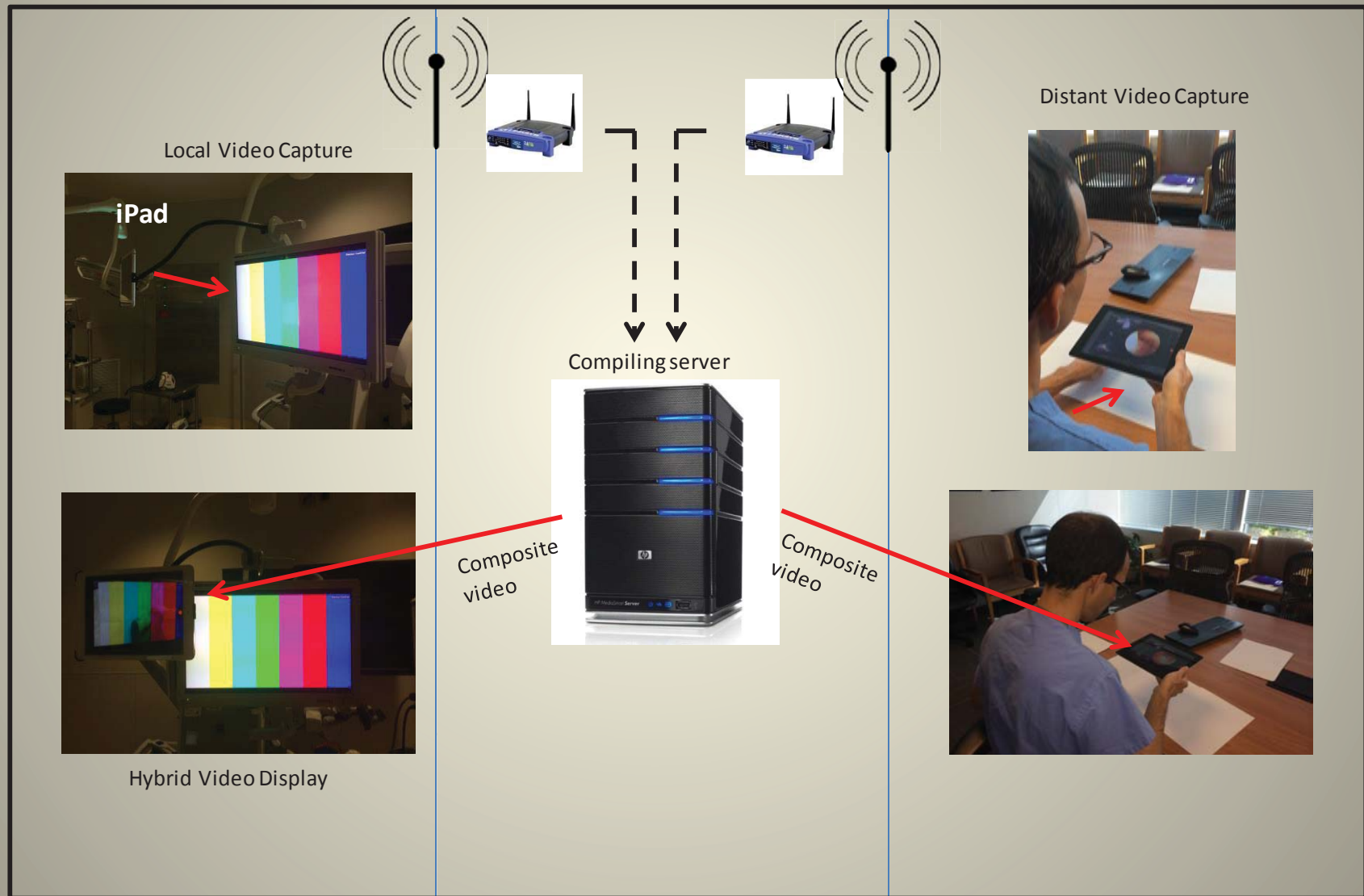
1 attending pediatric neurosurgeon, 1 pediatric neurosurgery fellow, 1 neurosurgery resident

Goals:

- 1) Teach and advise on case selection, management and surgical techniques, emphasizing craniosynostosis, ETV/CPC
- 2) Set up VIPAR system for international collaboration following return to Birmingham



Virtual Presence and Augmented Reality (VIPAR)







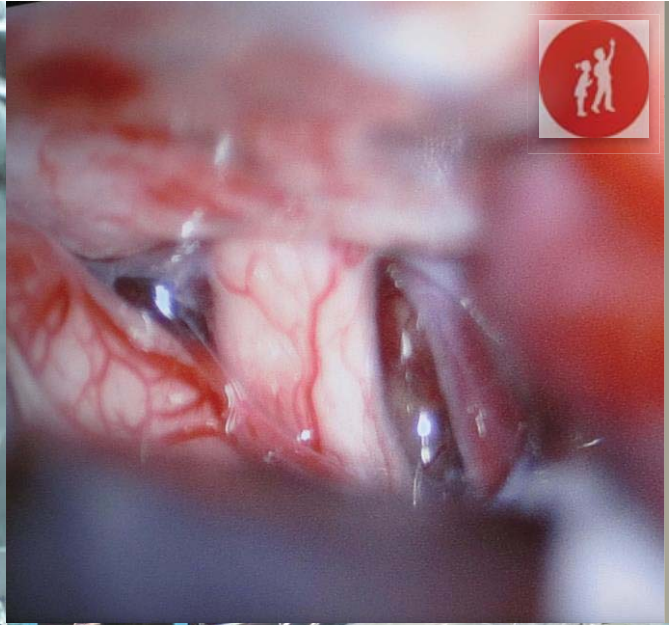
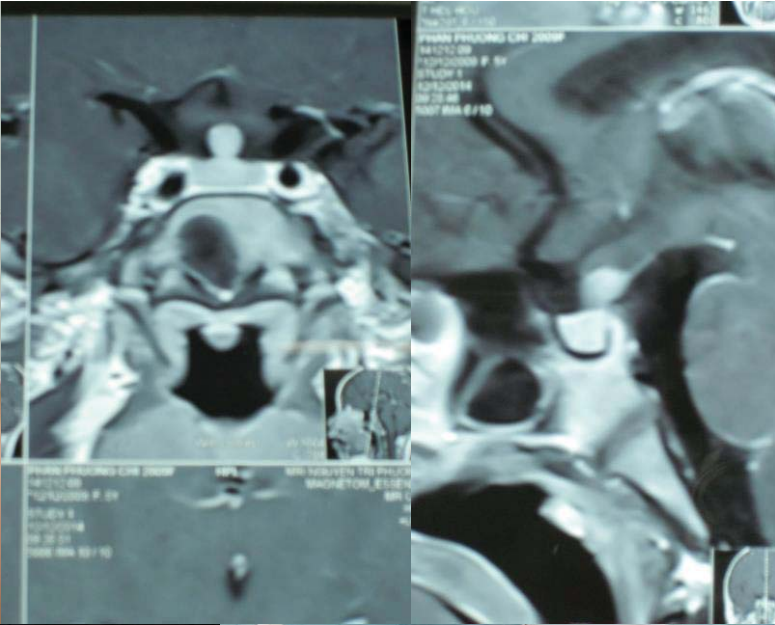


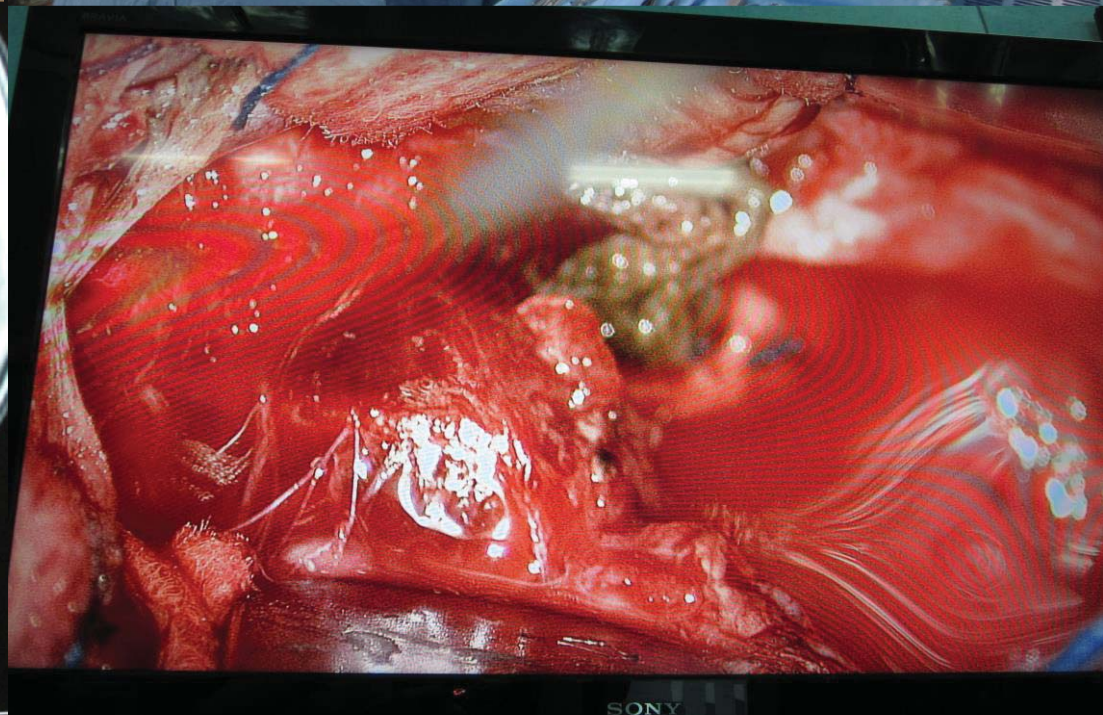
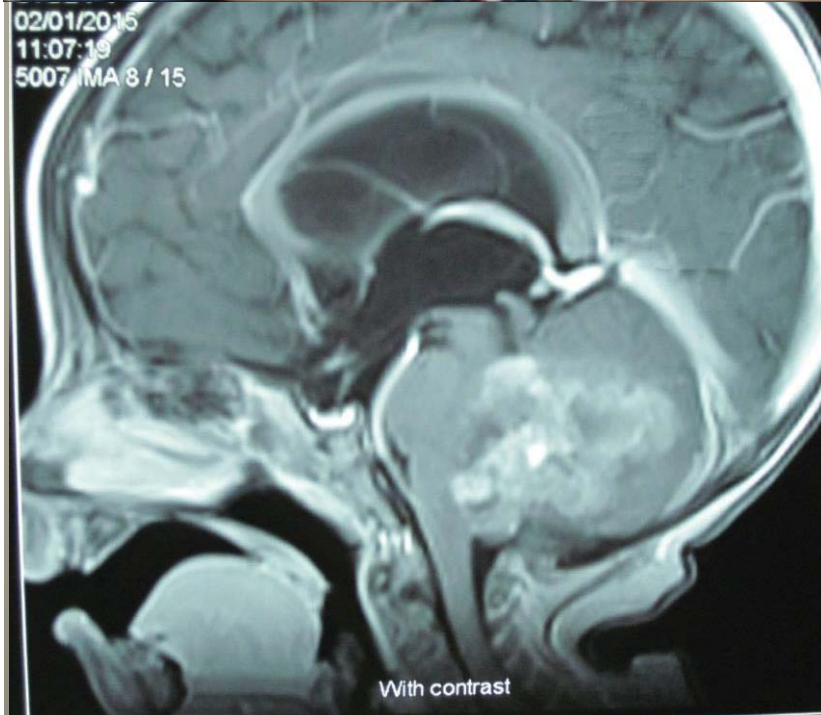
Clinic day

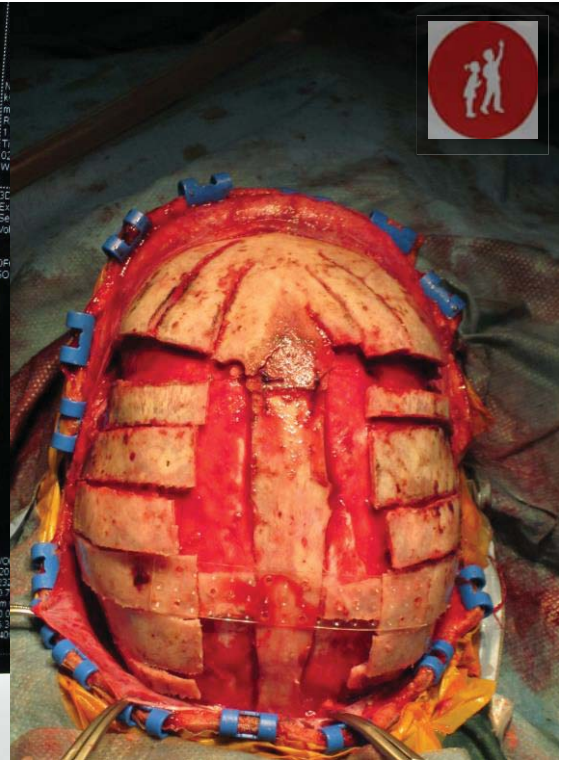
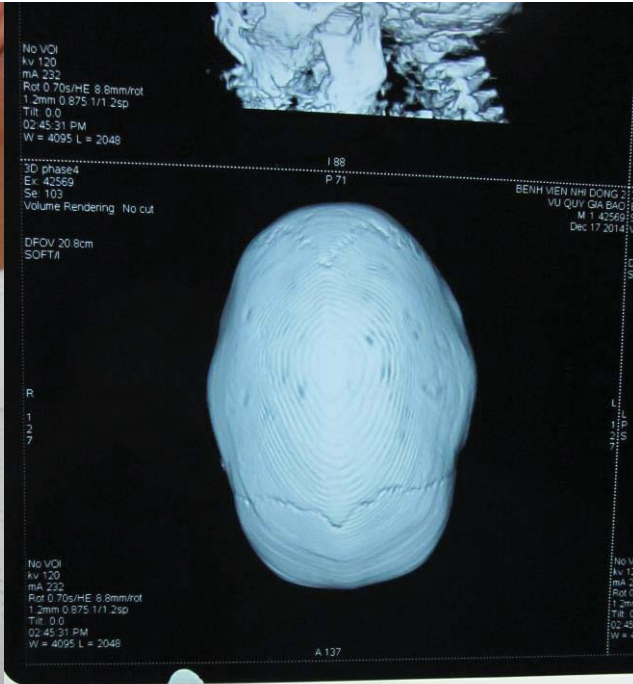


24 patients seen on first clinic day,
additional patients seen individually over
following week

12 operative cases selected

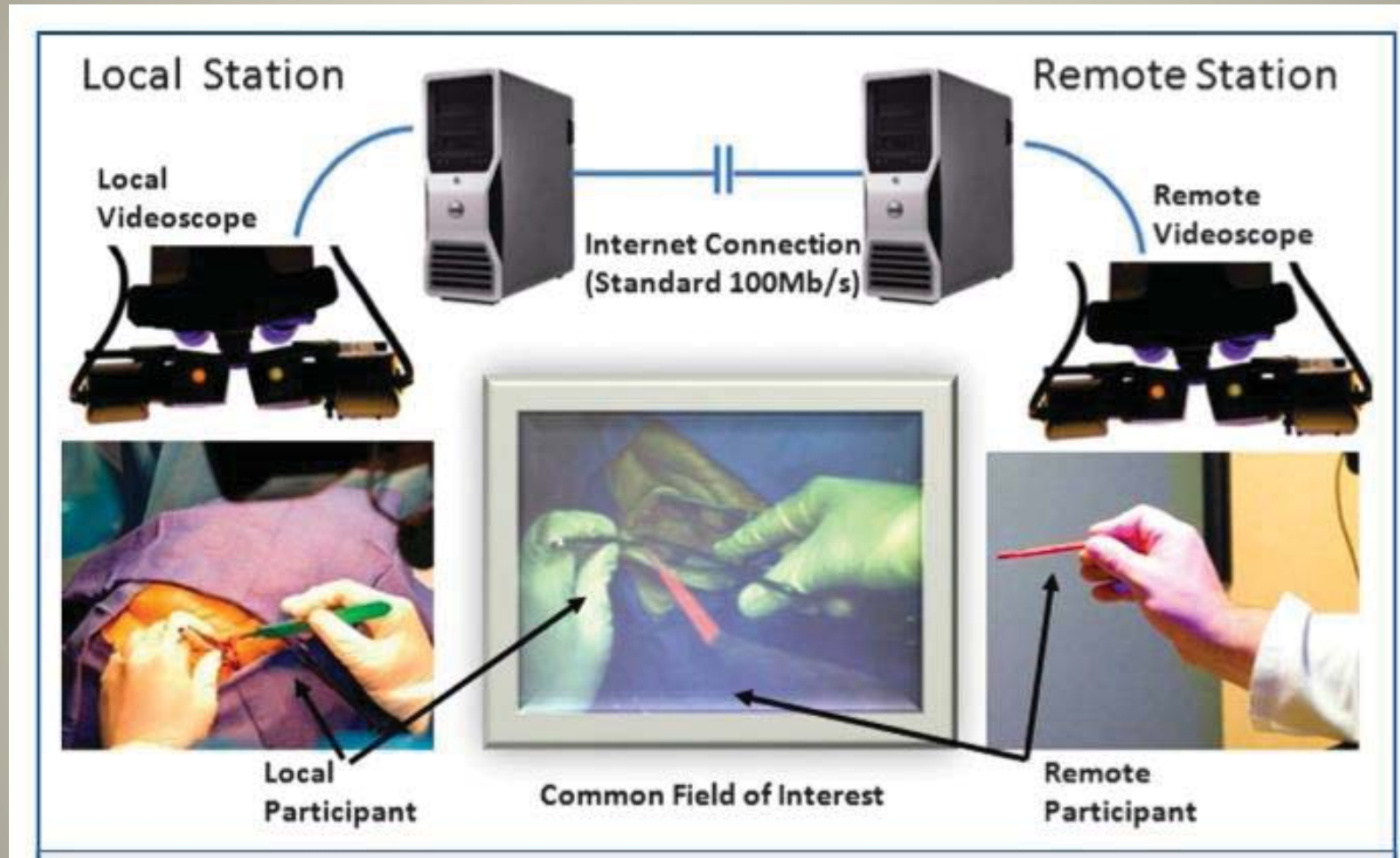






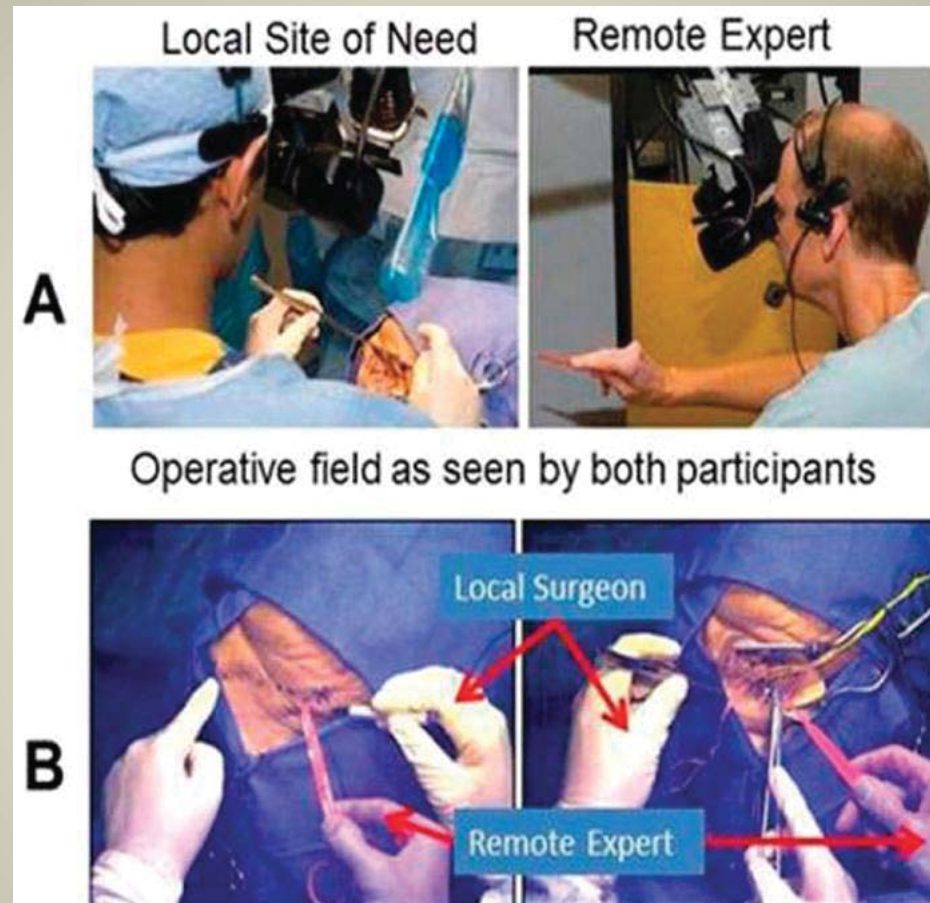


VIPAAR Interface – v1.0





VIPAAR Interface – v1.0

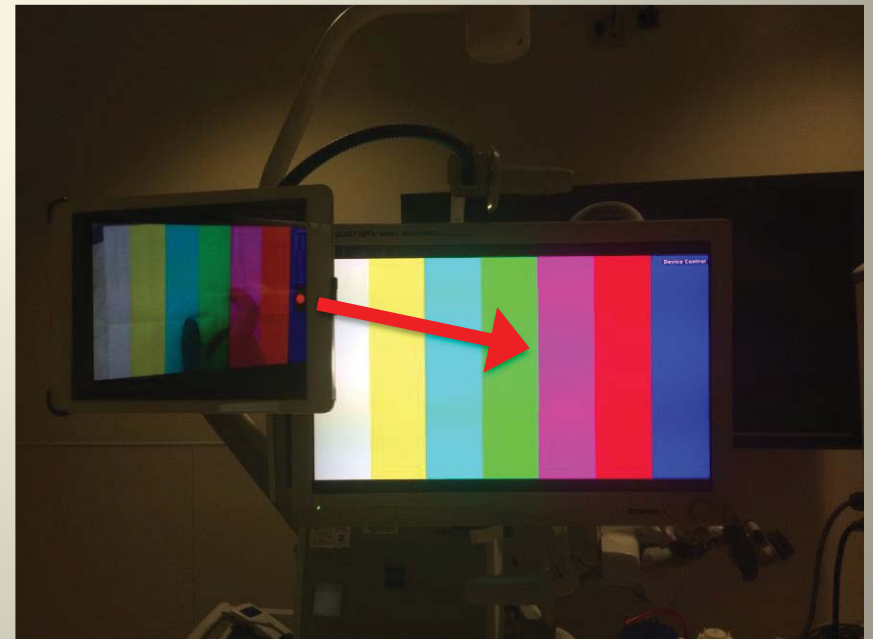
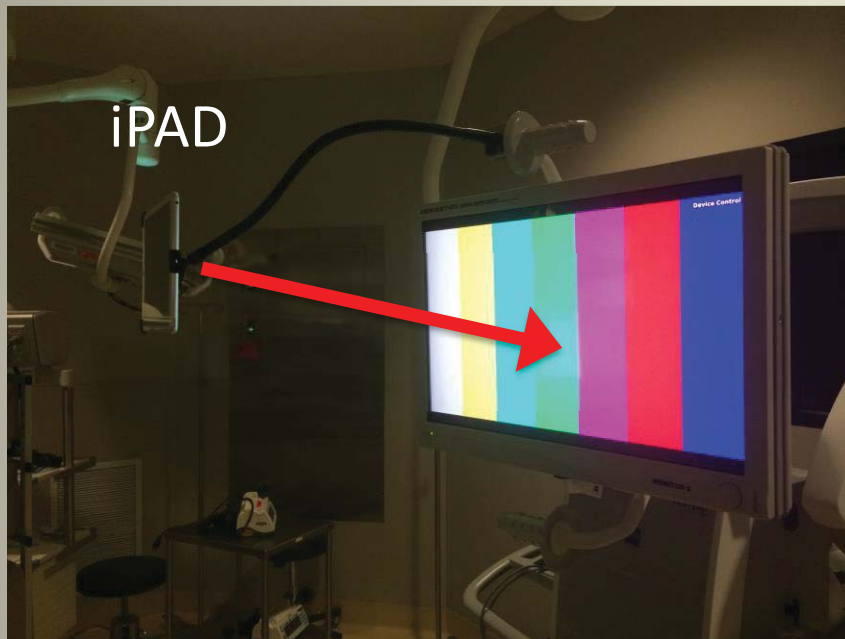


The local student (*left*) and remote mentor (*right*) are in separate locations (A), but both see a merged display of the other's actions (B)

VIPAAR v2.0
iPAD/App Store



VIPAAR 2.0 iPad Neuroendoscopy Configuration

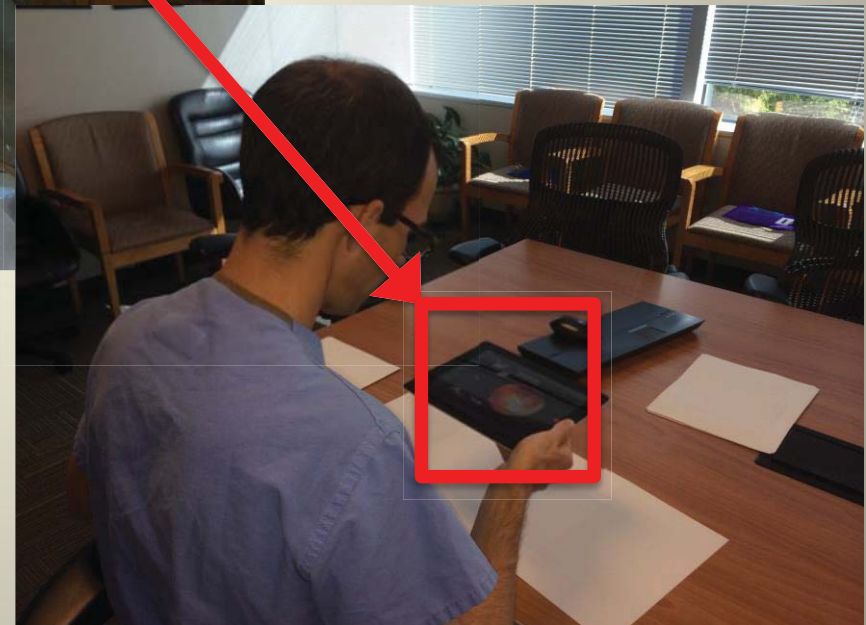


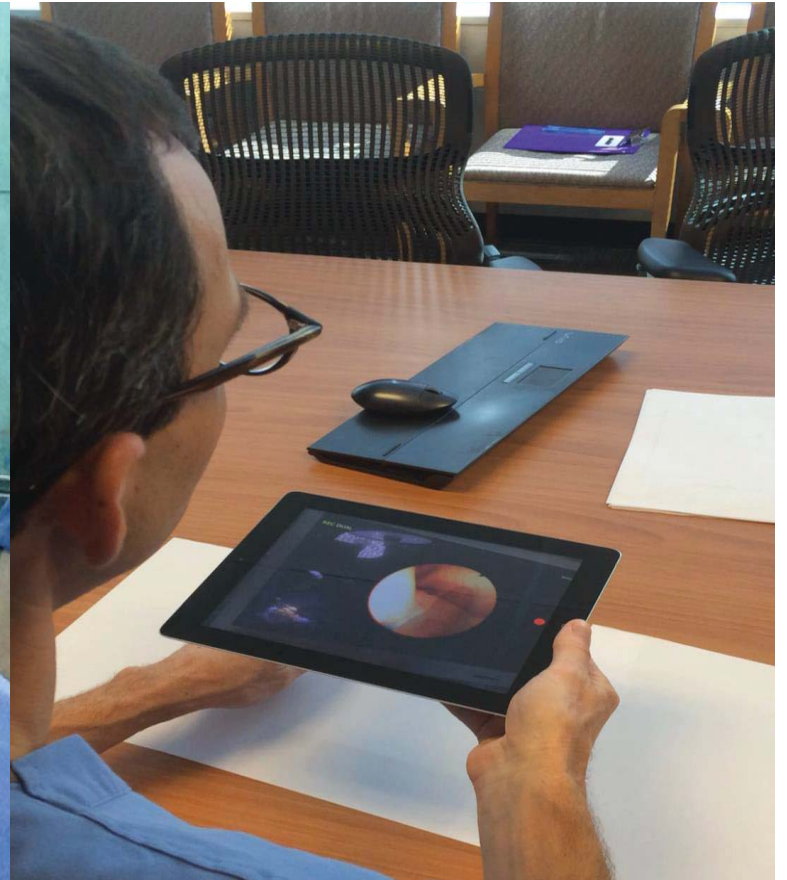
Endoscopic Third Ventriculostomy

Learner Surgeon



Mentor Surgeon





Endoscopic Third Ventriculostomy



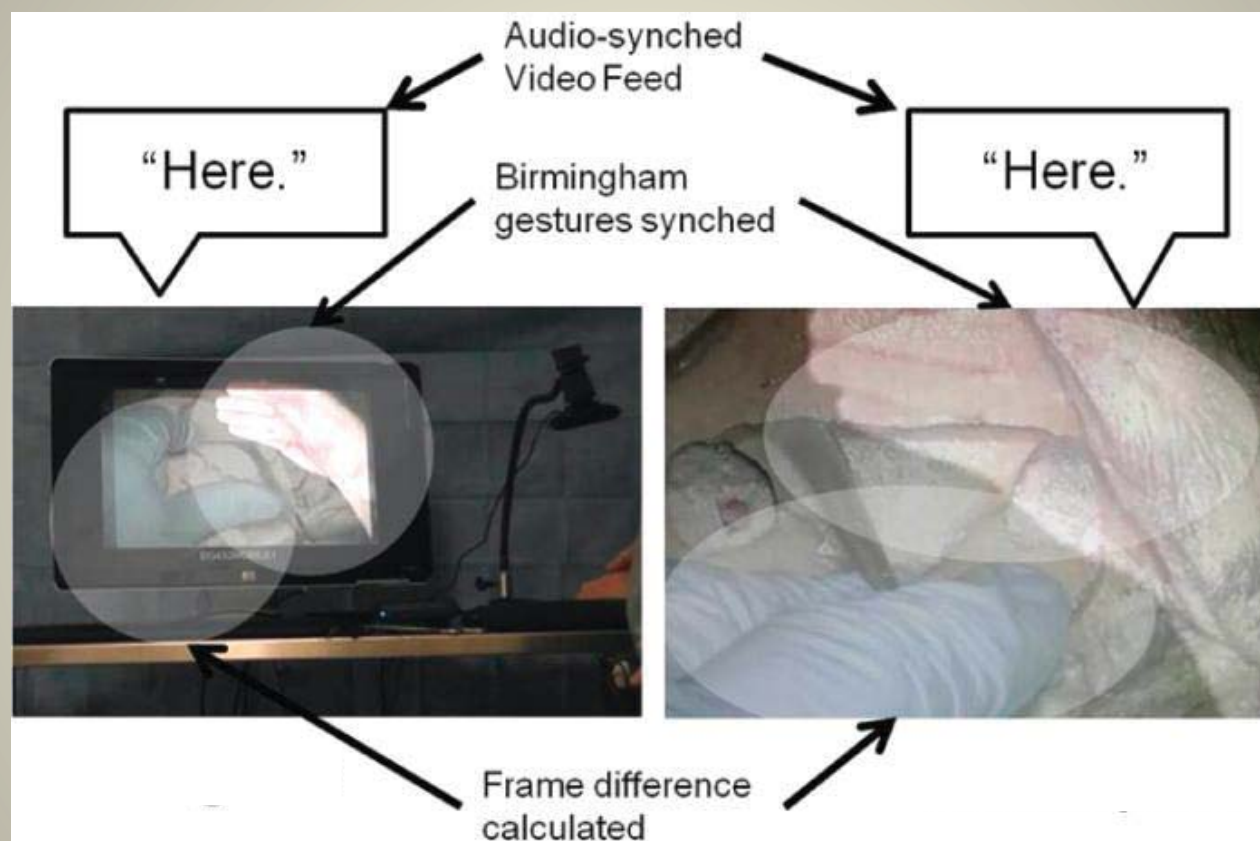
Endoscopic Third Ventriculostomy



VIPARR Operative Microscope Configuration



Composite latency and accuracy analysis



Using synchronized audio to calculate visual delay between remote locations. The two video streams are synchronized to a common audio cue, then the time difference between identical video locations is calculated by counting frames between the audio cue and video (visual) alignment.

Future Steps

Virtual Interactive Presence and Augmented Reality (VIPAR) for Remote Surgical Assistance

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BACKGROUND: Surgery is a highly technical field that combines continuous decision-making with the coordination of spatiovisual tasks.

OBJECTIVE: We designed a virtual platform that allows a remote surgeon, over a standard Internet connection,

METHODS: The VIPAR system covers over a surgical field and a blue screen a digital viewpiece, composed of a definition viewer displaying a virtual compositing selected elements. Virtual pieces were controlled by works of virtual remote interaction in real time. were added to the virtual field. a fixed-formalin cadaver head and (CEA) and pterional craniotomy.

RESULTS: The VIPAR system allowed (resident) and remote (attending) major anatomic structures were remote instruction for the local guidance to both surgeons. Camera perception were identified as technical

CONCLUSION: Virtual interactive platform for remote surgical assistance and remote expert assistance.

KEY WORDS: Augmented reality, Education

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Virtual interactive presence for real-time, long-distance surgical collaboration during complex microsurgical procedures

Technical note

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- Ongoing, international operative collaboration
- Implications for global training and capacity building