THE UNIVERSITY OF RHODE ISLAND
COLLEGE OF ENGINEERING

Improvement of Brain Aneurysm Surgery through Biomedical Imaging

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Introduction

What is an aneurysm?

- A cerebral aneurysm is a weak or thin spot on a blood vessel in the brain that fills with blood.

- An aneurysm can press on a nerve or surrounding tissue and burst, causing blood to spill into surrounding tissues

Aneurysm Details

Symptoms

- Dependent on size
- Headaches, numbness, loss of vision

Treatments

- Unruptured: treatment based upon symptoms
- Ruptured: surgery involving placing a metal clip at the base to prevent future ruptures

Surgical Details

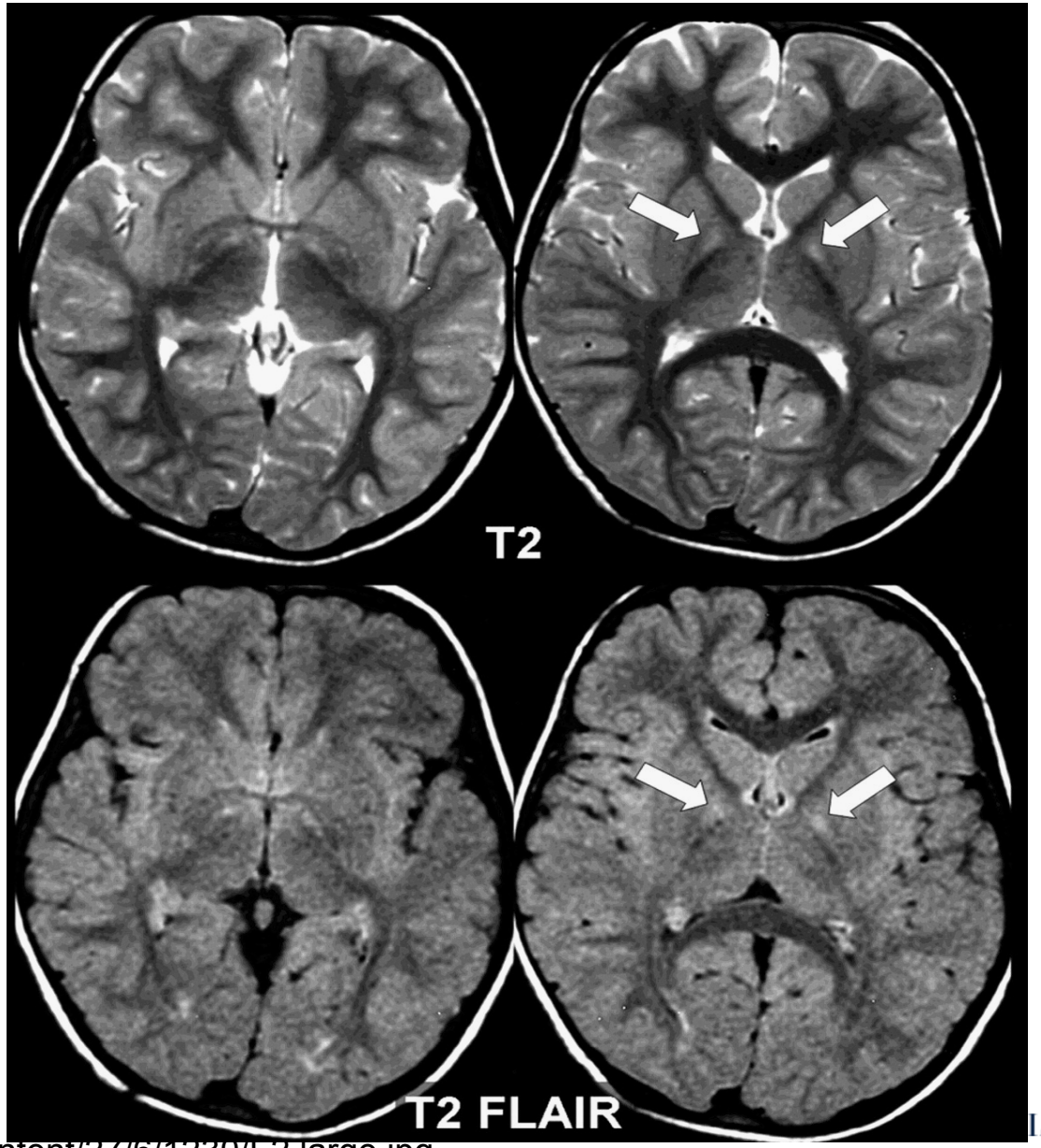
For ruptured aneurysms:

- Clipping is done during an open craniotomy
- Scalp, skull, and brain coverings opened
- Small metal clip placed at neck of aneurysm to prevent it from bursting

Surgical Details

- Not all aneurysms need to be treated right away. Aneurysms that have never bled and are very small do not need to be treated because are less likely to break open

- In this case, MRI's are frequently performed to watch the aneurysm's growth and change



http://www.ajnr.org/content/27/6/1230/F2.large.jpg

Risks with surgery utilizing basic MRI

- Blood clot
- Brain swelling
- Infection
- Speech/memory
- Reoccurrence

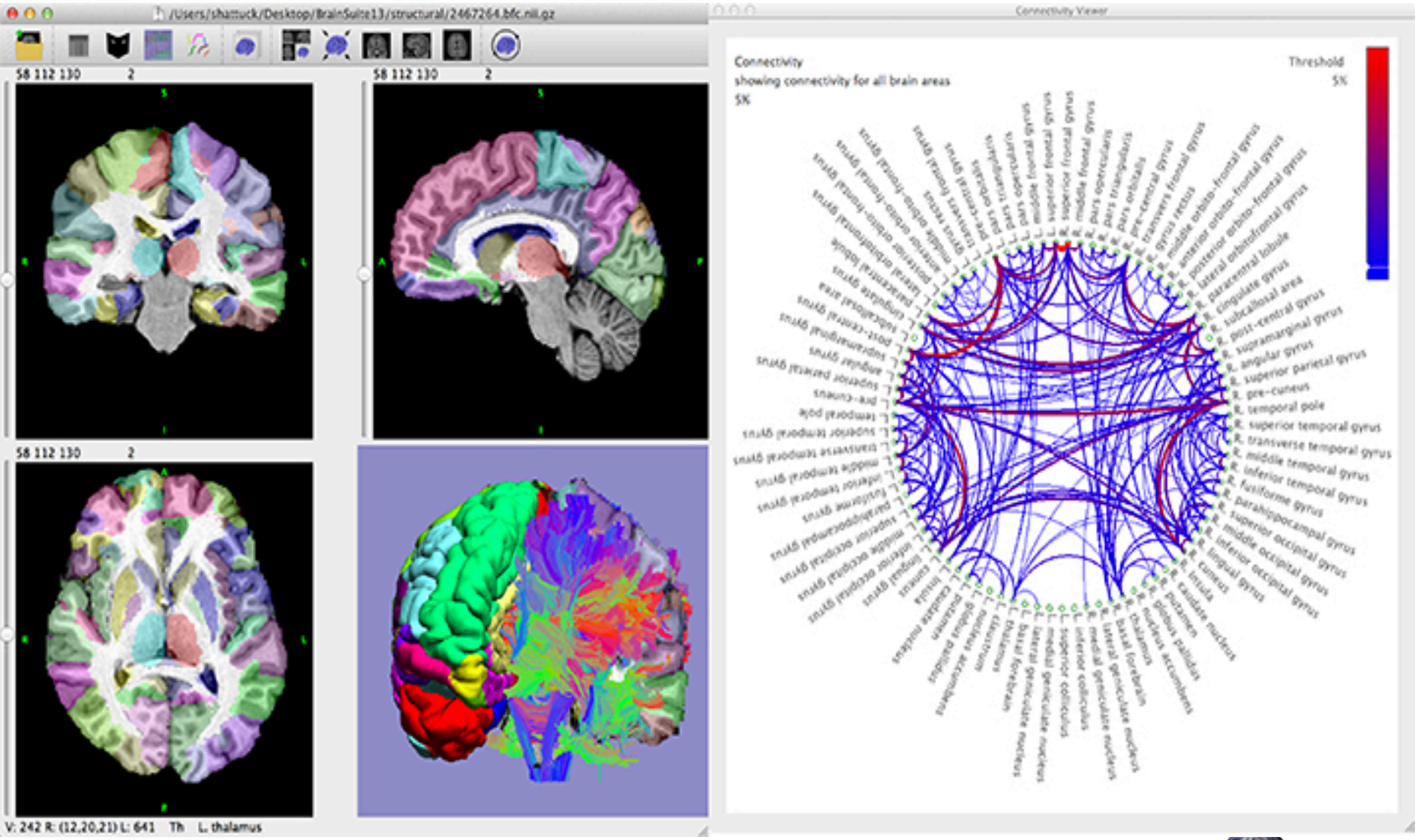
Solution

- *BrainSuite*
  - Software tool- enable processing of MRIs of the brain
  - Extracts and parameterize the inner and outer surfaces of the cerebral cortex
  - Segments and labels gray and white matter structures
  - Tools for visualizing data

BrainSuite

Features:

- Brain surface extraction, cerebrum labeling, and surface generation
- Surface registration software
- Tools for exploring data, tractography, and connectivity



http://www.brainsuite.org

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Study

- 2007 to 2013
- 105 patients- 39 ruptured and 66 unruptured
- Clipping surgery using BrainSuite software instead of typical MRI theater

Study

Conclusion:

- Immensely successful
- 100% successful clippings
- No difficulty
- However- concluded as "nonessential"

Future:

- Lots of medical promise

References

[1] BrainSuite: *Magnetic Resonance Image Analysis Tools*. 2015. <www.brainsuite.org>.

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[4] D'Andrea G, Frati A, Pietrantonio A, Familiari P, et al. Surgery of Brain Aneurysm in a BrainSuite Theater. *Clinical Neurology and Neurosurgery* 97, 2015.