

Evidence Discussion (HD-28)

Neurosurgical Imaging

- Imaging modalities for neurosurgical planning include MRI brain and CT head, along with vascular imaging.
- MRI brain is the preferred modality for the evaluation of intracranial neoplasms and other conditions affecting the brain parenchyma, meninges or cranium, due to its superior soft tissue resolution when compared to CT head.³
- CT head is the preferred modality for evaluation of bony structures in the pre-operative setting.⁴
- For localization of relevant vascular anatomy prior to surgery, MRI angiography (MRA) head and neck or CT angiography (CTA) head and neck, may be appropriate^{5,6}
- Pre-surgical navigational imaging, whether by CT or MRI, allows a spatially accurate anatomical patient model for use in the treatment-planning process.^{2,7} The requirements for surgical planning images differ from the requirements for diagnostic images, especially regarding the spatial accuracy of the images in the stereotactic coordinates used for localization and targeting.^{2,7}
- Navigation based on an immediate preoperative scan optimizes the accuracy of data used for initial surgical planning.⁷ Navigation systems reduce length of surgery, lower incidence of wound infection and shorten length of post-operative hospital stay.⁸
- For post-operative imaging, CT head is also useful for follow up of intracranial hemorrhage, edema, hydrocephalus, shunts, and general post-operative follow up. CT head has the benefit of providing rapid evaluation if a post-operative complication is suspected.³ Post-operative MRI brain provides superior soft tissue resolution in less urgent scenarios.⁴

References

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2. ACR-ARS Practice Parameter for the performance of brain stereotactic radiosurgery Revised 2021.
3. ACR ASNR SPR Practice Parameter for the Performance and Interpretation of Magnetic Resonance Imaging (MRI) of the Brain. Revised 2019.
4. ACR-ASNR-SPR Practice Parameter for the Performance of Computed Tomography (CT) of the Head. Revised 2020
5. ACR ASNR SPR Practice Parameter for the Performance and Interpretation of Cervicocerebral Computed Tomography Angiography (CTA) Revised 2020
6. ACR ASNR SPR Practice Parameter for the Performance and Interpretation of Cervicocerebral Magnetic Resonance Angiography (MRA) Revised 2020

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8. Khoshnevisan A, Allahabadi NS. Neuronavigation: principles, clinical applications and potential pitfalls. *Iran J Psychiatry*. 2012;7(2):97-103.