The 2nd International Neurotrauma Congress &
the 4th International Roads Safety Congress

Shefa Neuroscience Research Center, Tehran, Iran, 18-20 February, 2015

The Neuroscience Journal of Shefaye Khatam

Volume 2, No. 4, Suppl. 3

Oral Presentation

Role of Neuroimaging in Head Trauma

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Published: ***18 February, 2015***

Abstract

Cranio-cerebral injuries are a common cause of hospital admission following trauma, and long- term morbidity and mortality. Neuroimaging plays an essential role in brain injuries. In the X ray field however simple skull X ray is useful but there is shift toward recognition of intracranial pathology by CT scanning. CT is the most appropriate initial study for acute evaluation of the head-injured patient who may harbor lesion(s) that require immediate neurosurgical intervention. Early and sometimes repeat CT scanning may be required. Cerebral angiography has a role in demonstrating and managing traumatic vascular injuries such as pseudo aneurysm, dissection, fistulae, or diagnosis and neurointerventional treatment of uncontrolled hemorrhage. Dynamic spiral CT angiography (CTA) and magnetic resonance angiography (MRA) have a role as less invasive screening tools for detecting traumatic intracranial, skull base, and/or neck vascular lesions. Intracranial and neck MRA with fat- suppressed T1-weighted neck MR are helpful for screening vascular lesions such as thromboses, pseudo aneurysms, fistulae, or dissection. CTA of the aortic arch and neck vasculature may reveal carotid or vertebral dissection, although angiography remains the gold standard for depicting dissection. MRI in imaging of head trauma is limited while CT is sensitive for detecting injuries requiring a change in treatment, MRI is also used for acute head-injured patients with nonsurgical, medically stable pathology. Hemosidrin-sensitive T2-weighted gradient echo and susceptibility-weighted sequences are helpful for imaging small or subacute or chronic hemorrhages. Diffusion-weighted sequences improve detection of acute infarction associated with head injury. Although management of surgical injuries is not likely to be altered by the substitution of MRI for CT, superior depiction of nonsurgical lesions with MRI may affect medical management and predict the degree of neurologic recovery. Diffusion-weighted MRI and apparent diffusion coefficient (ADC) mapping depict cytotoxic injury almost immediately. In acute brain trauma, focal contusion and DAI may show restricted diffusion and evolve over time to atrophy or encephalomalacia. Perfusion imaging with CT or MRI may prove helpful as a marker for disorders of vascular autoregulation or ischemia. Diffusion tensor imaging and MR spectroscopy (MRS) are ancillary tools that may offer additional insight into the biochemical and structural patterns of injury following head trauma, as well as prognosis.

Keywords: Head Trauma, Neuroimaging, MRI, DWI, MRA, CTA, DAI.

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