

Infectious Diseases: Is There A Role for MRI?

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According to recent WHO report, infection is a major cause of mortality and morbidity and accounts for 23.5 % of total deaths (1). MR imaging was initially applied for the diagnosis of the diseases of the central nervous system (CNS) as it is not affected by respiratory and cardiac motion. Exploratory surgery performed for other body organs can not be easily applied to brain as it is associated with relatively high morbidity and mortality. Infections of the CNS are often life-threatening. The non-invasive differentiation of infective from the non-infective brain conditions may help in better clinical decision making. The prognosis mainly depends on rapid identification of the site of inflammation and offending pathogens to install effective antimicrobial treatment as early as possible. Analysis of blood/serum, CSF, and biopsy remain the gold standard to categorize the infectious agents.

There are several applications of MRI that have made substantial contribution to the differential diagnosis and subsequent management of the patients with CNS infection (2). CNS tuberculosis is one of the leading causes of morbidity and mortality in the developing world where the laboratory investigations are not very sensitive, take a relatively long time in the diagnosis and involve invasion. Magnetization transfer MRI, MR spectroscopy and diffusion weighted imaging (DWI) have helped in the diagnosis of these lesions and facilitated in the institution of immediate appropriate therapy. Similarly, differentiation of an abscess from necrotic glioblastoma multiforme has become possible by the use of MR spectroscopy and DWI which has helped in proper management of these divergent pathologies. Small hypointense lesions on T2 weighted images especially in the developing world with a differential diagnosis of calcification, chronic hemorrhage, and non-calcified granulomas needed CT for confirmation of calcification. GRE with corrected phase imaging has helped in differentiation of these entities. This has obviated the need for an extra investigation, thus making MRI economically efficient in the developing world where per capita income is low and majority of the population lives below the poverty line. HIV infection of the CNS is endemic and an effort is being made worldwide to develop techniques for in-vivo quantification of the viral load and to assess therapeutic response. Perfusion and diffusion tensor imaging have been found to be useful in monitoring the effect of therapy in these subjects. In addition, these imaging techniques have been found to be more useful compared to conventional imaging in the differential diagnosis of the intracranial lesions complicating AIDS syndrome (3).

Another area where MRI has made impact is in the differentiation of herpes simplex encephalitis (HSE) from other encephalitis. Besides conventional MRI, MT MRI and DWI are found to be very useful in early diagnosis of HSE by identifying the typical distribution of the lesions in the temporal lobes. This has helped in early institution of specific therapy available for only HSE without waiting for the laboratory results for the confirmation of diagnosis resulting in better prognosis.

In this presentation, I will focus on the role and the impact of cutting edge MR technology in alleviating the suffering of the mankind due to infectious diseases of the CNS especially in the developing world.

References:

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