Musculoskeletal Imaging: MRI versus Three Dimensional Spiral CT

Dear Editor,

This is with reference to the original article titled “Three Dimensional Spiral CT Imaging of Musculoskeletal System: Application & Advantages” (MJAFI 2005; 61:133-8). Comparison of application of Three dimensional spiral CT imaging with MRI in imaging of Musculoskeletal System continues to evoke mixed response. However, at present, the scale is clearly tilted towards Magnetic Resonance Imaging in most musculoskeletal conditions except in skeletal trauma. In view of this, following comments are offered on this article:

The authors have used 3-D CT Imaging in evaluation of bone tumors. The authors' contention is that CT is not only as efficacious but is superior to MRI in detection of cortical destruction of calcification. However, it is brought to the attention of the readers that the main aim of imaging studies in bone tumors is to establish the extent of lesion, detect the bone marrow involvement, skip lesions, satellite lesions, to define aggressive nature of lesion and to establish extent of soft tissue involvement. For all these aims, MRI remains the imaging modality of choice and is superior to 3-D CT Scan. With exception of densely sclerotic lesions e.g. osteoid osteoma, MRI has replaced CT scan for the assessment of skeletal tumors [1].

The authors have also used 3-D CT for evaluation of avascular necrosis of femoral head while accepting at the same time that MRI is considered as the gold standard. MRI can detect stage-I avascular necrosis of the femoral head whereas 3-D CT detects from stage – II onwards only [2,3]. The reason for 3-D CT imaging preference is not clear.

Last but not the least, the often ignored issue of radiation exposure and safety needs to be considered. In this study, every

patient underwent radiation exposure to obtain 180 to 320 CT images. Some of these patients also underwent repeat imaging studies. This is a highly significant level of radiation. Doing a 3-D CT imaging study in a patient with a skeletal tumor or avascular necrosis of femoral head (where MRI is the established gold standard) raises safety issues as well as ethical issues. It is hoped that patients undergoing these studies were fully informed of these issues and necessary informed consent was obtained for undergoing a relatively less revealing imaging study with very high radiation exposure. As the authors have not declared this study to be either experimental or comparative (with MRI), ethical issues regarding patient safety and relevance of investigations need due consideration. As the study was conducted at a tertiary care centre, it is not likely that facilities of MRI were not available locally (In service hospital/ in local civil medicare set up).

References

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3. Seiler JG III, Christier MJ, Homra L: Correlation of the findings of magnetic resonance imaging with those of bone biopsy in patients who have stage I or II ischaemic necrosis of the femoral head. J Bone Joint Surg. 71-A:28, 1989.

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REPLY

At the very outset the authors wish to thank the reader for the keen interest shown in the article. Rarely does one find such a response to published articles. The points raised by the reader are well taken, however at the same time we wish to clarify the issues.

This study was not a comparative evaluation of CT/3-D CT versus MRI, but a presentation of our experience with 3-D CT in various disorders of the musculoskeletal system. This study relates to the period when MRI was not available in the centre. It further needs to be reiterated that though MRI is a more recent imaging modality with definite advantages it will be incorrect to say that it has replaced CT, in fact at times both CT and MRI are complementary in providing a comprehensive diagnosis. Anatomic information gained from 3D CT can be useful in planning oncologic therapy, whether surgery or radiation therapy. Three-dimensional images are especially valuable in anatomically complex areas such as the ribs, pelvis, and shoulder and have proved useful in providing information to accurately assess the anatomic localization of the lesion. In fact some authors have suggested inclusion of volume rendered 3-D imaging as part of routine imaging protocol in the evaluation of neoplastic diseases of the bone [1]. An integrated 2-D and 3-D CT approach allows precise and rapid, imaging for initial

assessment, planning of radiation therapy, en bloc resection or limb-salvage surgery and also in evaluation of therapeutic response/recurrence in musculoskeletal tumours[2].

For evaluation of avascular necrosis, as stated in the text, MRI continues to be the gold standard. Much also depends on the availability of a specific modality and definitely 3-D CT is not the preferred modality.

Clarification needs to be made regarding the protocol for 3-D reconstruction adopted in this study, although 190 to 320 images were obtained in some of the patients, this does not mean that as many CT slices were taken. A significant advancement of Spiral CT is the ability to post-process the images. The base images which are acquired are reconstructed, using dedicated software, at narrower intervals to get more number of slices. This gives better 3-D images and at the same time helps in reducing the radiation dose to the patient. As far as radiation safety is concerned, patients were informed of the potential hazards of radiation and an informed consent was obtained from all of them. Notwithstanding this, every modality has its advantages and disadvantages and one has to consider in totality giving due consideration to the availability, faster study time, cost and advantages of modality.