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Use of magnetic resonance imaging for screening for avascular necrosis post-SARS: screening for avascular necrosis in atypical pneumonia

Key Message

This study found a low prevalence of avascular necrosis after atypical pneumonia and a high prevalence of incidental joint abnormalities.

Introduction

Viral infections have been associated with arthralgia, and some including the human immunodeficiency virus,[1,2] severe acute respiratory syndrome (SARS)–coronavirus,[3,4] and herpes zoster,[5,6] with bone necrosis. It is not known whether this was due to the infection itself or the treatment. For the majority of viral infections, however, no data exist as to the incidence of bone abnormalities after initial infection. Such lack of data extends to the common types of viral and atypical pneumonia.

In Hong Kong, it was found that some patients who had SARS developed osteonecrosis.[3] This study aimed at screening patients who had recovered from atypical pneumonia for the presence of bony abnormalities (including osteonecrosis). The same protocol for scanning was used for these patients as for patients who had recovered from SARS. The results of this study can be compared to data obtained from a territory-wide screening of post-SARS patients.

Magnetic resonance imaging (MRI) is the non-invasive, radiation-free modality of choice for detecting bone and joint abnormalities and has been used as a routine service for detecting such abnormalities for the past two decades.

Aims and objectives

This study aimed at providing control data for the main project on the incidence of hip and knee avascular necrosis after SARS. Patients diagnosed with atypical pneumonia requiring hospitalisation at the Prince of Wales Hospital in 2004 were included.

Objectives were to investigate: (1) the incidence of bony abnormalities in patients treated for community-acquired pneumonia, (2) the relationship between the aetiology of the infection and the development of avascular necrosis, (3) the relationship between treatment and avascular necrosis, and (4) the relationship between patient demographics and avascular necrosis.

Methods

This study was conducted from December 2004 to December 2005.

Patients

Patients who had recovered from atypical pneumonia and matched some of the demographics/clinical features of those who had recovered from SARS were selected by the Hospital Authority Head Office statistics department and invited to participate by a nursing co-ordinator. The aim was to screen 50 patients who had recovered from atypical pneumonia at specific times after their previous pneumonia. Exclusion criteria were (1) patient refusal, (2) patients in whom MRI was contra-indicated (because of unsafe implants), (3) patients who had previously used high dosages of corticosteroids (equivalent to >3 g prednisolone), and (4) femoral neck fracture, or other major hip or knee trauma.

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Scanning protocol

For hips, the scanning protocol was T1-weighted (TR 590, TE 20), spin-echo coronal sequence, slice thickness 3 mm, intersection gap 0.3 mm, field of view 350 mm with a 256 x 512 matrix; and T2-weighted (TR 2500, TE 90), fat-saturated spin-echo coronal sequence, slice thickness 3 mm, intersection gap 0.3 mm, field of view 350 mm with a 256 x 512 matrix.

For knees, the scanning protocol was T1-weighted (TR 520, TE 20), spin-echo coronal sequence, slice thickness 3 mm, intersection gap 0.3 mm, field of view 300 mm with a 256 x 512 matrix; and T2-weighted (TR 2500, TE 90), fat-saturated spin-echo coronal sequence, slice thickness 3 mm, intersection gap 0.3 mm, field of view 350 mm with a 256 x 512 matrix.

For both examinations, we used a spine synergy coil with a body array coil. The total examination time was about 30 minutes for all four sequences.

Image analysis

Image analysis was performed on a dedicated MRI workstation by a radiologist. Bone and joint abnormalities were assessed and recorded on a standard form, previously used for a similar study on SARS patients. All abnormalities of more than 3 mm were recorded on a scoring sheet. Data were categorised as (1) osteonecrosis (if present, graded according to Steinberg et al[7]), (2) non-specific bone marrow abnormality (subchondral or intramedullary), or (3) no bony abnormality.

Results

A total of 50 patients (29 male, 21 female; mean age, 50 [range, 22-64] years) were scanned by the end of the study period. A single patient (male, aged 64 years) was found to have a medullary infarct and femoral head avascular necrosis (on the left side). This patient was later found to have a history of prostate cancer with treated metastatic involvement.

There was a high incidence of incidental lesions in this group (affecting 23 patients), including a stress reaction (n=1), degenerative joint disease (n=8), osteochondral lesions (n=5), bone island/herniation pit/bone cyst (n=3), synovial/parameniscal cysts/bursitis (n=5), and an osteochondroma (n=1).

Discussion

The low prevalence of avascular necrosis in this small sample of patients suggests that the risk of developing avascular necrosis/bone infarct after atypical pneumonia is low. A larger-scale study would be needed to provide more accurate data. These data should be compared directly with that from SARS patients, taking into account the illness duration and the condition of the patient during the acute episode. The high prevalence of incidental findings is interesting. Most of these were degenerative and probably unrelated to previous atypical pneumonia. However, such lesions may cause arthralgia or other symptoms of joint disorder, and are thus important to consider when interpreting such symptoms during/after infection/pneumonia.

Conclusions

A low-level risk for developing avascular necrosis may be present after atypical pneumonia. Larger-scale studies are needed to obtain more representative results.

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