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EDITORIAL

Radiological images are shadows of reality

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Radiological imaging is the bedrock of investigations in the management of patients with orthopaedic disorders. Articles in this journal show a particular interest in the state of the articular cartilage: assessed in this month's issue by narrowing of the joint space[1] and in July's issue, by signal changes on MRI.[2] The problem arises, however, in how we define 'normal' and 'abnormal'; especially what is normal ageing and what is osteoarthritis? Pinsornsak et al[1] aimed to improve the assessment of joint space narrowing seen on plain knee radiographs in the management of patients presenting with painful knees. They correctly state that the decision for an operation requires consideration of both the symptoms of pain, and evidence of significant joint space narrowing on the radiograph. It should be noted that the *American College of Rheumatology* define osteoarthritis (if radiographs are available) as pain arising from the knee on most days in the previous month, crepitus on active movement, morning stiffness for less than 30 minutes, age over 50 years, and osteophytes on radiographs.[3] The points to note are firstly that the pain must arise from the knee joint, yet knee pain may be referred from the hip or back; and secondly, the key radiographic finding is osteophytes not joint space narrowing. Any bearing surface will wear over time, so joint space narrow on its own may be due to normal ageing and may not be a sign of osteoarthritis. A further problem arises in that even if the plain radiograph shows severe degeneration, it is not possible to say whether the patient experiences pain or not. It therefore follows that the cause of the pain is not from any effect of the articular cartilage loss, or osteophytes, as seen on the plain radiograph. An excellent example of this is often seen in isolated patellofemoral degenerative changes which are found independently of any symptoms. In my opinion, for a patient to have a diagnosis of osteoarthritis of the knee, and to consider surgery, there must be a history of effusions, or an effusion present. This implies articular cartilage damage has resulted in the production of wear particles which have been taken up by the synovium and created an inflammatory response. If I see a patient with anterior knee pain, and bone-on-bone changes in the patellofemoral joint, no history of effusions and a dry knee on examination, then careful assessment of the hip joint (and less frequently the lumbar spine) usually finds the origin of the pain. It is logical to conclude that patients who have undergone a total knee arthroplasty (TKA) and still have persistent pain, in the absence of any other evidence to the contrary, may have had an asymptomatic ageing knee with severe radiological changes, however, the pain experienced was referred from elsewhere. It is notable that chronic back pain is associated with persistent pain in the knee following a TKA.[4]

Pinsornsak et al[1] report on using single-leg standing images to define the amount of joint space narrowing on plain knee radiography. In the United Kingdom 30 years ago, only short non-weight-bearing anteroposterior and lateral knee images were taken. A tunnel view[5] would be taken if osteochondritis dissecans was suspected. Skyline views of the patellofemoral joint were not routine, even when considering the patellofemoral joint,[6] and are still not in Emergency Departments, even in cases of suspected patellar dislocation. Many would argue that an MRI of the knee would be more useful in this scenario. However, assessment of joint space narrowing is important if you have a unicompartmental knee practice. Stress radiography, advocated by the Oxford group,[7] is difficult to arrange in many hospitals. Standing anteroposterior views of both knees is now routine; typically performed in extension. This can be modified to the Rosenberg view[8] (45° flexion) as most cartilage wear occurs at this degree of flexion, and not in full extension. The suggestion that Pinsornsak et al[1] make to

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doi:10.1302/2046-3758.59.2000656

Bone Joint Res 2016;5:442–443.

adopt a single-leg standing view in extension is counter-intuitive, and needs to be compared with a standard both legs Rosenberg view, to see if there is a significant difference. If a single-leg stance is shown to be superior, it would be sensible to include it for research purposes. Adoption into routine clinical care is likely to follow. Whether the hip is adducted or abducted may well load more the lateral or medial tibiofemoral compartments, respectively, and be as useful as stress views. Then there is the long-leg anteroposterior alignment view, which allows measurement of mechanical and anatomical axes, is essential for osteotomy surgery, but is still debated for routine TKA.[9] Lateral single-leg standing views can also be taken which can assess the integrity of the anterior cruciate ligament.[10] The protocol to be used for plain imaging of the knee depends on the resources available. A research or teaching institution will have many more views in their protocol than a district hospital. However, clinicians need to be aware of the purpose of requesting radiological images and restrict the use of ionising radiation as much as possible. Currently, for clinical purposes, weight-bearing anteroposterior, lateral and skyline views are adequate for most purposes. However, there is a strong argument for long-leg alignment films pre- and post-TKA, as this employs the same logic as an osteotomy.

A similar problem of image interpretation arises with MRI. Many assume that signal changes in articular cartilage equate with a pathological process. From this it is then assumed that if the patient has pain, then the abnormal signal is the origin. As articular cartilage is aneural, this cannot be true. We also need to understand more about the effects of normal ageing on the musculoskeletal system, and how this is reflected in signal changes on MRI. Many patients are sent to the clinic following an MRI scan ordered in primary care, where the history and examination has no relationship to the presumed imaging pathology.

Plato describes reality like a man in a cave who sits looking towards the back and is resting against a wall.[11] Nearer to the entrance is a fire, and between the fire and the wall people are walking with clay objects on poles. The man sees the shadows of these objects on the back wall of the cave. However, outside the cave is the real world where the sun is the fire and the trees and other objects are those reproduced as the clay models. Radiological images are very much like the shadows of the clay models, and should never be taken as the ultimate truth when managing patients. This is particularly true when managing a subjective symptom such as pain. The management of pain is not about the management of the results of investigations, but the management of the patient. Radiological images are shadows of reality. It was Sir William Osler who said that "the good physician treats the disease; the great physician treats the patient who has the disease."[12]

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Funding Statement
- None declared

Author Contribution
- S. T. Donell: Writing the paper

ICMJE conflict of interest
- None declared