ICRS Newsletter Summer 2012: Focused on Diagnostic Cartilage Imaging

Pure cartilage or osteochondral lesion? SPECT/CT gives the answer!

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The importance of the integrity of the subchondral bone plate has not only recently gained increasing attention. SPECT/CT helps to differentiate between pure chondral and osteochondral pathologies[3, 4, 6-10]. This new imaging modality combines a 3D scintigraphy (SPECT) and a conventional computerized tomography (CT) into one imaging procedure. Uniquely, SPECT/CT allows the combined assessment of structure, mechanical and anatomical alignment, biology and function. To date, most commonly a 99mTc-HDP tracer is used for bone imaging in orthopaedics, which targets hydroxy-apatite in active osteoblasts[6]. Consequently, SPECT/CT is able to evaluate and visualize overloading of joint compartments[4, 5]. In patients with medial knee osteoarthritis or compartment overloading for instance the treatment can be better targeted. Hart et al. have shown the beneficial effect of SPECT in terms of diagnostic confidence and outcome[2]. They found that the patients suitable for a less invasive procedure such as a high tibial osteotomy or medial unicondylar knee arthroplasty are safely identified[2]. SPECT/CT is also able to visualize the compartment overload and the effect of deloading osteotomies [4, 5].

Another major benefit in our clinical experience, but not yet proven by clinical studies, is that SPECT/CT helps the orthopaedic surgeon to differentiate between patients, who need to undergo pure cartilage (e.g. ACI) and combined osteochondral procedures. In patient with osteochondral lesions the MRI is able to characterize the size and depth of the cartilage lesions[1]. Furthermore, it also shows the bone marrow edema, which might be an important predictive factor for outcome, although not being very specific. The major advantage of SPECT/CT in patients before and after

cartilage surgery is its strength in the assessment of the integrity of the subchondral bone plate. This has been emphasized in a number of published case reports[4, 8].

Due to the previously described characteristics we propose to use SPECT/CT preoperatively to establish the optimal indication for chondral or osteochondral surgery and postoperatively to follow-up patients after osteochondral repair procedures. A number of studies are currently ongoing at our institution investigating the clinical value, sensitivity, specificity in patients before and after chondral and osteochondral repair.

References

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Figure 1: 99mTc-HDP-SPECT/CT of a patient before (above) and one year after high tibial osteotomy of the knee showing a significant decrease of tracer uptake within the medial knee compartment.

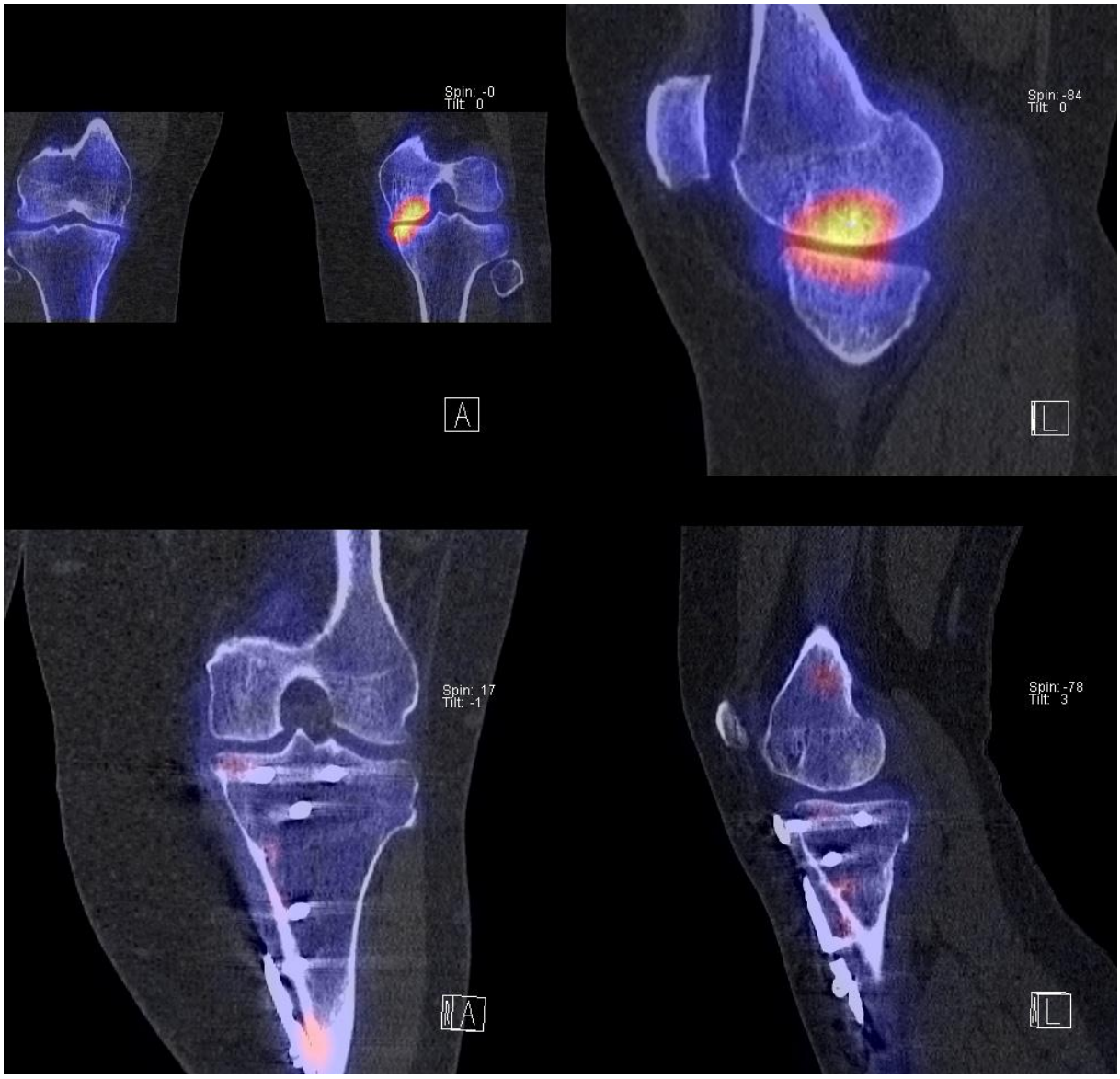

Figure 2: 99mTc-HDP-SPECT/CT (above) and MRI (below) of a patellofemoral osteochondral lesion showing increased SPECT/CT tracer uptake, but no bone edema on MRI.