THE SIGNIFICANCE OF SUBCHONDRAL EVENTS IN THE KNEE: A CLINICAL REVIEW

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Although a well known MRI entity, the natural history of bone bruising and bone marrow edema is still unknown, and little is known about short-term resolution, clinical symptoms and long-term prognosis. The high prevalence of bone bruises (microtrabecular fractures) in acute ACL injuries has alerted clinicians to this phenomenon, raised awareness and numerous questions about its prognostic implications. Several studies have shown that indirect, blunt trauma to articular cartilage produces profound changes in its histologic, biochemical and ultrastructural characteristics, even in the absence of surface disruption. Additionally, the osseous subchondral lesion might heal into a stiffer construction than the previous normal bone. Assuming that it represents a blunt injury to articular cartilage and underlying subchondral bone, bone bruising may be a predictor of future cartilage degeneration, even in the absence of symptoms and a visible articular cartilage injury.

On the other hand, articular cartilage degeneration, although fundamental to the pathogenesis of osteoarthritis, is not the site of origin of pain, the predominant symptom of osteoarthritis. However, patients with symptomatic osteoarthritis often have MRI evidence of progressive bone marrow edema of femoral and tibial condyles, including early formation of subchondral cysts (remodelling failure).

Extensive edema of the bone marrow has also been observed in patients with painful transient osteoporosis with otherwise unexplained atraumatic medial tibial pain. We also know very little about clinically similar, but structurally different conditions like spontaneous osteonecrosis (SONK).

Most clinicians accept that articular cartilage repair procedures are generally associated with MRI evidence of focal bone marrow edema for up to 12 months postoperatively. We seem to agree that persisting subchondral changes beyond this time correlate with clinically and symptomatically failed chondral repair. Therefore, it would make sense to aim to repair the osteochondral unit (articular cartilage and subchondral bone) rather than articular surface only.

We would like to discuss our clinical experience with a wide range of traumatic and atraumatic subchondral events, based on clinical, arthroscopic and MRI (optimised for articular cartilage and subchondral imaging) observations over the past ten years. We would also like to present MRI outcomes of articular cartilage repair (Microfracture, OATS and ACI) from subchondral point of view and a new integrated treatment of knee femoral and tibial osteonecrosis with a combination of subchodral decompression, autologous bone marrow transplantation and autologous osteochondral transplantation, as a preliminary clinical report of 20 cases.