

Points

- Cartilage imaging involves morphologic and matrix imaging
- Morphologic imaging is best performed using standard and special MRI sequences
- The common conditions addressed include OA, acute and chronic osteochondral lesions, osteochondritis dissecans and chondromalacia patellae

Cartilage Imaging with MRI A Pictorial Essay

MRI imaging of the cartilage is performed for the following reasons:

1. Morphologic imaging
2. 3D assessment of cartilage volume
3. Macromolecular matrix imaging

3D assessment is typically performed in clinical trials to assess the efficacy of anti-osteoarthritic drug therapy on cartilage. Macromolecular matrix imaging includes at least three research techniques that focus on assessment cartilage integrity before the abnormalities become morphologically obvious.

Morphologic imaging of the cartilage however is a powerful way of assessing cartilage anatomy and pathology. Using standard sequences (fast spin-echo, proton density and T2W, with and without fat suppression) (Fig. 1A, 2A) and special cartilage sequences (DESS, SPGR, etc) (Fig. 1B, 2B), the following cartilage pathologies can be assessed reliably

1. Osteoarthritis (OA) (Fig. 3)
2. Acute and chronic chondral and osteochondral injuries (Figs. 4, 5, 6, 7)
3. Osteochondritis dissecans (OCD) (Figs. 8, 9)
4. Chondromalacia patellae (Figs. 10, 11).



Fig. 1A

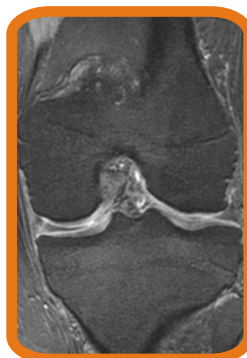


Fig. 1B

Fig. 1 (A, B): Normal cartilage. Proton density sagittal (A) and DESS coronal (B) images showing normal cartilage

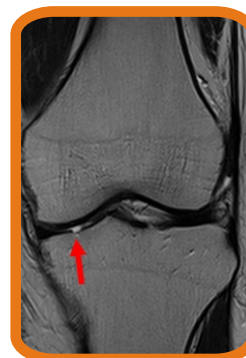


Fig. 2A



Fig. 2B

Fig. 2 (A, B): Acute chondral injury. T2W coronal (A) and DESS coronal (B) images show a focal chondral defect (arrows).

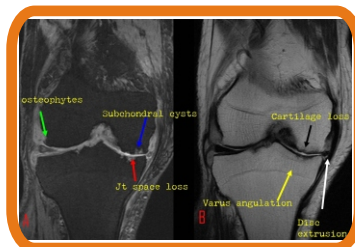


Fig. 3

Fig. 3: Osteoarthritis. DESS coronal (A) and T2W coronal (B) images showing typical bi-compartmental OA of the knee, the medial compartment being more severely involved. The typical findings seen in OA are described.

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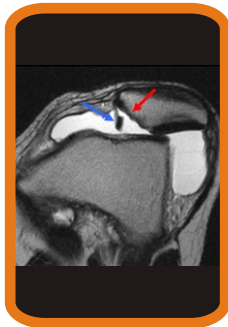


Fig. 4A

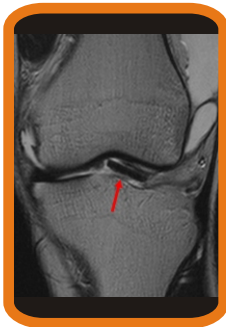


Fig. 4B

Fig. 4 (A, B): Acute patellar chondral injury. T2W axial (A) and coronal (B) images show an acute chondral injury, where the medial patellar cartilage has been sheared away (red arrow), with a small residual flap (blue arrow). The torn cartilage is seen anteriorly in the medial compartment (red arrow in B).



Fig. 5A



Fig. 5B

Fig. 5 (A, B): Acute delamination injury. T2W sagittal (A) and STIR coronal (B) images show a delamination chondral injury, with separation of the cartilage from the underlying cortex (arrows), but without significant displacement as in Fig. 4 and without involvement of the underlying bone as in Fig. 6.



Fig. 6A



Fig. 6B

Fig. 6 (A, B): Acute osteochondral injury. DESS axial (A) and T2W axial (B) images showing an acute osteochondral injury (arrows) with cartilage and bone components.



Fig. 7A



Fig. 7B

Fig. 7 (A, B): Osteochondral lesion talus (OLT). DESS coronal (A) and T2W sagittal (B) images show a focal osteochondral lesion with a bone fragment and cartilage involvement (arrows) involving the talar dome medially. This is usually a result of remote trauma.

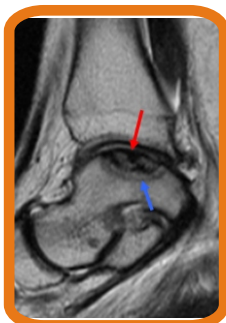


Fig. 8A

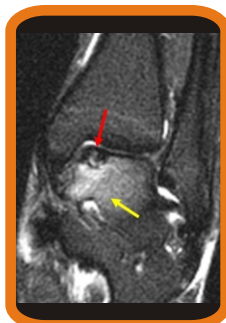


Fig. 8B

Fig. 8 (A, B): Osteochondritis dissecans talus. T2W sagittal (A) and STIR (B) images show a stable OCD of the talar dome with typical involvement of the cartilage and bone. Note the low signal interface between the lesion and bone (blue arrow in A) and the marrow edema (yellow arrow in B).



Fig. 9A



Fig. 9B

Fig. 9 (A, B): Osteochondritis dissecans femoral condyle. T2W sagittal (A) image shows a typical OCD with a separated bone and cartilage fragment (red arrow). Note the high-signal interface (yellow arrow) seen in the DESS coronal (B) image, suggesting an unstable lesion.



Fig. 10

Fig. 10: Chondromalacia patellae. T2W axial image shows swelling of the cartilage with altered signal (yellow arrow), normally seen in Gd 1 disease with fissuring, a hallmark of Gd 2 disease.



Fig. 11

Fig. 11: Chondromalacia patellae. DESS axial image shows significant cartilage loss (arrow) involving the medial patellar facet, suggestive of Gd 4 disease.

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