

Sonographic and power Doppler semeiotics in musculoskeletal disorders

4.1 Cartilage

Sonography has great potential for the non-invasive study of hyaline cartilage, as it can depict microscopic lesions to be demonstrated with a high spatial resolution. The main limit to the sonographic study of articular cartilage is the relatively limited dimensions of acoustic windows available for the visualization of the cartilage surfaces. The most frequent errors in the study of cartilage, especially at knee level, are linked to incorrect examination. The most frequent artifacts come out in suprapatellar panoramic views, as the cartilage profile of the femoral trochlea is not perpendicular to the direction of the US beam. An apparent loss in sharpness of the chondro-synovial margin of the cartilage and an apparent reduction or increase of the cartilage thickness are the main artifacts caused by incorrect technique [2].

Ultrasonography provides rapid and reliable, albeit incomplete, information about the characteristics of articular cartilage, without radiation risk or patient discomfort [3-5].

A wide range of cartilaginous changes can be detected in patients with osteoarthritis and chronic arthritis. These include: *loss of sharpness* of the superficial margin, *loss of transparency* of the cartilaginous layer, *cartilage thinning* and *subchondral bone profile irregularities*.

Osteoarthritis

Cartilage involvement in osteoarthritis ranges from subtle findings to extensive, easily detectable abnormalities [6-8]. Loss of clarity of the cartilage and loss of sharpness of the synovial space-cartilage interface are clearly evident features even in the absence of other US signs of cartilage damage. The integrity of the synovial space-cartilage interface is the main distinguishing feature of healthy subjects, when compared to patients with osteoarthritis (Fig. 4.1). Loss of cartilage transparency could reflect pathological changes such as fibrillation of cartilage and cleft formation.

Blurred and/or irregular margins together with marked cartilage thinning are the most common US findings in advanced osteoarthritis (Fig. 4.2 a, b).

Although standard criteria for assessing US changes in osteoarthritic condylar cartilage are not yet widely accepted, McCune et al. [7] have reported four main abnormalities in patients with knee osteoarthritis that can be regarded as US hallmarks of the disease at different stages. These include loss of cartilage transparency, reduced sharpness of the superficial cartilage margin, increased intensity of the deep cartilage margin and cartilage thinning [8-12].

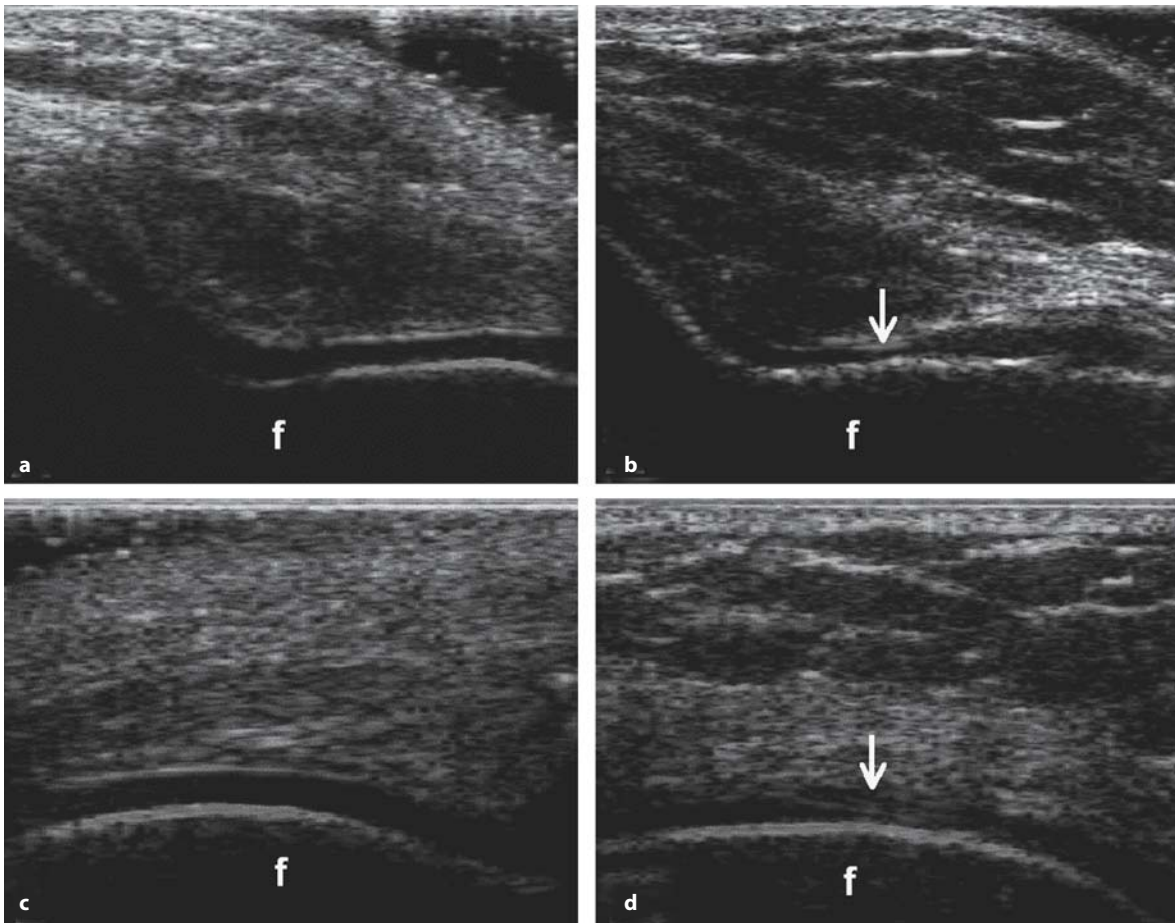


Fig. 4.1 a-d

Osteoarthritis. Transverse (**a,b**) and longitudinal (**c,d**) supra-patellar US scans of the knee. **a,c** Normal cartilage features. **b,d** Loss of sharpness of the superficial margin and circumscribed thinning (arrows) of the cartilage layer of the medial femoral condyle (f)

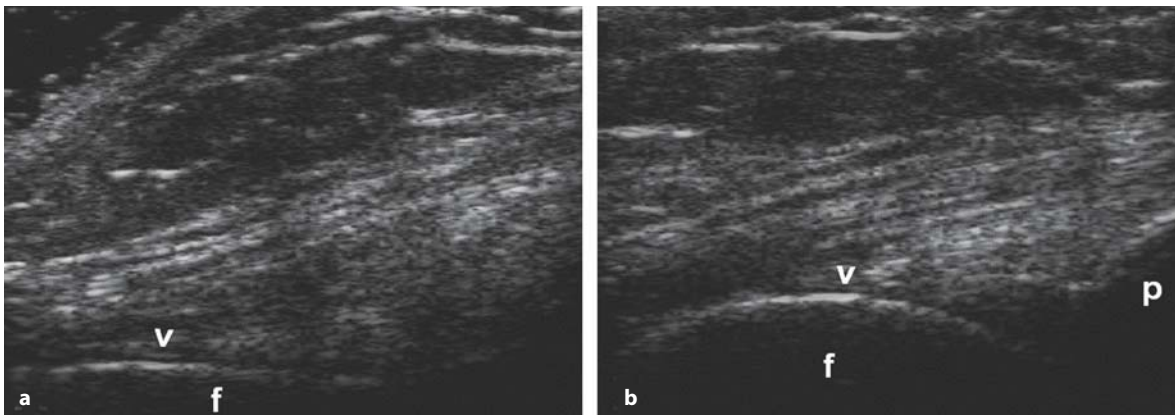


Fig. 4.2 a, b

Osteoarthritis. Transverse (**a**) and longitudinal (**b**) supra-patellar US scans of the knee. Marked diffuse thinning (arrowheads) of the cartilage layer of the lateral femoral condyle (f). p = upper pole of the patella