Ultrasonography and therapy monitoring

US permits accurate and reliable assessment of soft tissue involvement in rheumatic disease [1-3]. High-resolution US with power Doppler equipment can detect even minimal morphostructural and perfusional changes within soft tissues [4-14], and may offer additional information for disease activity monitoring [15-24] (Figs. 6.1-6.6).

Some preliminary investigations suggest that power Doppler US could be successfully incorporated into drug therapy monitoring in patients with

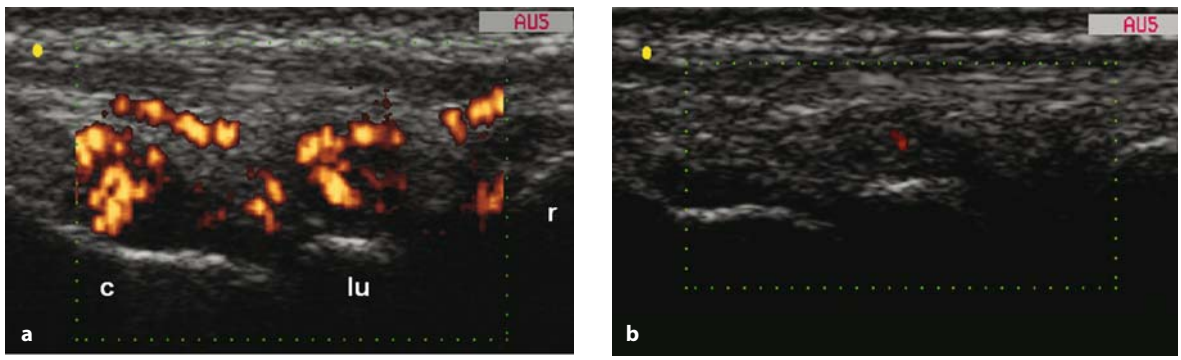

Fig. 6.1 a, b

Rheumatoid arthritis. **a** Baseline US examination with a longitudinal dorsal scan of the wrist joint. An intra-articular injection of triamcinolone acetonide (30 mg) was performed under US guidance. **b** Two weeks after the injection, follow-up US examination detected a dramatic decrease in both joint cavity widening and intra-articular power Doppler signals. *c* = capitate bone; *lu* = lunate bone; *r* = radius

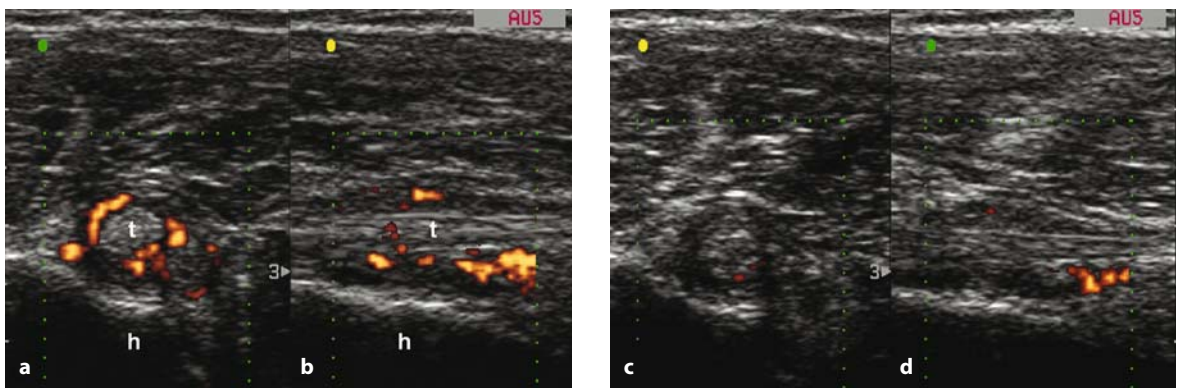

Fig. 6.2 a-d

Rheumatoid arthritis. Baseline US examination on transverse (**a**) and longitudinal (**b**) anterior scans of the shoulder showing active tenosynovitis of the long head of biceps tendon (*t*). An injection of triamcinolone acetonide (30 mg) was performed under US guidance within the tendon sheath. **c**, **d** Two weeks after the injection, follow-up US examination detected a marked reduction of power Doppler signal. *h* = bicipital groove

synovitis, but further verification in larger numbers of patients is required.

Power Doppler US with high-resolution probes can demonstrate a raised blood volume both around and within joints and tendons. These changes occur in patients with synovitis because of increased perfusion and/or angiogenesis. Thus, power Doppler US could play an interesting role in therapy monitoring because of its safety, repeatability and low operative cost.

In patients with active synovitis, power Doppler signal can be identified with appropriate setting of the US equipment. Lack of signal within and under the bone profile and a "pulse repetition frequency" of 700-1000 Hz appear to be the best compromise between the sensitivity and the specificity of power Doppler.

Several limitations of power Doppler US have to be kept in mind. Images are operator-dependent and machine-dependent. Artifacts are com-

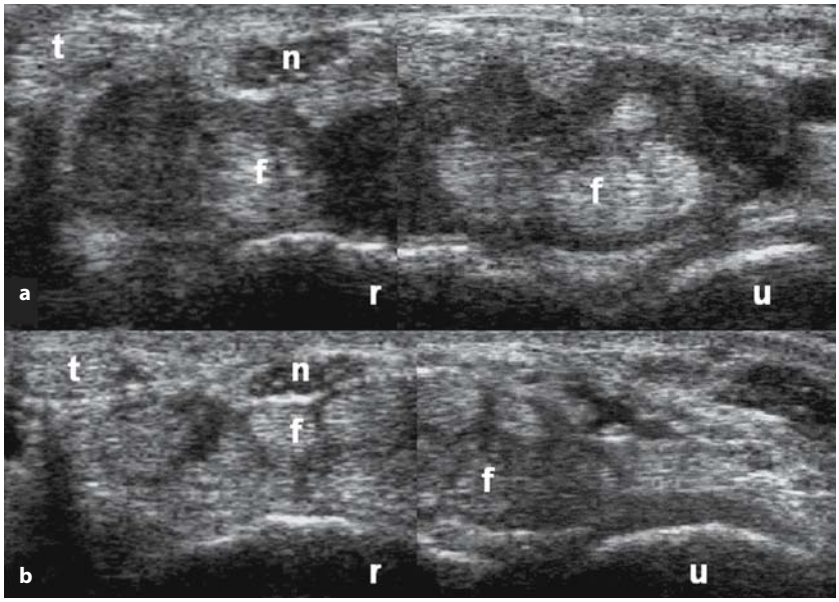

Fig. 6.3 a, b

Rheumatoid arthritis. Carpal tunnel syndrome due to proliferative tenosynovitis of the finger flexor tendons (*f*). **a** Baseline US examination on transverse scan showing marked tendon sheath widening. An injection of triamcinolone acetonide (30 mg) was performed under US guidance within the tendon sheath. **b** Two weeks after the injection, follow-up US examination showed no signs of tenosynovitis. *r* = radius; *u* = ulna; *n* = median nerve; *t* = flexor carpi radialis tendon

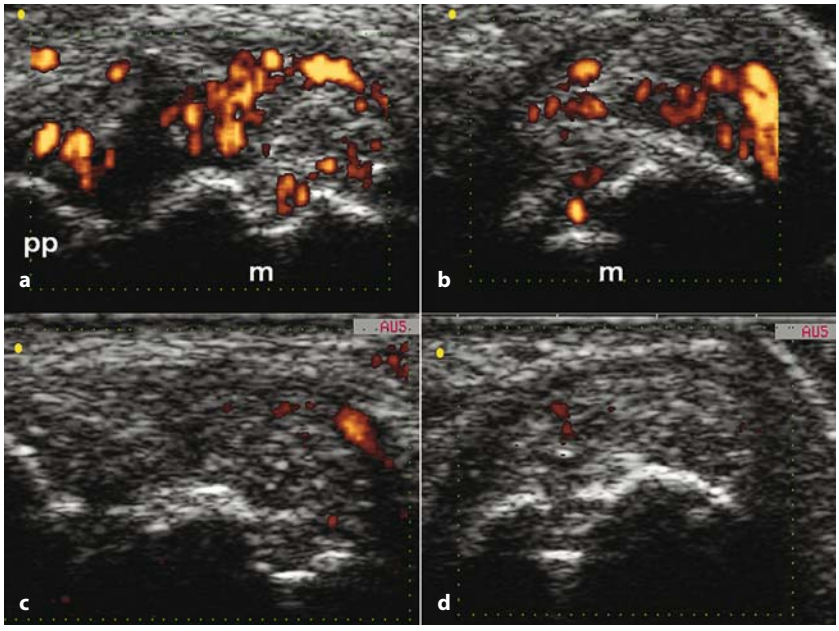

Fig. 6.4 a-d

A 72-year-old man presented with rheumatoid arthritis and active synovitis of the second metacarpophalangeal joint of the dominant hand. **a**, **b** Baseline US examination revealed increased intra-articular perfusion with synovial proliferation localized both around and inside an area of eroded bone at the metacarpal head. **c**, **d** After 3 months of treatment with intramuscular methotrexate (10 mg per week), pain improved (visual analog scale (VAS) score reduced from 9 to 0) and the intra-articular power Doppler signal almost disappeared. *m* = metacarpal head; *pp* = proximal phalanx