



# Sonographic assessment of orthopedic hardware impingement on soft tissues of the limbs

R. Guillin <sup>a</sup>, S. Bianchi <sup>b,\*</sup>

<sup>a</sup> Service de Radiologie, Hôpital Sud, France

<sup>b</sup> CIM Cabinet Imagerie Médicale, Geneva, Switzerland

## KEYWORDS

Sonography;  
Soft tissues;  
Orthopedic hardware.

**Abstract** Ultrasonography allows high-resolution imaging with real-time correlation to patients' pain, and it is an indispensable tool for assessing disorders associated with soft tissue impingement by orthopedic hardware. The sonographic examination in these cases begins with static studies, and images are then obtained during active and passive joint mobilization designed to reproduce the conflict with the orthopedic hardware. Ultrasonography is particularly useful for documenting hardware-induced injury to tendons and synovial bursae, but also those of muscles and vascular structures. The frequency of hardware-soft tissue conflict varies with the site and type of surgical procedure, but in all cases ultrasonography plays an essential role in identifying this type of conflict and assessing the soft tissue lesions it causes.

**Sommario** L'ecografia, per la possibilità di correlare in tempo reale il dolore del paziente con le strutture visualizzate, unitamente a un'eccellente risoluzione spaziale, si è imposta nella valutazione delle sindromi dolorose causate dal conflitto tra il materiale ortopedico e i tessuti molli limitrofi.

La tecnica di esecuzione dell'esame si basa su una prima fase statica e su un secondo tempo, mirato alla mobilizzazione attiva e passiva delle strutture, in modo di cercare di riprodurre il conflitto con il materiale ortopedico.

L'ecografia è particolarmente efficace nell'evidenziare le lesioni dei tendini e delle borse sinoviali da conflitto con materiale ortopedico, ma anche quelle di muscoli e vasi.

La frequenza dei conflitti materiale ortopedico/tessuti molli adiacenti varia a seconda della sede e del tipo di intervento operatorio, in tutti i casi l'ecografia gioca un ruolo essenziale nell'identificazione del conflitto e nella valutazione delle alterazioni patologiche secondarie dei tessuti molli.

© 2012 Elsevier Srl. All rights reserved.

\* Corresponding author. CIM SA, Cabinet Imagerie Medicale, Route de Malagnou 40A, 1208 Geneva, Switzerland.  
E-mail addresses: [cimgeneve@gmail.com](mailto:cimgeneve@gmail.com), [stefanobianchi@bluewin.ch](mailto:stefanobianchi@bluewin.ch) (S. Bianchi).

## Introduction

Orthopedic hardware (OH) used for osteosynthesis or in prostheses differs widely in terms of host tolerability. In patients with fractures, the persistence of symptoms after satisfactory consolidation has been achieved may be an indication for OH ablation [1,2]. Conflict between the OH and adjacent soft tissues is difficult to visualize on standard radiography owing to the presence of overlying bones [3,4], the static nature of the images, insufficient contrast for the soft tissues, and the absence of real-time correlation between the patient's pain and the structures being observed. The use of ultrasonography (US) eliminates all of these problems and offers excellent spatial resolution as well, so it is easy to see why this imaging modality has come to be regarded as an indispensable tool for assessing pain caused by OH-soft tissue conflicts.

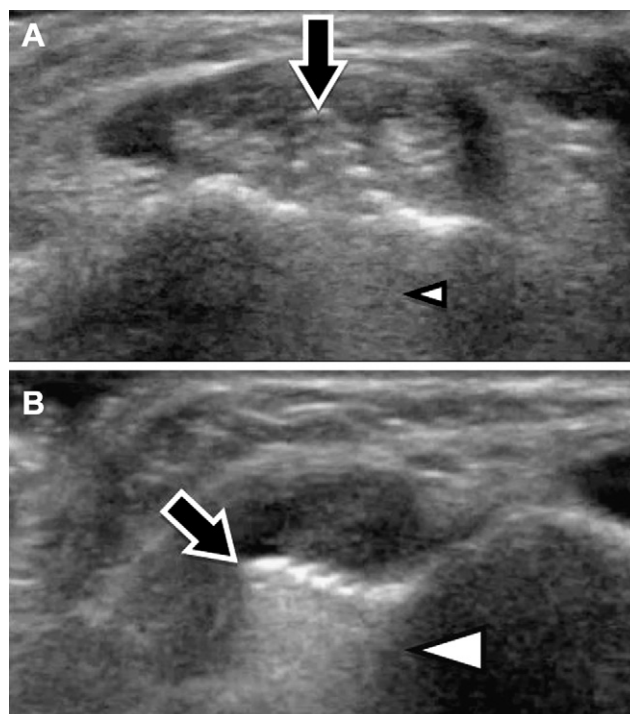
## Examination technique and US appearance of OH

The sonographic assessment begins with a detailed patient history that includes information on the temporal characteristics of the symptoms with respect to the surgical procedure, factors associated with the onset of pain, and the precise location of the pain. The initial phase of the examination includes longitudinal and axial scans aimed at visualizing the entire orthopedic device. If the patient reports focal pain, pressure can be exerted on different structures under real-time ultrasound monitoring to reproduce the symptoms described. The fact that the elicited pain can be correlated with the images being visualized is a fundamental advantage of the sonographic approach. Later in the examination, dynamic imaging can be used during active and passive mobilization of the structures designed to reproduce the OH impingement.

The OH is typically hyperechoic with a characteristic posterior reverberation artifact. In vivo and in vitro studies of the tips of surgical screws show that this artifact increases with the angle of incidence of the US beam (Fig. 1). When doubts arrive, visualization of the tip of the screw can be improved by inclining the transducer so that the angle between the US beam and the screw is as close as possible to 90°.

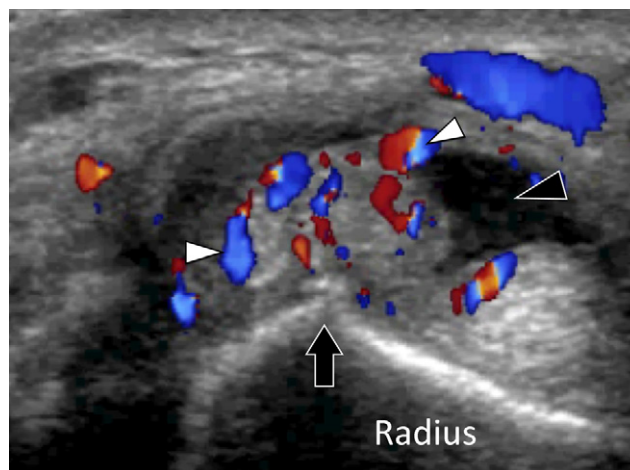
## Lesions of the tendons and synovial bursa secondary to conflict with OH

Inside their osseofibrous tunnels, the tendons (particularly those of the wrist and ankle) are in close contact with the bone plane. For this reason, they are highly vulnerable to trauma during surgical procedures and thereafter, as a result of OH impingement during muscle contraction [4–6]. A tendon that has been damaged by chronic conflict of this type displays local hyperemia on color Doppler imaging and in some cases there is also evidence of tenosynovitis. The latter is manifested by the presence of synovial effusion or hypertrophy of the tendon sheath (Fig. 2). Persistent impingement can result in partial tearing of the tendon, which is reflected by longitudinal



**Figure 1** A. The tip of a screw (arrow) can be seen protruding into the extensor compartment of the wrist. Note the moderately evident posterior reverberation artifact (arrowhead). B. The artifact becomes more obvious when the transducer is inclined.

fissuring or thinning of the tendon. The final stage consists of complete rupture of the tendon, which may be associated with retraction (sometimes quite marked) of the proximal stump [7]. The main objective of the sonographic examination is to make sure that the tendon is not entrapped beneath the plate or within the fracture itself [8], although this complication can usually be avoided by



**Figure 2** The protruding tip of this screw is the cause of tenosynovitis of the extensor carpi radialis tendons (black arrowhead). Note hypervascularization of the tendons (white arrowhead).

Download English Version:

<https://daneshyari.com/en/article/4236770>

Download Persian Version:

<https://daneshyari.com/article/4236770>

[Daneshyari.com](https://daneshyari.com)