may also rarely be seen in athletes due to an avulsive injury of one of the muscles attached to the pubic bones [7].

Regarding Brucellosis infection involving bones and joints, partial or complete obliteration of the joint space in sacroileitis and destruction of the medial end of the clavicle in sternoclavicular arthritis have been reported [2]. In our patient, a lytic lesion surrounded by an ill-defined area of sclerosis and localized destruction of the cortex adjacent to the symphysis pubis were demonstrated. The joint space itself was not affected and the soft tissues were normal. This relatively indolent process is consistent with other reports mentioning that Brucellosis infection usually does not cause joint destruction [3]. Plain X-rays, CT scans and radiosotope studies all contributed to the diagnosis of osteomyelitis with the CT scan giving a more detailed demonstration of the lesion.

Although Brucellosis is not a common disease nowadays it should be included in the differential diagnosis of patients with fever and arthralgia, and it may present as low grade osteomyelitis seen in flat bones such as in the pelvis.

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Case Report: Fibroma of Tendon Sheath in the Distal Forearm With Associated Median Nerve Neuropathy: US, CT and MR Appearances

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A fibroma of tendon sheath has been identified in the distal forearm in a patient presenting with pain and sensory impairment in the distribution of the median nerve. The sonographic CT and MR appearances are reported.

Fibroma of tendon sheath is a rare benign tumour, more frequent in males, composed of fibroblasts embedded in a dense, fibrous stroma. The tumour was fully characterized by Chung and Enzinger [1] who presented a series of 138 cases. Fibromas of tendon sheath are usually well circumscribed masses, small and lobulated, firm or hard, attached to tendon and/or tendon sheath. Typically the fibroblasts are spindle-shaped and the fibrous stroma is markedly collagenized. The pathognomic microscopic feature of this tumour is the presence of numerous thin-walled vascular channels that range from dilated spaces to slitlike structures. Occasionally fibroma of tendon sheath may resemble, focally, fibrous histiocytoma or nodular fascitis and exhibits the same multilobular pattern and attachment to tendon sheath as a giant cell tumour of the tendon sheath. It differs microscopically because of haphazardly arranged fibroblasts embedded within a dense collagen matrix. Unlike the rounded cells of giant cell tumour of tendon sheath, the cells of fibroma of the tendon sheath are predominantly spindle-shaped and there are no associated xanthoma cells or siderophages which are typical findings in giant cell tumour of the tendon sheath.

In the reported case, a fibroma of tendon sheath was detected in the distal forearm in a patient who underwent sonography for suspected carpal tunnel syndrome. To our knowledge, the radiologic appearance of this unusual tumour has not previously been reported.

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CASE REPORT

An 80-year-old, left-handed man presented with pain, numbness and paraesthesia of the fingers of the left hand in the distribution of the median nerve. The wrist and the distal forearm were stiff and swollen but no distinct masses were appreciable at clinical examination. Tinel's sign and Phalen's test were positive; the sensory latency suggested a distal entrapment of the median nerve (3.8 ms left median nerve, 3.2 ms right median nerve palmar surface conduction velocity with antidromic technique). Although these findings are non-specific, sonographic examination of the wrist was performed for suspected carpal tunnel syndrome. No pathologic findings were detected in the carpal tunnel. A solid, hypoechoic, flattened mass about 30 mm × 5 mm in size was identified in distal forearm (Fig. 1). The tumour was in the region of the distal radius and ulna superficial to the pronator quadratus muscle. The median nerve and the flexor tendons were displaced in a radial and superficial direction. No direct involvement of the median nerve by the tumour was appreciable. Further imaging examinations were per-

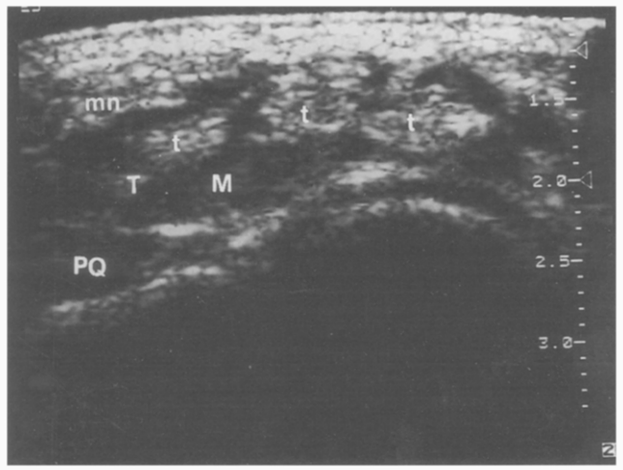
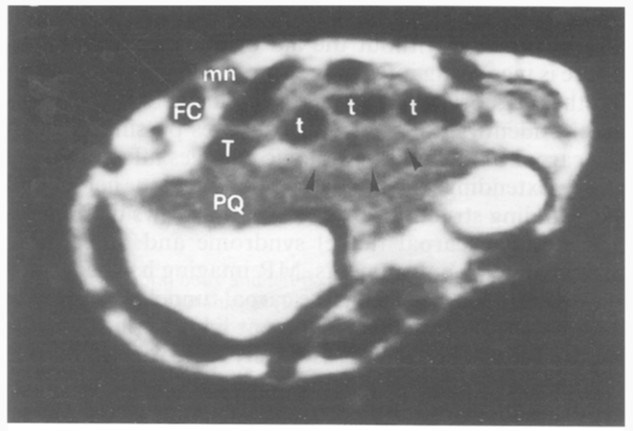
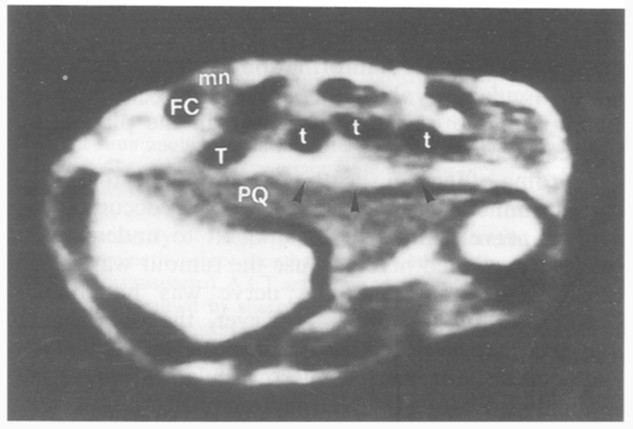


Fig. 1 – Transverse US view of the left forearm above the wrist joint showing a solid dishomogeneous mass and its relationship with adjacent structures (M, mass; T, tendo M. flexoris pollicis longi; t, tendo M. flexoris digitorum profundi; mn, median nerve; PQ, M. pronator quadratus).

formed to attempt preoperative characterization of the mass. Xerographic findings were negative. A low density (mean 33.4 HU) inhomogeneous mass with no significative contrast enhancement was identified at CT examination (Fig. 2). Axial and sagittal MR images were obtained on a 0.5T superconductive unit. Sagittal scans were less informative than the axial images, but provided more accurate information regarding the extent of the tumour cephalad and caudad. A mass of signal intensity similar to muscle with homogeneous contrast enhancement after intravenous administration of gadolinium was identified on T1-weighted images (Fig. 3*a*,*b*). On T2-weighted images the mass was hyperintense when compared with surrounding muscle. A well circumscribed mass was found at surgery displacing and stretching the median nerve and the flexor tendons (Fig. 4). No direct involvement of these structures by the tumour was found. The median nerve was apparently thinned. The mass was attached to the posterior aspect of the tendon sheaths. The tumour was excised and proven histologically to be a fibroma of tendon sheath. One year later the patient remains free of symptoms.



(*a*)



(*b*)

Fig. 3 – (*a*) Axial T1-weighted MR image of the distal forearm (TR = 500, TE = 20, 4 excitations). A muscle-like signal intensity mass (arrowheads) is appreciable (T, tendo M. flexoris pollicis longi; t, tendo M. flexoris digitorum profundi; FC, tendo M. flexoris carpi radialis; mn, median nerve; PQ, M. pronator quadratus). (*b*) Following administration of gadolinium there is an appreciable homogeneous contrast enhancement of the mass (arrowheads).

DISCUSSION

Carpal tunnel syndrome is a relatively common condition resulting from chronic compression of the median nerve in the wrist. Currently, the diagnosis of carpal tunnel syndrome is based mainly on clinical findings and nerve conduction studies, which can be equivocal. Tinel's sign and Phalen's test are easily performed, but they are prone to false-positive and false-negative results; electrophysiologic testing is operator dependent and is normal in up to 5% of patients [2]. Differentiation between carpal tunnel

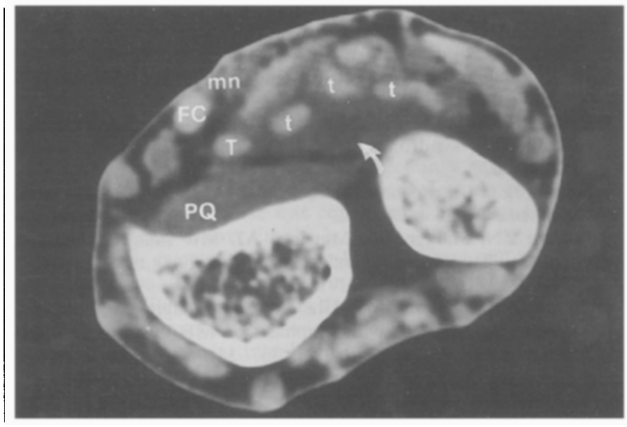


Fig. 2 – Axial CT scan of the left forearm. The relationship of the mass (curved arrow) and adjacent structures are better characterized (T, tendo M. flexoris pollicis longi; t, tendo M. flexoris digitorum profundi; FC, tendo M. flexoris carpi radialis; mn, median nerve; PQ, M. pronator quadratus).

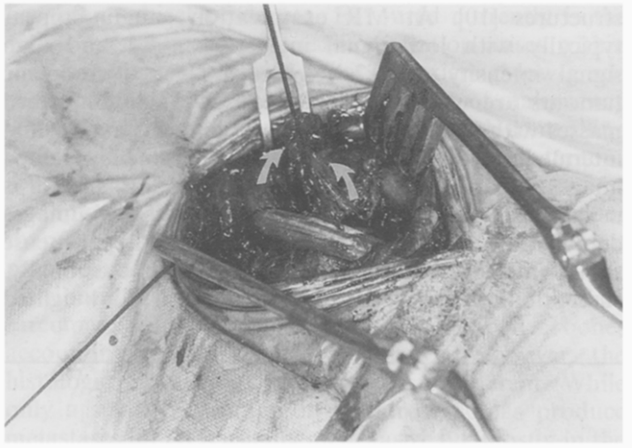


Fig. 4 – Intraoperative photograph demonstrating the partially dissected fibroma (curved arrows).

syndrome and other median nerve entrapments is not always possible without the aid of imaging techniques. There is increasing interest in using imaging modalities to aid the diagnosis of median nerve injuries. Sonography is able to identify both normal structures passing through the carpal tunnel and pathologic changes affecting them [2,3]. Extending the study of the median nerve and surrounding structures in the forearm allows differentiation between carpal tunnel syndrome and other more proximal nerve entrapments. MR imaging has been used successfully for evaluating the carpal tunnel [4], however, its high cost and time requirement limit application for routine clinical use. CT is rarely performed. In our opinion, sonographic examination of the wrist and forearm should be performed routinely in suspected carpal tunnel syndrome.

Soft tissue masses are well known as a possible cause of median nerve pathology [5–7]. The imaging techniques provide accurate information regarding the extent, neurovascular involvement and tendon encasement. These data are particularly helpful in the planning of surgical treatment.

Fibroma of tendon sheath is known as a rare cause of carpal tunnel syndrome [1,8], but the occurrence of median nerve neuropathy is difficult to understand in the case presented here because the tumour was outside the carpal tunnel and the nerve was not directly compressed by the mass. However, the displacement and the increased tension applied to the nerve may compromise intraneural microvascular supply which resulted in disturbed nerve function [9].

The characterization of the different soft tissue masses is difficult. Ganglia, tumours of the nerve sheaths and giant cell tumour of the tendon sheath should be considered as the commonest masses in the wrist and in the distal forearm. Specific diagnosis is usually possible in ganglia, lipoma and giant cell tumour of the tendon sheath.

The imaging findings in the case of fibroma of tendon sheath described here, differ from the typical appearance reported for the most common soft tissue masses in this region. Ganglia are anechoic with well defined margins, while detection of a hypoechoic mass in the course of a nerve is suspicious for a neurogenic tumour, especially if neurologic deficit occurs. Localized giant cell tumour of the tendon sheath usually produces nodules around the small joints of the digits which present as an hypoechoic occasionally lobulated mass adherent to deeper structures [10]. At MR examination ganglia appear typically with low signal intensity on T1 and high signal intensity on T2-weighted images. Neurogenic tumours are usually homogeneous well circumscribed masses with low to medium signal intensity on T1 and intermediate to high signal intensity on T2-weighted images. Giant cell tumour of the tendon sheath is usually isointense to muscle on T1-weighted images demonstrating an inhomogeneously hyperintense signal intensity on T2-weighted images. Occasionally, susceptibility effects are observed on T2-weighted images, which correspond to areas of haemosiderin deposition [10]. This effect manifests as signal void areas in long TR/TE images. Fibromas are usually low signal intensity masses on both T1 and T2-weighted images with minimal contrast enhancement after administration of gadolinium.

At CT ganglia present typically as nonenhancing well circumscribed lesions with liquid density. Neurogenic tumours are usually well defined neoplasms with increased attenuation. Giant cell tumors of the tendon sheath appear as nonhomogenous soft tissue masses with rim enhancement. Occasionally focal areas of increased attenuation (probably haemosiderin deposition) are appreciable in unenhanced images [11].

Various bony abnormalities are usually associated to giant cell tumour of the tendon sheath, probably following pressure injury [10,11].

In conclusion, fibroma of the tendon sheath should be considered in the differential diagnosis of soft tissue lesion in the upper extremity when: (a) a flattened or multilobulated mass is appreciable, adherent to deeper structures, to the tendons and/or the tendon sheaths; (b) the mass is separated by a distinct cleavage plane from the nerves; (c) the tumour is hypoechoic at sonography, isointense to muscle on T1-weighted images and homogeneously hyperintense on T2-weighted images without susceptibility effects. The treatment of choice is surgical. Accurate information regarding the extent of the lesion can be obtained with sonography, CT and MR imaging. These data are particularly helpful in the planning of surgical treatment because recurrence may follow incomplete excision.

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