CASE REPORT

RJME
Romanian Journal of Morphology & Embryology
http://www.rjme.ro/

Ultrasonography role in the evaluation of a giant cell tumor of the flexor *pollicis longus* tendon

MARIUS EUGEN CIUREA[1)], ANANU-FLORENTIN VREJU[2)], DRAGOŞ-GEORGE POPA[1)], RALUCA NICULINA CIUREA[3)], CRISTINA DORINA PÂRVĂNESCU[4)], ANDREEA-BEATRICE CHISĂLĂU[4)], ANCA ROŞU[2)], PAULINA-LUCIA CIUREA[2)]

[1)]*Department of Plastic Surgery and Reconstructive Microsurgery, University of Medicine and Pharmacy of Craiova, Romania*
[2)]*Department of Rheumatology, University of Medicine and Pharmacy of Craiova, Romania*
[3)]*Department of Morphology, University of Medicine and Pharmacy of Craiova, Romania*
[4)]*Department of Rheumatology, Emergency County Hospital, Craiova, Romania*

Abstract

Hand tendons lesions represent a challenge for an accurate diagnosis, an optimal treatment strategy, the description of the lesion and its location being an important step. The non-invasive ultrasound evaluation was demonstrated to be an important diagnostic method in these types of lesions, especially in those situations where clinical evaluation failed to reveal the pathological changes and therefore has an important role in the adequate management.

Keywords: ultrasonography, tendon, hand, giant cell tumor, surgery.

Introduction

The second most frequent mass of the hand are giant cell tumor of tendon sheath (GCTTS), followed by vascular ones, including capillary hemangioma, venous hemangioma, hemangioendothelioma and by lipomas. Histopathologically, GCTTS is characterized by a discrete proliferation of rounded synovial-like cells and a variable number of multi-nucleated giant cells, siderophages, inflammatory cells, xanthoma cells. This tumor was first evidenced by Chassaignac [1], who described it as a "cancer of tendon sheath". On ultrasonography (US), giant cell tumors of the tendon sheath are as well defined solid hypoechoic masses, which arise from the tendon sheath, most commonly on the volar side, close to metacarpophalangeal (MCP) joints [2, 3]. Power Doppler (PD) signal is positive, sometimes peripheral. Remarkable is that during dynamic examination, GCTTS do not move with the tendons [3].

Aim

In this paper, our aim was to present the case of a female patient in which US played a crucial role in establishing surgical indication for hand surgery, with a rare occurrence of a giant cell tumor of the tendon sheath. Appropriate description of this type of tumors is of utmost importance in order to determine an accurate diagnosis and the optimal strategy.

Case presentation

A 41-year-old woman, with diabetes mellitus was admitted in the Department of Plastic Surgery, for painless limitation of right thumb, especially with flexion and a growing mass of the thenar eminence over the last 12 months. Her biological exams showed nothing particular, with slightly increased erythrocyte sedimentation rate (ESR 15 mm/h) and normal C-reactive protein (CRP). Her complete blood count was as follows: white blood cells 6.8×10^3/mm^3, hemoglobin 12.6 g/dL and platelet count 375×10^3/mm^3.

US revealed a heterogeneous, but mostly hypoechoic, well defined solid, inhomogeneous mass of the thenar eminence, in contact to the synovial sheet of the flexor *pollicis longus* tendon, with peripheral PD signal present (Figure 1). Remarkable was that, during dynamic examination, the mass did not move with the tendon.

The hand surgery involved dissection of the palmar superficial layers and highlighting the *flexor pollicis* tendon. Near the tendon, arising from the tendon sheath, we could reveal a tumor, which impeded the tendon to move smoothly. After exhibiting the tendon, the tumor was surgically removed (Figure 2) and the specimen was sent to Department of Pathology for histopathological exam.

Histopathological (HP) examination revealed changes compatible with a giant cell tumor of tendon sheath, localized nodular type (Figure 3). The tumor was well circumscribed, lobulated, with a fibrous capsule of varying thickness (Figure 3A).

The histological appearance of this tumor consisted in a big amount of giant cells, mononuclear cells, xanthoma cells, hemosiderin and collagenization. The tumor was moderately cellular and it contained sheets of round or polygonal cells blending with hypocellular collagenized arias with slightly spindled cells. Cleft-like spaces were present in this case (Figure 3, B and C).

There are present areas of bone metaplasia, which feature is very rare (Figure 3D).

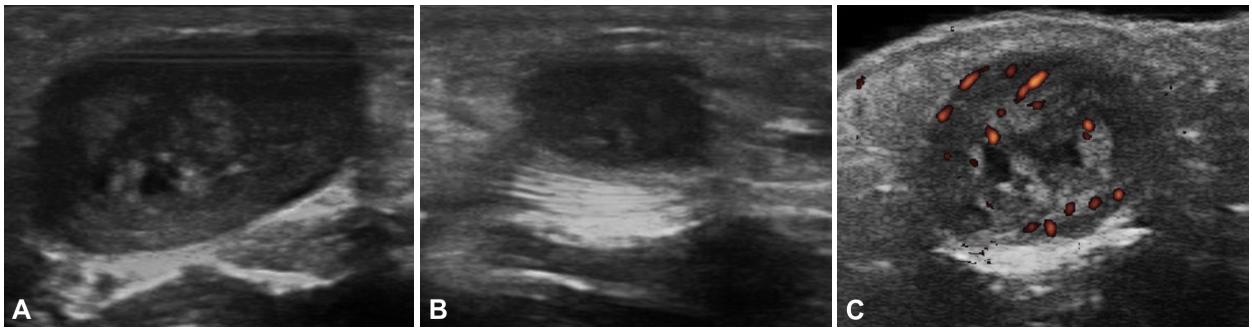

Figure 1 – ***Transverse (A and C) and longitudinal (B) sections, volar aspect, close to the flexor pollicis longus tendon. The hypoechoic, well-defined mass arise from the tendon sheet (A) and was PD positive (C).***

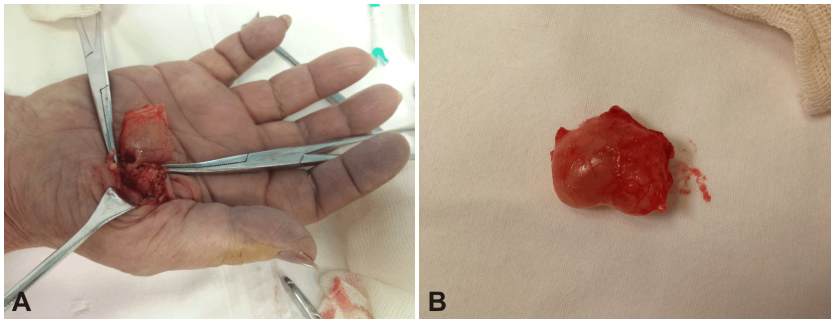

Figure 2 – ***Surgery (A) and macroscopic (B) view of the tumor found.***

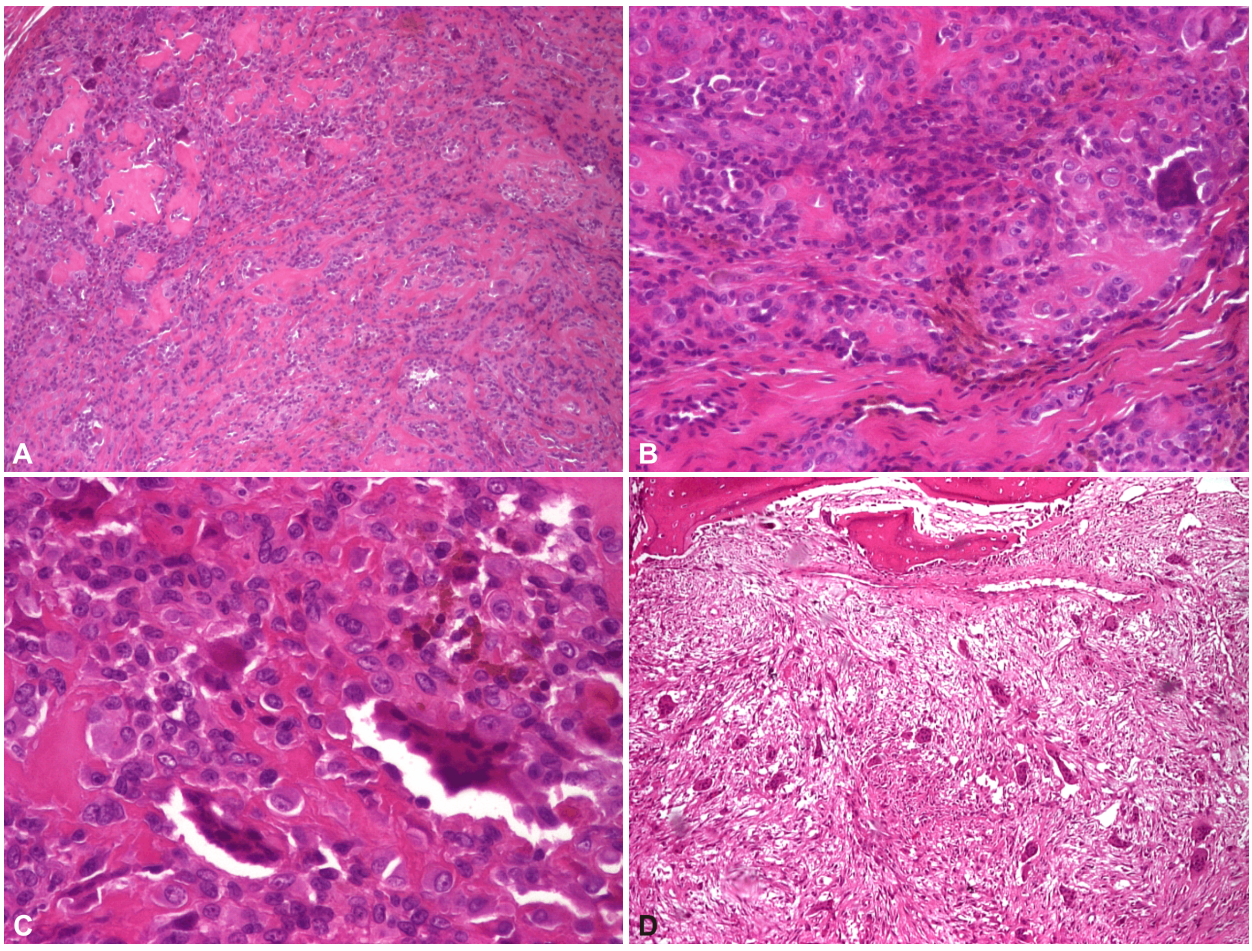

Figure 3 – ***Histopathology images in Hematoxylin–Eosin (HE) staining, showing changes specific to giant cell tumor of the tendon sheet in different magnification: (A) The tumor is lobulated, very well circumscribed by a fibrous capsule (×40); (B) Mononuclear cells and giant cells (×100); (C) Xanthoma cells, intracytoplasmic hemosiderin deposits, collagenization and cleft-like spaces (×200); (D) Areas of bone metaplasia (×40).***

For an accurate diagnosis, it was decided to perform immunohistochemistry and Masson's trichromic special staining. For the immunohistochemical analysis, we used the following antibodies panel: CD34 (CD34 ab81289 EP373Y sodium citrate buffer, pH 6, 1:100 dilution, Abcam) and CD68 mouse monoclonal antibody (clone KP1, Dako, 1:100 dilution, citrate buffer antigen retrieval, pH 6) and for both antibodies was used LSAB–HRP system.

Test results revealed cytoplasmic positivity for CD68 both in giant cells and in mononuclear cells (Figure 4, A and B), while CD34 was negative in tumor cells and positive in the dendritic cell of the tumor stroma (Figure 4C).

Masson's trichromic special staining revealed and sustained the presence of bone metaplasia and collagenization areas (Figure 4D).

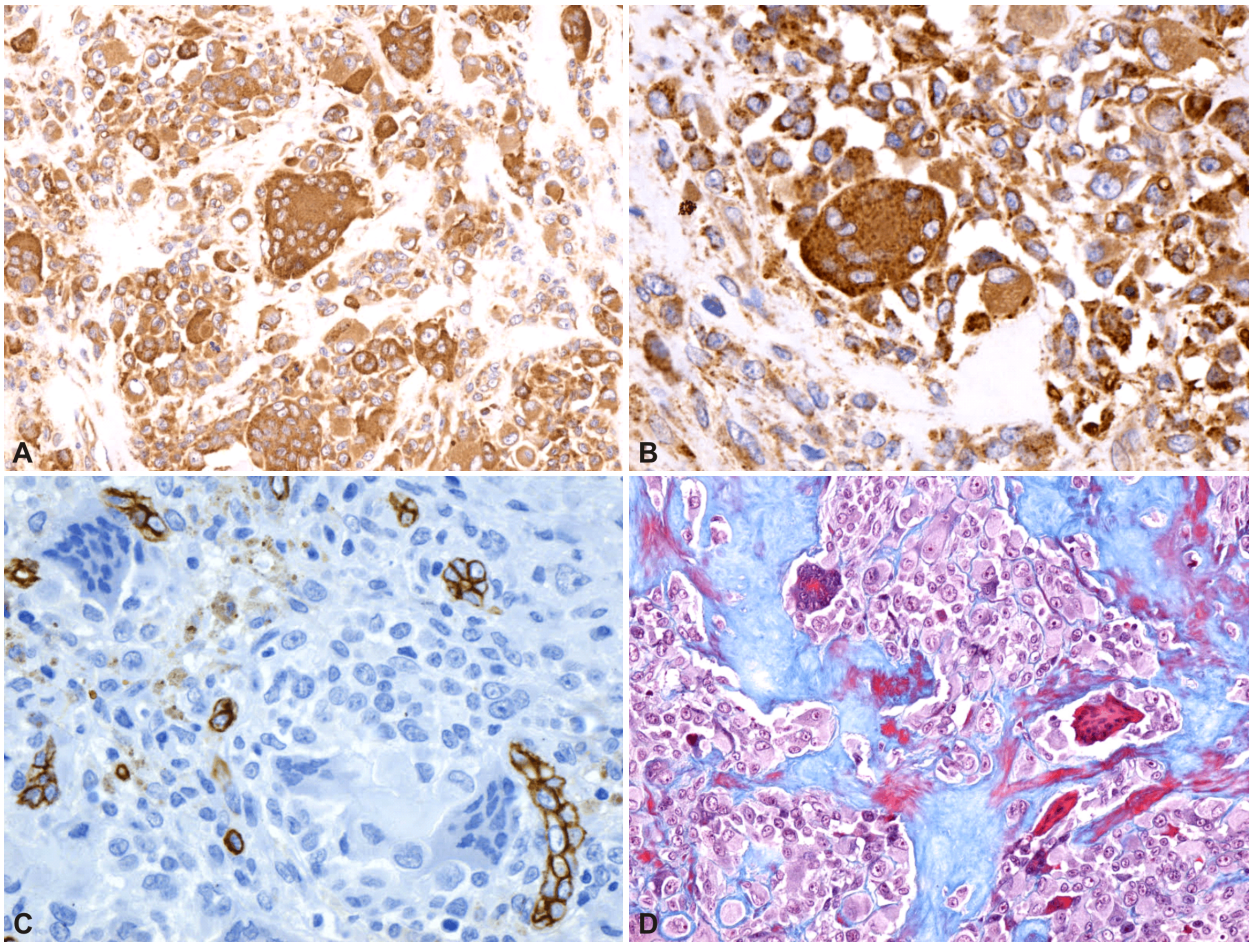

Figure 4 – ***Immunohistochemistry images with CD68 and CD34 staining, and Masson's trichromic special staining: (A) Cytoplasmic positivity for CD68 both in giant cells and in mononuclear cells (×100); (B) Cytoplasmic positivity for CD68 both in giant cells and in mononuclear cells (×200); (C) CD34 was negative in tumoral cells and positive in the dendritic cell of the tumoral stroma (×100); (D) Masson's trichromic special staining showing collagenization areas (×100).***

The patient had a good evolution with functionality resumption of the finger, after four weeks post-surgery. She provided informed consent for all procedures and for using the clinical data for this presentation. All work has been done in accordance with the regulations imposed by the Ethics Committee of the University of Medicine and Pharmacy of Craiova, Romania.

Discussion

GCTTS is a slowly growing benign tumor, considered a localized form of pigmented villonodular synovitis, due to the histological appearance. The diffuse forms of pigmented villonodular synovitis (PVNS) and giant cell tumor (GCT) are classified as fibrohistiocytic tumors by the *World Health Organization* (WHO) [4].

GCT is the most common solid, soft-tissue lesion of the hand [4] and is the second most common mass of the hand, second to ganglion [5–7]. Typically, it is more common in women than men and usually present in the third to fifth decades of life [4, 8].

The optimal treatment is represented by surgical excision, but as recurrence is common if the lesion is not completely removed or if multiple primary lesions, tumors involving the thumb, and erosion of the bone are present [7, 9], an accurate evaluation is important.

Magnetic resonance imaging (MRI) findings of giant cell tumor can be specific, with hypointense to the muscle image in both T1- and T2-weighted series, probably due to presence of hemosiderin. In short *tau* inversion recovery (STIR) fat suppressed sequences, the tumor appears hyperintense, due to high magnetic susceptibility [10]. The non-invasive US evaluation was demonstrated to be an important diagnostic method in tendon lesions, especially in those situations where clinical evaluation

failed to diagnose and therefore has an important role in the adequate management.

Before surgery, US might offer important information related to the structures involved, the cause of the tendon impairment, dimensions and neighborhood of the lesions or masses, allowing both passive and dynamic evaluation. Usually, US shows mostly hypoechoic, well-defined mass, with heterogeneous aspect and increased vascularization on color and PD images [3, 11, 12]. The differential between GCT and the most frequent palpable mass in the hand, the ganglion cyst, can be made using US, as it can discriminate between cystic and tissue appearance. The final diagnosis, though, is accurately made by biopsy and pathological evaluation. Macroscopic pathological findings include well-defined, lobulated mass, with translucent glass-like appearance.

Histopathologically, the mononuclear cells, osteoclast-like cells, epithelioid histiocyte-like cells and xanthoma cells constitute the cellular infiltrate [13]. This tumor, with a histopathological diagnosis that is not usually difficult, is characterized by synovial-like cells and giant cells proliferation, and also of inflammatory cells, siderophages, and xanthoma cells containing characteristically hemosiderin in their cytoplasm [14]. It is grey to yellow-orange in color with brownish areas, depending on the amount of hemosiderin, collagen and present histiocytes. According to the WHO classification system for bone and soft tissue tumors, it is classified as a "fibrohistiocytic tumor" [15–17].

After surgery, US can be useful in screening for local recurrences. Once the lesion is removed, the surrounding area should be inspected for secondary lesions and if present, these should be removed. Recurrence might be frequent, with an average rate of 26.5%, if the tumor was not completely removed. There is increased risk of recurrence if multiple primary lesions and/or tumors involving the thumb are present. The average time to recurrence is usually around two years.

Conclusions

The benefits of US described above provide important support for its use by physicians in their daily practice, in evaluating tendons and soft tissue masses of the hand.

Conflict of interests

The authors declare that they have no conflict of interests.

Contribution note

The first two authors contributed equally to the manuscript.

Acknowledgments

This paper was published under the frame of European Social Fund, Human Resources Development Programme 2007–2013, POSDRU/159/1.5/S/136893.

References

[1] Chassaignac CME. Cancer de la gaine des tendons. Gaz Hosp Civ Milit, 1852, 47:185–190.
[2] Wong DC, Wansaicheong GK, Tsou IY. Ultrasonography of the hand and wrist. Singapore Med J, 2009, 50(2):219–225; quiz 226.
[3] Middleton WD, Patel V, Teefey SA, Boyer MI. Giant cell tumors of the tendon sheath: analysis of sonographic findings. AJR Am J Roentgenol, 2004, 183(2):337–339.
[4] Fletcher CDM, Unni KK, Mertens F. Giant cell tumour of tendon sheath. In: Fletcher CDM, Unni KK, Mertens F (eds). Pathology and genetics of tumours of soft tissue and bone. World Health Organization (WHO) Classification of Tumours, International Agency for Research on Cancer (IARC) Press, Lyon, 2002, 110, 111.
[5] Karasick D, Karasick S. Giant cell tumor of tendon sheath: spectrum of radiologic findings. Skeletal Radiol, 1992, 21(4): 219–224.
[6] Bogumill GP, Sullivan DJ, Baker GI. Tumors of the hand. Clin Orthop Relat Res, 1975, (108):214–222.
[7] Francisco BS, Agarwal JP. Giant cell tumor of tendon sheath in Guyon's canal causing ulnar tunnel syndrome. A case report and review of the literature. Eplasty, 2009, 9:e8.
[8] Myers BW, Masi AT. Pigmented villonodular synovitis and tenosynovitis: a clinical epidemiologic study of 166 cases and literature review. Medicine (Baltimore), 1980, 59(3):223–238.
[9] Grover R, Grobbelaar AO, Richman PI, Smith PJ. Measurement of invasive potential provides an accurate prognostic marker for giant cell tumour of tendon sheath. J Hand Surg Br, 1998, 23(6):728–731.
[10] Bassetti E, Candreva R, Santucci E. Giant cell tumor of the flexor tendon of the wrist: US and MRI evaluation. Case report. J Ultrasound, 2011, 14(1):37–39.
[11] Vreju FA, Ciurea ME, Popa D, Popa F, Parvanescu CD, Chisalau BA, Barbulescu AL, Parvanescu V, Rosu A, Ciurea PL. Ultrasonography in the diagnosis and management of non inflammatory conditions of the hand and wrist. Med Ultrason, 2016, 18(1):90–95.
[12] van Holsbeeck MT, Introcaso JH. Musculoskeletal ultrasound. 2nd edition, Mosby, St. Louis, 2001, 562.
[13] Monaghan H, Salter DM, Al-Nafussi A. Giant cell tumour of tendon sheath (localised nodular tenosynovitis): clinicopathological features of 71 cases. J Clin Pathol, 2001, 54(5):404–407.
[14] O'Connell JX. Pathology of the synovium. Am J Clin Pathol, 2000, 114(5):773–784.
[15] Weiss SW, Goldblum JR. Benign tumors and tumor-like lesions of synovial tissue. 4th edition, CV Mosby Co., St. Louis, MO, 2001, 1037–1062.
[16] Fletcher CDM, Unni KK, Mertens F (eds). Pathology and genetics of tumours of soft tissue and bone. World Health Organization (WHO) Classification of Tumours, International Agency for Research on Cancer (IARC) Press, Lyon, 2002, 112–114.
[17] Di Grazia S, Succi G, Fragetta F, Perrotta RE. Giant cell tumor of tendon sheath: study of 64 cases and review of literature. G Chir, 2013, 34(5–6):149–152.

Corresponding author
Ananu-Florentin Vreju, Lecturer, MD, PhD, MSc, Department of Rheumatology, University of Medicine and Pharmacy of Craiova, 2 Petru Rareş Street, 200349 Craiova, Romania; Phone +40742–060 999, Fax +40251–502 322, e-mail: florin_vreju@yahoo.com

Received: August 18, 2015 *Accepted: April 29, 2016*