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Ultrasound Imaging in Giant Cell Tumor of the Tendon Sheath

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Dear Editor,

Giant cell tumor of the tendon sheath (GCTTS) is a benign tumor, derived from the tendon sheath or the synovium of the joint. It is the second most common subcutaneous tumor of the hand, and it appears more frequently in women than men (ratio 3:2) and in the 3rd–5th decade of life [1–3]. Its etiology is unknown, although it has been suggested a traumatic etiology in some cases [1, 2].

Clinically, it usually appears as a slowly growing, often lobulated, solitary subcutaneous nodule that does not affect the overlying skin. It has a firm or rubbery consistency and is either asymptomatic or slightly tender on touch [1, 3]. It typically appears on the dorsal or volar aspect of the fingers of the hand—more commonly in the distal interphalangeal joint—but also in the ankle-foot region, and extremities, and rarely affects large joints [1, 2].

As the tumor grows, it may acquire a considerable size and cause pain with flexion or distal numbness, or present with close relation to the interphalangeal joint [2, 3]. Rarely, the nail unit may be affected, causing onychodystrophy [2]. GCTTS may also affect the underlying bone, with erosions or bone deformities (9%–25% of cases) [1, 2, 4].

The diagnosis of suspicion is based on clinical history and imaging tests [3]. Nonetheless, the final diagnosis is given by the histopathological examination, showing the presence of histiocyte-like foamy or multinucleated cells and fibroblast-like cells, which typically associate deposits of hemosiderin and hemosiderophages [1, 2, 5, 6]. Thus, conventional surgery with complete removal of the lesion is the treatment of choice [1, 3]. Local recurrence rates reported in the literature are variable, ranging from 6% to 45% of cases [1, 6]. Factors linked to the risk of recurrence are: location adjacent to the interphalangeal joint, previous joint disease, and an incomplete excision [1].

Regarding imaging tests, although some reports described the use of simple radiography and ultrasound in GCTTS [1–3, 5], magnetic resonance imaging (MRI) is still considered the imaging test of choice for its diagnosis [1, 5, 6]. However, MRI is not widely available in all centers and may lengthen the waiting period until surgery. This article aims to describe the sonographic characteristics of GCTTS, and to show its usefulness in the diagnosis and presurgical evaluation.

Three GCTTS cases evaluated in our clinical settings using cutaneous ultrasound are presented, showing its common sonographic findings. Longitudinal and cross-sectional sonography scans with L10- to 22-MHz and L8- to 18-MHz probes were used in all three cases, leading to the diagnosis suspicion, which was later confirmed by histopathological examination after surgical excision.

Case 1. A 79-year-old woman consulted for a 5-year-old asymptomatic tumor in the 4th finger of the left hand. Physical examination revealed a polylobate, indurated, and subcutaneous tumor on the lateral side of the proximal interphalangeal joint (Figure 1a). Sonography scans showed, in B-mode, a hypoechoic, slightly heteroechoic, lobulated,

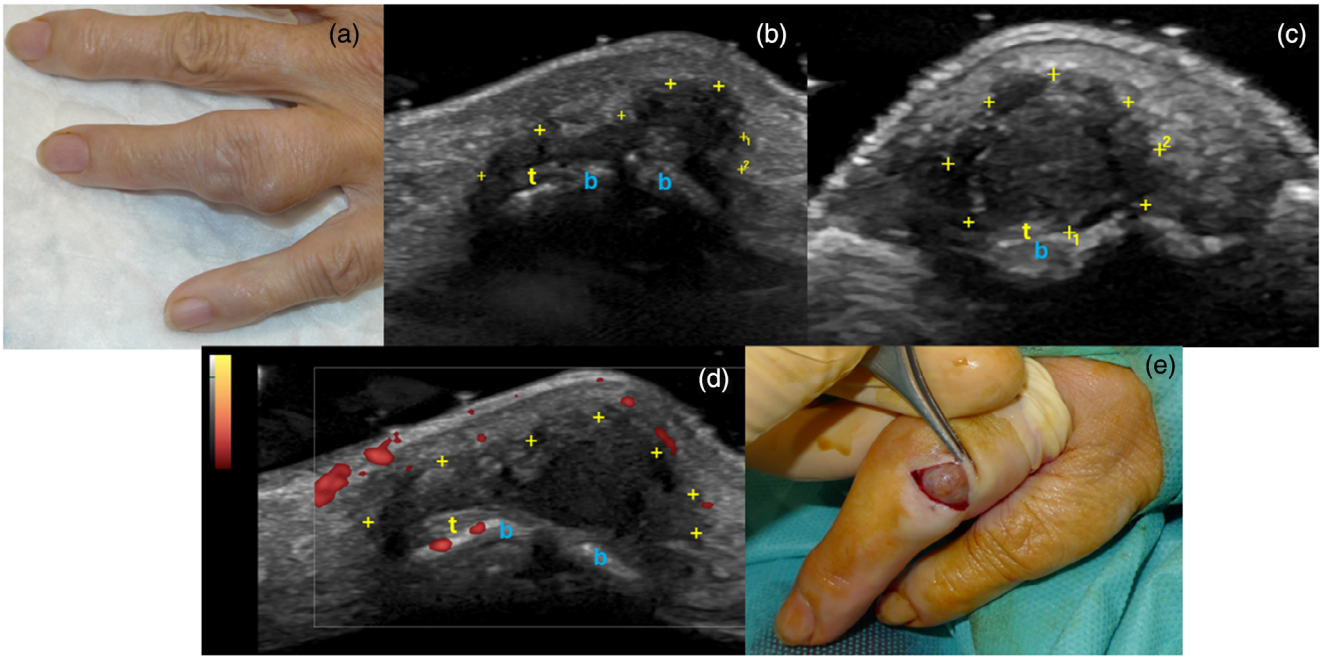

FIGURE 1 | Asymptomatic tumor in the 4th finger of the left hand of a 79-year-old woman. (a) Physical examination revealed a polylobate, indurated on touch, and a subcutaneous tumor on the lateral side of the proximal interphalangeal joint. (b–c) Longitudinal (b) and cross-sectional (c) sonography scans with L10- to 22-MHz and L8- to 18-MHz probes, in B-mode: a hypoechoic, slightly heteroechoic, lobulated, and well-defined (+) lesion, of 1.2 × 0.5 cm of size, adjacent to the tendon (t), and above the bone (b). (d) Power Doppler mode (longitudinal plane): no increase of intralesional vascularization. (e) Intraoperative image showing surgical excision of the lesion.

and well-defined lesion, adjacent to the tendon (Figure 1b-c), without an increase of intralesional vascularization in Power Doppler mode (Figure 1d). Margins were assessed by sonography prior to the surgery, to better delimited the lesion and prevent the risk of recurrence. Surgical excision was performed, under truncal anesthesia of the finger, with direct closure (Figure 1e).

Case 2. A healthy 58-year-old man, presented with a 2-month history of an asymptomatic subcutaneous tumor in the pretibial area of the left leg and elastic on palpation (Figure 2a). Sonography examination in B-mode showed a hypoechoic, oval-shaped, and well-circumscribed lesion in the hypodermis, adjacent to the tendon (Figure 2b). Power Doppler mode did not reveal an intralesional flow signal (Figure 2c). Surgical excision with local anesthesia was finally carried out (Figure 2d).

Case 3. A 69-year-old man consulted for a 2-year-old slowly growing lesion in the 3rd finger of the right hand, slightly painful on touch. Physical examination revealed a rounded, smooth, and firm subcutaneous lesion at the dorsal aspect of the finger. Sonography scans showed, in B-mode, a hypoechoic well-defined subcutaneous lesion, embracing the tendon (Figure 3a), and an increased intralesional vascularization, consisting of small vessels, in Power Doppler mode (Figure 3b).

In the literature review, MRI is considered the imaging study of choice in GCTTS, due to its superior soft tissue resolution and multi-planar capabilities. Nonetheless, this technique is not available in all centers and might lengthen the waiting period until treatment.

High-frequency ultrasonography (HFUS) is a widely available and noninvasive diagnostic tool, which has been increasingly used in dermatology in the last years, proving to be useful in the diagnosis, but also in margins assessment, in a wide range of pathologies [7–10].

Only few reports describe the findings of HFUS in GCTTS, and most of them do not provide ultrasound images [2–6, 11]. To the best of our knowledge, this is the first article describing together the ultrasound findings of three cases of GCTTS and presenting it with sonographic images [3]. The HFUS findings in our case series are similar to those described in the literature, reinforcing the potential paper of ultrasound in the diagnosis of GCTTS. In the fingers, GCTTS presents as a well-circumscribed, hypoechoic, or heteroechoic mass, often lobulated, arranged adjacent to—and often also surrounding—the flexor or extensor tendon sheath. In other locations, it may also appear as well-defined solid hypoechoic subcutaneous nodules [2–6]. Variable degrees of vascularization have been described: from hypovascular lesions to hypervascular tumors with thin and slow-flowing vessels [2–5]. Although the HFUS pattern is not specific, these common findings, showing an intimate relation with the tendon sheath, in a fitting clinical context, should suggest the diagnosis [4]. In addition, sonography can also help in the differential diagnosis of other common subcutaneous lesions of the hand, such as the synovial or the epidermal inclusion cysts [2, 4, 5].

Furthermore, we want to highlight the usefulness of cutaneous ultrasound also in the presurgical evaluation [2, 3, 11], which in our experience allowed a more precise tumor delimitation and election of the best surgical approach, preventing from leaving residual tissue.

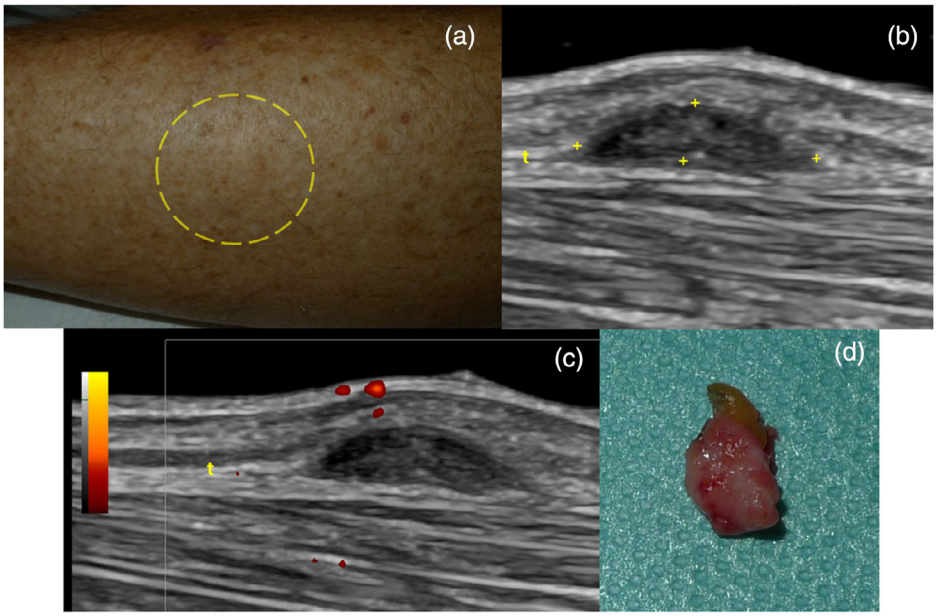

FIGURE 2 | Asymptomatic subcutaneous tumor in the pretibial area of the left leg in a healthy 58-year-old man (a) (yellow circle). (b) Sonographic study with L10- to 22-MHz and L8- to 18-MHz probes. B-mode (longitudinal plane): a hypoechoic, oval, and well-circumscribed (+) lesion in hypodermis, adjacent to the tendon (t). (c) Power Doppler mode (longitudinal plane): no intralesional flow signal. (d) Macroscopic appearance of the lesion after its excision.

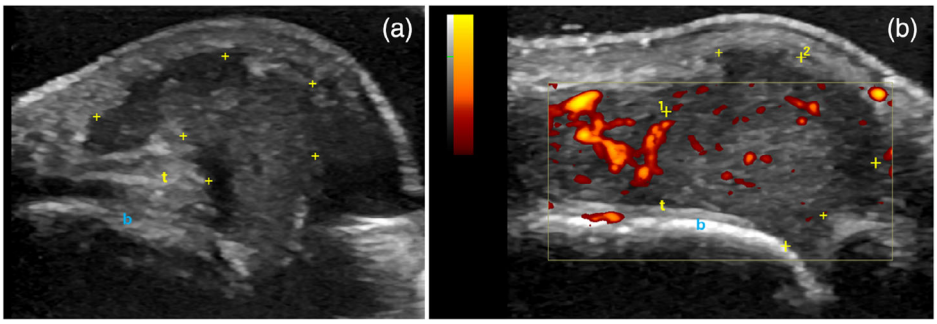

FIGURE 3 | A 2-year-old slowly growing lesion in the dorsal aspect of the 3rd finger of the right hand, in a 69-year-old man. (a) Sonography scans with L10- to 22-MHz and L8- to 18-MHz probes. B-mode (cross-sectional): a hypoechoic well-defined (+) subcutaneous lesion, of 0.6 cm in diameter, embracing the tendon (t), and above the bone (b). (b) Power Doppler mode (cross-sectional): increased intralesional vascularization, with small vessels.

In summary, three cases of GCTTS treated in our clinical setting are presented, showing similar findings on ultrasound examination. Cutaneous ultrasound proved to be an accessible and useful tool in the diagnosis but also in margins assessment, allowing a more precise surgical approach and reducing waiting time until surgery.

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Ethics Statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Consent

Formal consent has been acquired.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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References

1. S. Jadhav, A. Awasthi, S. Deshpande, V. Jadawala, and A. Salwan, "Giant Cell Tumor of Extensor Tendon Sheath in Ring Finger: A Case Report," *Cureus* 14 (2022): 543–556, https://doi.org/10.7759/cureus.29605.

2. X. Wortsman and G. B. E. Jemec, *Dermatologic Ultrasound With Clinical and Histologic Correlations*, New York: Springer, (2013), 1–623, https://doi.org/10.1007/978-1-4614-7184-4/COVER.

3. L. R. Ramos-Pascua, O. A. Guerra-Álvarez, P. Casas-Ramos, and F. Arias-Martín, "Tumor de Células Gigantes de Las Vainas Tendinosas de Los Dedos de La Mano," *Reumatología Clínica* 11 (2015): 252–254, https://doi.org/10.1016/j.reuma.2014.10.004.

4. A. Bueno Horcajadas, J. López Lafuente, R. de la Cruz Burgos, et al., "Ultrasound and MR Findings in Tumor and Tumor-Like Lesions of the Fingers," *European Radiology* 13 (2003): 672–685, https://doi.org/10.1007/s00330-002-1477-0.

5. G. S. Stacy, J. Bonham, A. Chang, and S. Thomas, "Soft-Tissue Tumors of the Hand—Imaging Features," *Canadian Association of Radiologists Journal* 71 (2020): 161–173, https://doi.org/10.1177/0846537119888356.

6. D. Aden, S. Khalid, S. Zaheer, A. K. Dinkar, M. Singh, and S. Ranga, "FNAC Study of Giant Cell Tumor of Tendon Sheath (Localized Tenosynovial Giant Cell Tumor): Clinico-Radiological Correlation and Cytopathological Features," *Diagnostic Cytopathology* 50 (2022): 543–556, https://doi.org/10.1002/dc.25033.

7. J. Verdaguer-Faja, N. Rodríguez-Garijo, C. Arean-Cuns, P. Redondo Bellón, and F. J. García-Martínez, "Cutaneous Ultrasound of the Nuchal-Type Fibroma: Diagnostic Clues and Surgery Planning," *Journal of Ultrasound* (2024), https://doi.org/10.1007/s40477-023-00842-z.

8. G. Chen, X. Leng, W. Liu, J. Meng, and X. Liao, "High-Frequency Ultrasound Findings of Sebaceous Carcinoma in the Eyelid," *Skin Research and Technology* 30 (2024): 11–12, https://doi.org/10.1111/srt.13555.

9. A. Zemtsov, "Skin Ultrasonography and Magnetic Resonance, New Clinical Applications and Instrumentation," *Skin Research and Technology* 30 (2024): 10–13, https://doi.org/10.1111/srt.13633.

10. Y. Miao, W. W. Ren, F. Y. Yang, et al., "Diagnostic Value of High-Frequency Ultrasound (HFUS) in Evaluation of Subcutaneous Lesions," *Skin Research and Technology* 29 (2023): 1–9, https://doi.org/10.1111/srt.13464.

11. S. K. Asaad, R. Bapir, A. M. Salh, et al., "Giant Cell Tumor of the Tendon Sheath in a 5-Year-Old Child; A Case Report," *Annals of Medicine and Surgery* 69 (2021): 102599, https://doi.org/10.1016/j.amsu.2021.102599.