Acquired digital fibrokeratoma: First observation by high-resolution skin ultrasound and line-field confocal optical coherence tomography

Sir,

Acquired digital fibrokeratoma is a rare, benign, fibrous tumour that can occur at interphalangeal or metacarpophalangeal joints of fingers or at the periungual site. It usually occurs in young adults as a small (<1 cm) asymptomatic solitary nodule, gradually increasing in size with no tendency towards spontaneous regression. The pathophysiology is unknown but trauma or chronic irritation have been addressed as possible predisposing factors. Since shaving or curettage usually cause local recurrence, the recommended treatment consists of a surgical excision with adequate free margins along with the basal attachment of the lesion.[1,2]

We herein report a case of an 18-year-old boy, who presented with a cone-shaped lesion, 0.5 cm in diameter, developed at the proximal interphalangeal joint of the 5th finger for ten months [Figure 1]. Close examination revealed a thick, adherent skin-coloured cone with a hyperkeratotic yellowish tip and a depressed whitish "collarette" delimiting the base. Mechanical trauma on the lesion elicited moderate pain. The patient noticed a slow growth for the first four months and then firmness since the past six months.

High-resolution skin ultrasound was performed in Siena University Hospital (Italy) with a 10–22 MHz linear probe (MyLab Twice-Esaote biomedica®, Firenze, Italy) up to 3mm depth.[3] Examination of the base [Figure 1] revealed an oval, homogeneously hyperechogenic structure within the epidermal layer (E), surrounded by two hyperechoic parallel bands due to the hyperkeratotic collarette, with a well-defined posterior shadow cone reaching the papillary dermis and reticular dermis [Figure 2].

Line-field confocal optical coherence tomography (DAMAE Medical®, Paris, France) is a new technique that combines the efficacy of conventional optical coherence tomography and reflectance confocal microscopy, revealing a comprehensive structural mapping of the skin at the cellular level with superior detail. Line-field confocal optical coherence tomography (LC-COT) was performed on lateral surfaces.[4,5] *In vivo* 2D vertical examination highlighted a hyperkeratotic stratum corneum, a normal or focally slightly hyperplastic stratum granulosum, unaltered stratum spinosus and dermo-epidermal junction and a wave-shaped epidermal profile due to the presence of acanthosis. Sweat eccrine glands were visible in 2D [Figure 3] and in the corresponding 3D virtual reconstruction [Figure 4]. The estimated average thickness of the stratum corneum was 260 µm in the lesional area, while it was 77–90 µm at the perilesional healthy skin area (i.e., one cm away from the lesion margin).

The lesion was totally excised for histopathologic examination, confirming the suspicion of acquired digital fibrokeratoma [Figures 5-7]. The clinical-pathological classification proposed by Kint *et al.* includes a type I (i.e., dome-shaped lesion containing collagen bundles, elastic fibres and large capillaries), a type II (i.e., an elongated hyperkeratotic lesion mainly composed by collagen bundles with few elastic fibres), and a type III acquired digital fibrokeratoma (i.e., a flat to dome-shaped lesion characterised by poorly cellular, edematous structure and no elastic fibres).[1,2] Based on clinical appearance i.e., a cone-shape neoformation with a central homogeneous pale-yellow area surrounded by a hyperkeratotic, white squamous collarette and the histologic findings, we assigned a diagnosis of an acquired digital fibrokeratoma type II.

The spectrum of clinical manifestations of acquired digital fibrokeratoma is wide and polymorphic. Thus, proper differential diagnosis with other skin neoformations is needed to allow adequate treatment. Differential diagnosis of type II-acquired digital fibrokeratoma includes elongated/cone-shaped warts, cutaneous horn and periungual and subungual fibromas (Koenen's tumours). However, warts usually exhibit multiple digital projections and hairpin

How to cite this article: Tognetti L, Bertello M, Cinotti E, Rubegni P. Acquired digital fibrokeratoma: First observation by high-resolution skin ultrasound and line field confocal optical coherence tomography. Indian J Dermatol Venereol Leprol 2022;88:275

Received: December, 2020 **Accepted:** October, 2021 **EPub Ahead of Print:** February, 2022 **Published:** February, 2022

DOI: 10.25259/IJDVL_1236_20 **PMID:** 35138053

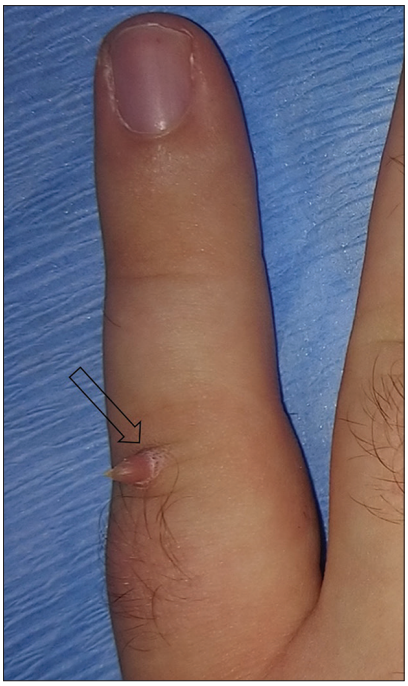

Figure 1: Clinical appearance of the patient's left hand at presentation time: Acquired digital fibrokeratoma type II developed over the proximal interphalangeal joint

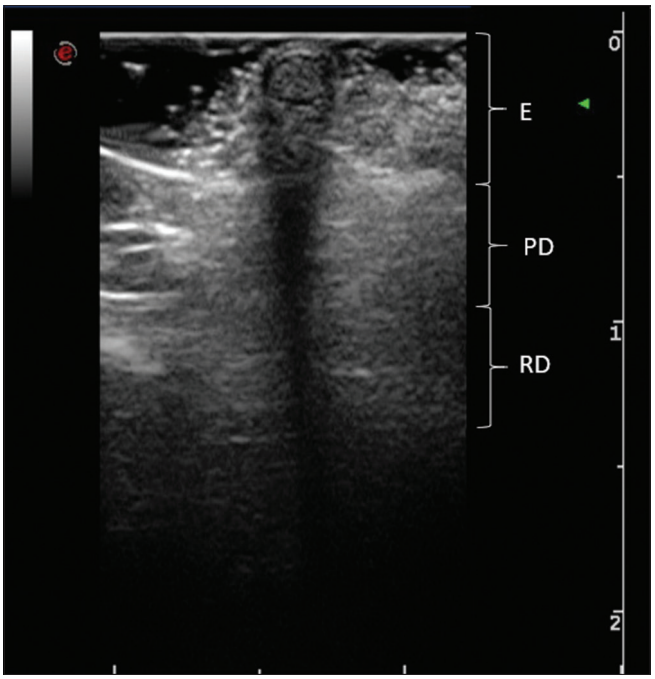

Figure 2: Ultrasound examination 22 MHz performed positioning the probe across the base of the lesion (Fig. 1, arrow) revealed a homogeneously hyperechoic oval structure corresponding to the transversal section within the epidermis (E), surrounded by a hyperkeratotic collarette with the double echoic parallel bands (railway sign), and a well-defined posterior shadow cone extending to the papillary dermis (PD) and reticular dermis (RD)

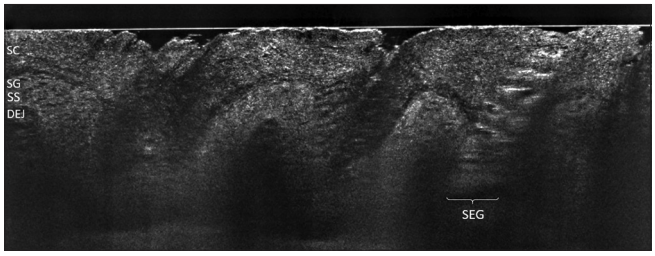

Figure 3: Vertical *in vivo* 2D line-field optical coherence tomography examination carried over the lesion at 500 µm showing an hyperkeratotic stratum corneum (SC) along with normal stratum granulosum (SG), stratum spinosum (SS) and dermo-epidermal junction (DEJ) and unaltered sweat eccrine gland (SEG) profile

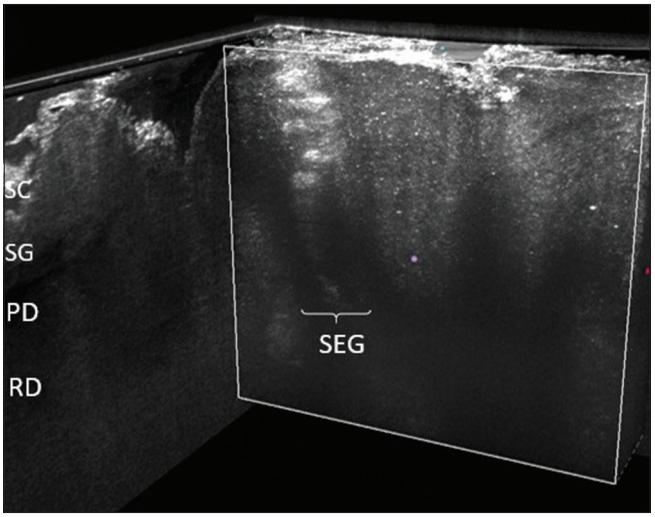

Figure 4: The 3D virtual "cube" reconstruction of 1200 µm × 500 µm × 500 µm (MinIP software, 3DSlicer version 4.10.2) of the same lesional site: the sweat eccrine gland structure is well visible across the epidermis and papillary dermis. [SC: stratum corneum, SG: stratum granulosum, PD: papillary dermis; RD: reticular dermis; SEG: sweat eccrine gland]

vessels under dermoscopy, the cutaneous horn is uncommon in young patients and has a different histology and Koenen's tumours occur at peri/subungueal sites in the context of sclerosis tuberosa (50% of cases) phenotype. Furthermore, type I-acquired digital fibrokeratoma should be differentiated from rudimentary supernumerary digit. However, this one is congenital and symptomatic due to presence of neural elements in the papillary dermis. Finally, type III-acquired digital fibrokeratoma occurring at fingertips/nail fold area can be mistaken with a pyogenic granuloma or a superficial acral fibromyxoma. Notably, both exhibit gelatinous consistency at palpation, while the acquired digital fibrokeratoma is parenchymatous.[1,2]

To the best of our knowledge, this is the first report of a combined non-invasive and invasive examination of type II acquired digital fibrokeratoma, investigated by high-resolution skin ultrasound, line-field confocal optical coherence tomography and histopathology.

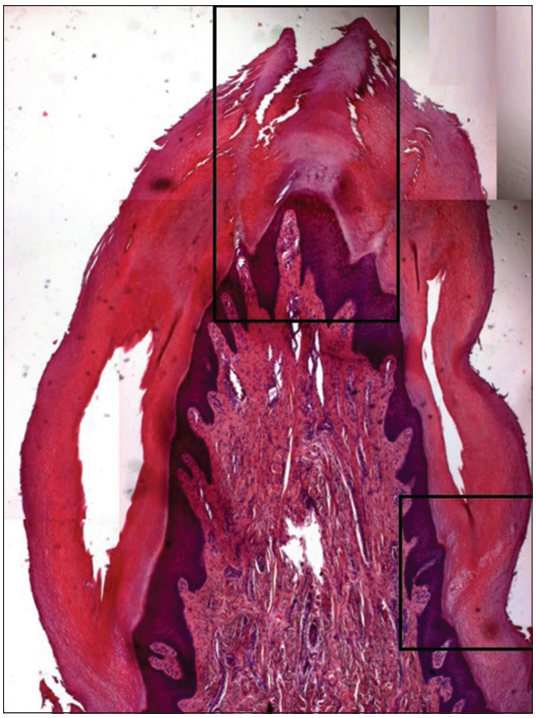

Figure 5: Histopathological section of the lesion (H&E, 25×OM) showing a core composed by thick, interwoven bundles of collagen with scarce elastic fibres and few capillaries predominantly oriented along the main axis of the lesion.

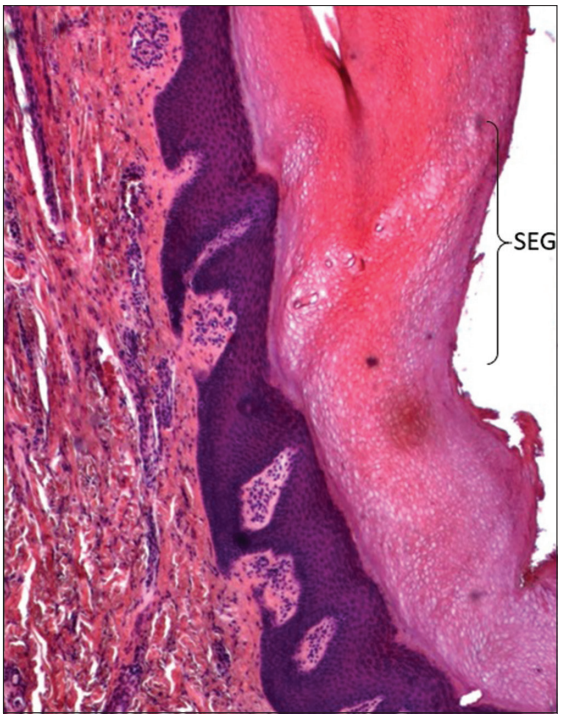

Figure 6: Closer examination (H&E, 50×OM) of the lateral part of the lesion (Fig.5, square) revealed a hyperkeratotic epidermis with mild acanthosis and visible structure of the sweat eccrine glands (SEG)

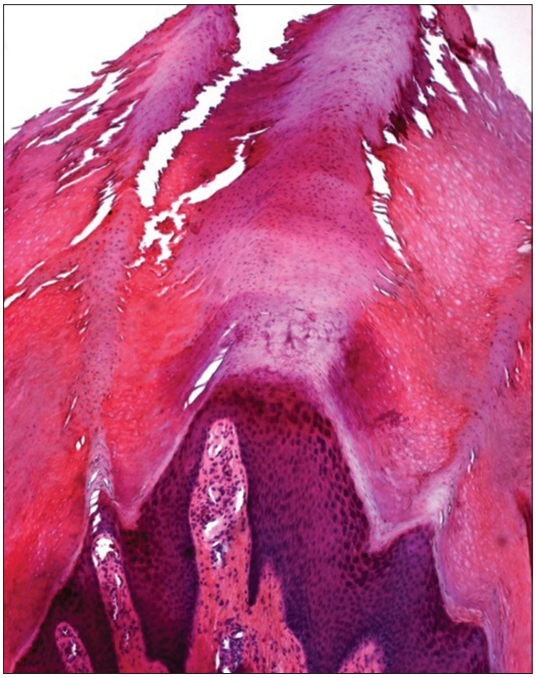

Figure 7: Closer examination (H&E, 50×OM) of the distal part of the lesion (Fig.5, square) revealed a hyperkeratotic epidermis with mild acanthosis

High-resolution skin ultrasound is a rapid, effective, largely available and pain-free technique that can support dermatologists in the differential diagnosis of skin neoformations in daily practice.[3] In our case, high-resolution skin ultrasound allowed us to define the exact localisation of the lesion, the morphology of the base and the collarette and to study the intense posterior shadow cone generated by a dense structure [Figure 2]. The line-field confocal optical coherence tomography technique allows to explore in real time, a skin lesional area up to the papillary dermis, both 2D [Figure 3] and 3D [Figure 4]. When combined together, the high-resolution skin ultrasound and line-field confocal optical coherence tomography can provide a detailed morphological, *in vivo* vertical view of the epidermal layers and adnexa structures and possibly reach a tri-dimensional "virtual histology" matching with standard histologic examination.[4,5]

Using non-invasive techniques can support physicians to properly recognize an acquired digital fibrokeratoma type-II lesion from their simulators in clinical activity and to assess adequate surgical excision margins.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Linda Tognetti, Martina Bertello, Elisa Cinotti, Pietro Rubegni

Dermatology Unit, Department of Medical, Surgical and Neurosciences, University of Siena, Siena (Italy)

Corresponding author:
Dr. Martina Bertello,
Hospital "S. Maria alle Scotte", viale Bracci 16, 53100 Siena (Italy).
bertellomartina@hotmail.com

References

1. Shih S, Khachemoune A. Acquired digital fibrokeratoma: Review of its clinical and dermoscopic features and differential diagnosis. Int J Dermatol 2019;58:151-8.
2. Rubegni P, Poggiali S, Lamberti A, Chiantini A, de Paola M, Peccianti C, *et al*. Dermoscopy of acquired digital fibrokeratoma. Australas J Dermatol 2012;53:47-8.
3. Tognetti L, Cinotti E, Perrot JL, Neri G, Pianigiani E, Fimiani M, *et al*. Preliminary experience of the use of high-resolution skin ultrasound for the evaluation of extrathyroidal manifestations of Graves' disease and response to UVA-1 phototherapy. Photodermatol Photoimmunol Photomed 2019;35:129-31.
4. Monnier J, Tognetti L, Miyamoto M, Suppa M, Cinotti E, Fontaine M, *et al*. *In vivo* characterization of healthy human skin with a novel, non-invasive imaging technique: Line-field confocal optical coherence tomography. J Eur Acad Dermatol Venereol 2020;34:2914-21.
5. Tognetti L, Fiorani D, Suppa M, Cinotti E, Fontaine M, Marmol VD, *et al*. Examination of circumscribed palmar hypokeratosis with line-field confocal optical coherence tomography: Dermoscopic, ultrasonographic and histopathologic correlates. Indian J Dermatol Venereol Leprol 2020;86:206-8.