Scanning electron microscopy of dermatofibroma*

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Abstract: Dermatofibroma is a proliferation of spindle cells located in the dermis. We used scanning electron microscopy to examine two histologically confirmed lesions and observed preserved collagen bundles in the perilesional area. In the lesional area, the collagen was denser, without formation of bundles. Higher magnification showed collagen with mesh-like appearance similar to stretched tufts of cotton. Very high magnification evidenced the tufts of cotton and spindle cells measuring 2 to 12 microns.

Keywords: Collagen; Histiocytoma, Benign Fibrous; Microscopy, Electron, Scanning

INTRODUCTION

Dermatofibroma (DFB) or fibrous histiocytoma is a proliferation of spindle cells located in the dermis, made up of a mixture of fibroblasts, collagen, and blood vessels. Several variants have been described. Histological features of some variants can coexist in the same lesion.[1]

In recent years, immunohistochemical studies have demonstrated factor XIIIa-positive dendritic cells, which may be involved in the genesis of DFB.[2]

DFB is one of the most common skin lesions, accounting for approximately 3% of skin lesion specimens received by dermatopathology laboratories.[3] Other histological variants described to date include aneurysmal, hemosiderotic, cellular, epithelioid, lipidized, clear cell, palisading, atrophic, keloidal, granular cell, myxoid, lichenoid, balloon cell, and signet ring cell variants. [4-8]

Dermatofibroma is composed of cells with round to oval shape and is a dermal nodule measuring less than 1 cm in diameter. Simple excision is usually curative, and local recurrence is rare.

Histologically, DFB is defined as a proliferation of spindle cells in variable proportions that are arranged in short woven fascicles and histiocyte-like cells mixed with inflammatory and foamy siderophage cells in the dermis.

We report here the three-dimensional, ultrastructural findings of two DFB cases with scanning electron microscopy.

RESULTS

A 46-year-old woman expressed her desire to have two dermatofibromas removed for aesthetic reasons. The excised fragment was cut in half; half was fixed in formalin for light microcopy and half in glutaraldehyde for scanning electron microscopy.

The findings were similar in the two lesions. Light microscopy with hematoxylin & eosin showed cell proliferation immersed in collagen without formation of bundles in the dermis (Figures 1a and b) and normal collagen bundles still observed in the lower portion of the fragment (Figure 1a). Higher magnification showed spindle-shaped cells in the affected area (Figure 1c). Weigert's stain revealed diminished density of elastic fibers in the area of fibroblast proliferation (Figure 1d).

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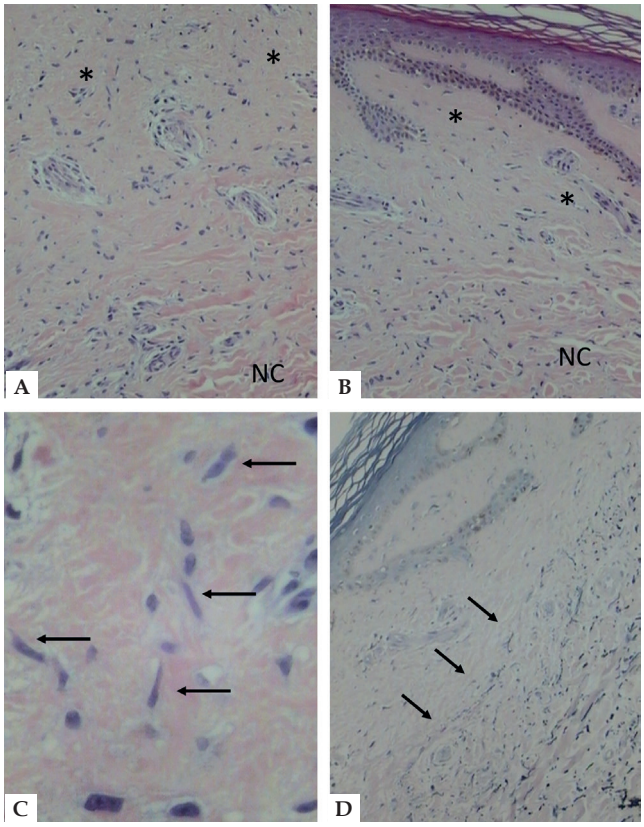

Figure 1: Light Microscopy - **A -** Collagen homogenization with cell proliferation (asterisks) with normal collagen in the lower portion (NC) (hematoxylin & eosin, x150). **B -** similar aspect in the lesion border, with involvement of the papillary dermis (hematoxylin & eosin, x150). **C -** detail of the fusiform cells (arrows) (hematoxylin & eosin, x400). **D -** diminished elastic fibers in the homogenous area, with clear demarcation of normal elastic tissue (arrows) in the lower portion (Weigert's stain, x150)

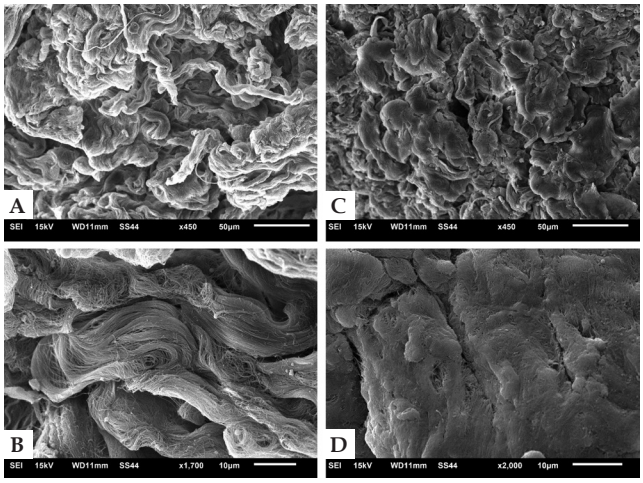

Figure 2: Scanning electron microscopy. **A -** Low magnification of the perilesional area with normal collagen bundles (x450). **B -** Higher magnification of normal collagen bundles (x1.700). **C -** Low magnification of the lesional area with compact tufted collagen (x450). **D -** Higher magnification of affected compacted collagen (x2.000)

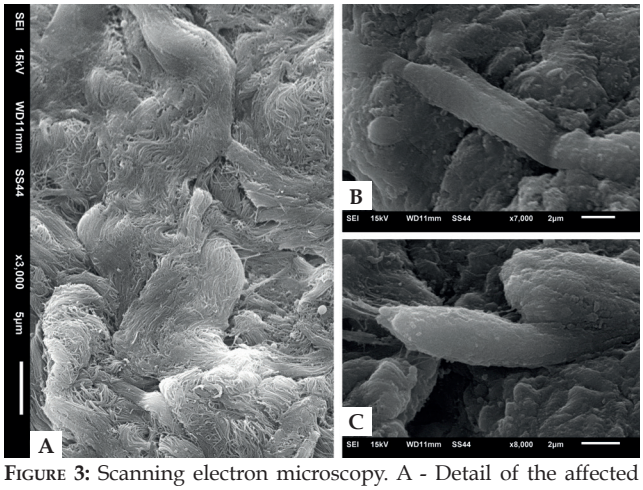

Figure 3: Scanning electron microscopy. A - Detail of the affected area with tufted collagen without bundle formation (x3.000). **B e C -** Detail of fusiform cells, measuring 2 to 12 microns (x7,000 and x8,000)

Scanning electron microscopy (SEM) showed preserved collagen bundles in the perilesional area (Figures 2a and b). In the lesional area, the collagen appeared denser, with no bundle formation (Figure 2c). Higher magnification showed collagen with mesh-like appearance similar to stretched tufts of cotton (Figure 2d). Very high magnification evidenced the "cotton tufts" (Figure 3a) and spindle cells measuring 2-12 microns (Figures 3b and c).

DISCUSSION

We found no reports in our literature review of three-dimensional analysis of DFB using SEM, but only studies with transmission electron microscopy, which only provides a two-dimensional analysis.[9]

Our findings demonstrated that, in addition to the proliferation of cells, there were important changes in dermal collagen on light microscopy which revealed no bundle formation and reduction of elastic fibers in the affected area, confirming the changes in the normal dermal structure. Three-dimensional analysis identified the loss of normal configuration of collagen, which was entangled and not in bundles. Spindle cells could also be identified.

This structural modification in the dermis with changes in collagen configuration associated with the loss of elastic fibers may account for the typical fibrotic feeling of DFB on palpation.❑

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