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Case Series

A Case Series of Collagenous Fibroma (Desmoplastic Fibroblastoma): Clinicopathologic Study of 7 Cases

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Abstract

Background: Collagenous fibroma (desmoplasticfibroblastoma) is a rare benign fibroblastic soft tissue tumor. It typically involves subcutis or skeletal muscle, but occasionally primarily involves the dermis. We present a case series of 7 cases with varied anatomic distribution.

Methods: Cases of skin lesion presenting with nodule/swelling and histomorphologically diagnosed as collagenous fibroma over a period of 4 years (2022–2025) were included. Malignancies, autoimmune diseases, and skin adnexal lesions were excluded.

Results: Seven cases were identified comprising four women and three men, ranging in age from 29 to 61 years (mean 41 years). Tumors involved the right trunk (1), forehead (1), left index finger (1), hard palate (1), left arm (1), right forearm (1), and right middle finger (1). Each case demonstrated a hypocellular proliferation of bland stellate to spindled fibroblasts in a collagenous stroma without cellular atypia, mitotic activity, or necrosis. All patients were treated by simple surgical excision with no recurrence on follow-up.

Conclusions: Collagenous fibroma may present at varied anatomic locations and poses a potential diagnostic challenge. Recognition of characteristic histopathologic features and awareness of this entity within the differential diagnosis of fibrous soft tissue tumors is essential for accurate diagnosis.

Keywords: collagenous fibroma, desmoplasticfibroblastoma, soft tissue tumor, benign fibrous neoplasm.

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Introduction

Collagenous fibroma/desmoplasticfibroblastoma is a rare benign fibroblastic soft tissue tumor mainly affecting men. It typically involves the subcutis or skeletal muscle, but occasionally it primarily involves the dermis. It presents as a slowly growing, painless subcutaneous mass of long duration mainly in adults. The most common sites are the soft tissues of the upper extremities, including the shoulder, upper arm, and forearm, followed by the lower extremity; rare lesions have been reported in other sites, including the oral cavity and genital region.[1-3] Desmoplasticfibroblastoma was first described in a seven-case series by Evans in 1995. It is a benign fibroblastic/myofibroblastic neoplasm, typically composed of medium-sized to large stellate fibroblasts sparsely distributed in a fibromyxoid to densely fibrous background. As this lesion is seldom encountered in dermatopathology practice, it represents a potential source of diagnostic difficulty for practicing general pathologists. [1] We present a case series of seven collagenous fibromas, including involvement of the forearm and finger, to heighten awareness of this entity.

Materials and Methods

After obtaining the appropriate Institutional Review Board approval, cases of skin lesion presenting with nodule or swelling and histomorphologically diagnosed as collagenous fibroma over a 4-year period (2022–2025) were included in this study. The clinicopathologic features were recorded. Cases were retrieved from the departmental archives, and for all included

cases, hematoxylin and eosin-stained slides were reviewed and the diagnoses confirmed. Immunohistochemical stain results were recorded as positive or negative (if less than 5% of the lesional cells demonstrated immunoreactivity). Malignancies, autoimmune diseases, and skin adnexal lesions were excluded from this study. Only cases with available material and confirmed histomorphological features of collagenous fibroma were included for final analysis.

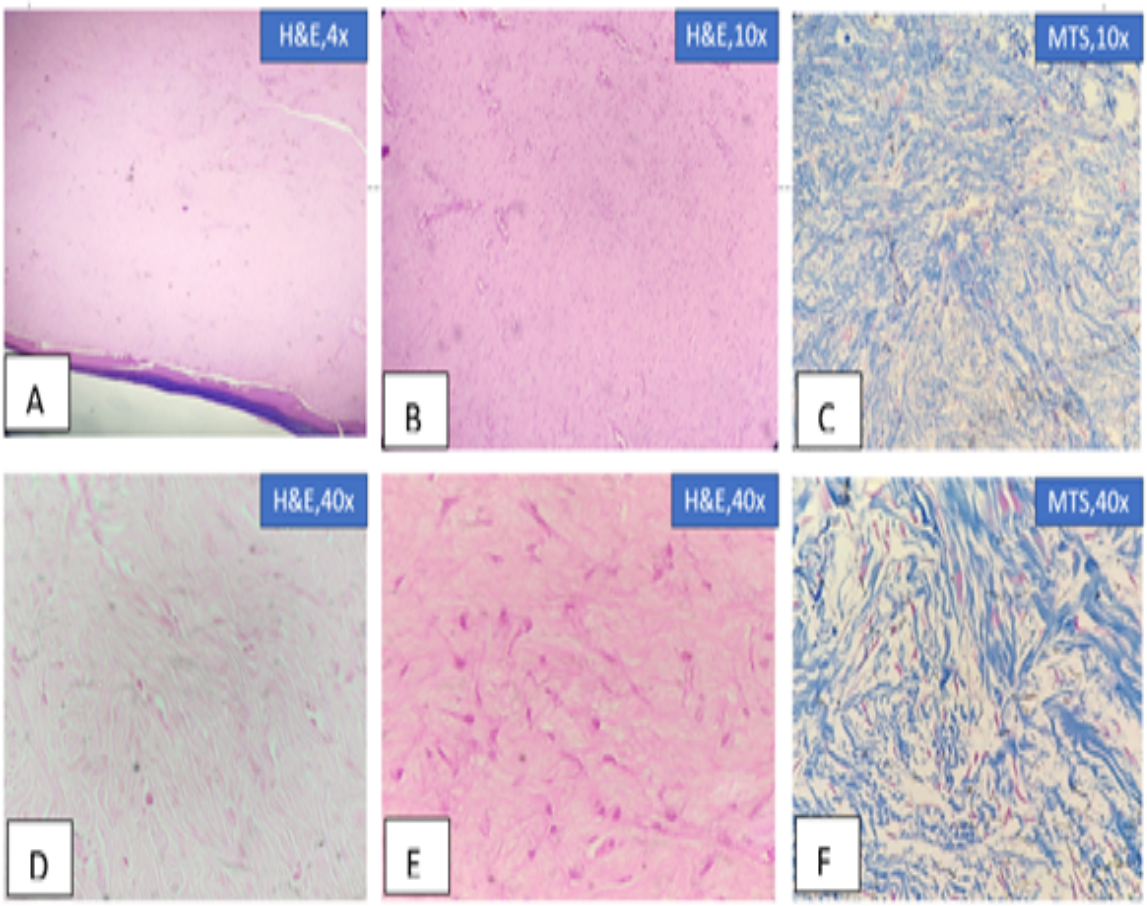

Figure 1 A. H&E Image of Collagenous fibroma, 4x; B. H&E Image of Collagenous fibroma, 10x; C. Masson's trichrome stain (MTS) Image of Collagenous fibroma, 10x; D. H&E Image of Collagenous fibroma, 40x; E. H&E Image of Collagenous fibroma, 40x; F. Masson's trichrome stain (MTS) Image of Collagenous fibroma, 40x

Results

Seven cases of collagenous fibroma were identified over the study period. The patients comprised four women and three men, ranging in age from 29 to 61 years (mean 41 years). Literature review recorded a male preponderance, but in our study there was a slight predilection towards female sex. The clinicopathologic features of all cases are summarized in Table 1. The tumors were located at the right side of the trunk, forehead, left index finger, hard palate, left arm, right forearm, and right middle finger. All lesions were solitary and presented with masses that had been slowly growing. Histologically, each case demonstrated the characteristic features of collagenous fibroma: a well-circumscribed lesion composed of collagenized fibrous stroma arranged haphazardly and interspersed with spindle-shaped fibroblasts. No evidence of cellular atypia, mitotic activity, or necrosis was seen in any of the cases. The surgical margins were uninvolved in all cases.

The patients were treated by simple surgical excision. Follow-up information was available in all cases and no tumor recurred or metastasized.

Table 1: Clinicopathologic characteristics of 7 cases of collagenous fibroma

Case	Age (years)	Gender	Location	Duration	Histologic findings
1	61	Female	Right trunk	3 years	Hypocellular fibroblastic proliferation; dense collagenous stroma; no atypia
2	39	Male	Forehead	1 year	Hypocellular fibroblastic proliferation; dense collagenous stroma; no atypia
3	31	Male	Left index finger	3 months	Hypocellular fibroblastic proliferation; dense collagenous stroma; no atypia
4	38	Female	Hard palate	6 months	Hypocellular fibroblastic proliferation; dense collagenous stroma; no atypia
5	42	Female	Left arm	8 months	Hypocellular fibroblastic proliferation; dense collagenous stroma; no atypia
6	46	Male	Right forearm	1.5 years	Hypocellular fibroblastic proliferation; dense collagenous stroma; no atypia
7	29	Female	Right middle finger	4 months	Hypocellular fibroblastic proliferation; dense collagenous stroma; no atypia

Case Reports

Case 1: A 61-year-old woman presented with a slowly enlarging, painless nodule over the right trunk of three years' duration. Clinical examination revealed a firm, mobile, subcutaneous mass without overlying skin changes. The lesion was excised, and histopathologic examination demonstrated a well-circumscribed, hypocellular proliferation of bland, stellate to spindled fibroblasts within a densely collagenous stroma. No cytologic atypia, mitotic activity, or necrosis was identified, and surgical margins were free of tumor. The patient remained recurrence-free on follow-up.

Case 2: A 39-year-old man presented with a one-year history of a slow-growing, painless subcutaneous nodule on the forehead. The lesion was clinically well-defined and non-tender. Excisional biopsy showed a hypocellular fibroblastic proliferation set within a dense collagenous stroma, with bland nuclear features and no mitotic activity or necrosis. Margins were uninvolved, and no recurrence was noted at follow-up.

Case 3: A 31-year-old man presented with a three-month history of a small, firm nodule on the left index finger, without associated pain or functional limitation. The lesion was excised with clear margins. Histopathology revealed the characteristic hypocellular fibroblastic proliferation in a densely collagenized stroma without cytologic atypia or increased mitotic activity. Follow-up showed no evidence of recurrence.

Case 4: A 38-year-old woman presented with a six-month history of a painless swelling of the hard palate, noted incidentally during a routine dental examination. Excisional biopsy was performed, and histopathologic evaluation demonstrated a hypocellular spindle cell proliferation within a collagenous stroma, consistent with collagenous fibroma. No atypia, mitoses, or necrosis were identified, and the patient remained disease-free on follow-up.

Case 5: A 42-year-old woman presented with an eight-month history of a slowly enlarging, painless mass on the left arm. The lesion was well-circumscribed on clinical examination and was excised in its entirety. Microscopic examination revealed a hypocellular proliferation of bland fibroblasts in a dense collagenous background, without atypia, mitotic activity, or necrosis. Margins were clear, and no recurrence was observed at follow-up.

Case 6: A 46-year-old man presented with a slowly enlarging, painless subcutaneous nodule over the right forearm of approximately one and a half years' duration. Clinical examination revealed a firm, well-circumscribed, non-tender mass without overlying skin changes or neurovascular involvement. The lesion was excised, and histopathologic examination demonstrated a hypocellular proliferation of bland, stellate to spindled fibroblasts within a densely collagenous stroma, without cytologic atypia, mitotic activity, or necrosis. Surgical margins were free of tumor, and the patient remained recurrence-free on follow-up.

Case 7: A 29-year-old woman presented with a four-month history of a small, firm, painless nodule involving the right middle finger, with no associated functional limitation or sensory disturbance. The lesion was excised with clear margins. Histopathologic evaluation revealed a hypocellular fibroblastic proliferation within a dense collagenous stroma, with bland nuclear features and no evidence of atypia, mitotic activity, or necrosis. Follow-up revealed no recurrence.

Discussion

Desmoplasticfibroblastoma, also known as collagenous fibroma, is a rare benign soft tissue tumor that typically arises in the subcutis or deep soft tissue, though it may occur across a wide variety of anatomic locations including the oral cavity and genital region.[1,2] As it is seldom

encountered involving the dermis, it represents a potential source of diagnostic difficulty for general pathologists and dermatopathologists who are not accustomed to encountering such cases in routine practice.1 Herein, we present a case series of seven collagenous fibromas, expanding the recognized anatomic spectrum to include the forearm and a digit (middle finger), with the intention of raising awareness of this entity and describing its clinicopathologic characteristics.

Histopathologically, desmoplasticfibroblastoma typically presents as a well-circumscribed, firm, non-encapsulated lesion composed of bland, stellate fibroblasts with elongated cytoplasmic processes set within a paucicellular, sclerotic to focally myxoid stroma with few, if any, small-calibre vessels. Atypia or increased mitotic activity should not be observed.[2,3] Collagenous fibromas are usually small lesions measuring 1 to 4 cm in diameter, although examples up to 20 cm have been reported.[3,4] All of the lesions in the differential diagnosis are, on average, more cellular than desmoplastic fibroblastoma.[2,3,4]

Clinicopathologic analyses have further characterized the superficial variant of this tumor, confirming its predilection for subcutaneous tissue and the dermis, while highlighting the diagnostic challenges posed by its location.[4,5]

Notably, the tumor has also been reported to mimic other entities on imaging, such as tenosynovial giant cell tumor, further underscoring the need for pathologic confirmation, particularly for acral lesions such as those involving the finger.[6,7]

Immunohistochemically, the lesional cells show variable actin positivity consistent with myofibroblastic differentiation, while stains for desmin, CD34, S-100 protein, and keratins/EMA are typically negative, as corroborated in our series.[2] Cytogenetically, these lesions share an 11q12 rearrangement, and subsequent microarray analysis has revealed upregulation of FOSL1 mRNA.[2,3] This finding has led to the development of FOSL1 immunohistochemical staining as a practical diagnostic tool. Kato et al. demonstrated that diffuse strong nuclear FOSL1 expression is specific to desmoplasticfibroblastoma and was negative or only focally equivocal in fibroma of tendon sheath.[8] More recently, De Noon et al. confirmed recurrent FOSL1 rearrangements in desmoplasticfibroblastoma by RNA sequencing, with 90% concordance between FOSL1 immunohistochemistry and molecular findings, further validating FOSL1 as a reliable and practical diagnostic marker.[9]

Low-grade fibromyxoid sarcoma (LGFMS) may also present as a superficial tumor involving the dermis and therefore enters the differential diagnosis.10 Histopathologically, LGFMS is of low to moderate cellularity and is composed of deceptively bland spindle-shaped cells arranged in fascicles with alternating collagenous and myxoid areas. The cells display only mild nuclear atypia with low mitotic activity. Prominent networks of curvilinear and branching capillary-sized blood vessels in the myxoid zones are characteristic of LGFMS and are not observed in desmoplastic fibroblastoma.[10] The overwhelming majority of LGFMS harbors a t(7;16) translocation involving FUS and CREB3L2 genes. Gene expression profiling has identified MUC4 gene overexpression, which led to the development of MUC4 immunohistochemical staining as a highly sensitive and specific marker, reported as positive in 100% of LGFMS cases while being negative across a broad panel of other soft tissue tumors.[10] Out of all the differential diagnoses, recognition of LGFMS is the most crucial, as these are true sarcomas with a propensity for local recurrence and late distant metastasis. Accordingly, pathologists and dermatopathologists should maintain a very low threshold for obtaining MUC4 immunohistochemical staining to exclude LGFMS.[10]

Neurofibroma is a benign nerve sheath tumor that may arise in both deep and superficial soft tissue compartments.[11] Histopathologically, it is characterized by a more cellular, haphazard arrangement of short, comma-shaped spindled cells with rounded tips set in a variably myxoid fibrillary stroma. Mast cells and ropey collagen bundles are frequently identified. S-100 protein and SOX10 immunohistochemical staining reliably distinguishes neurofibroma from desmoplastic fibroblastoma.[2,11]

Similar to desmoplasticfibroblastoma, perineurioma may be somewhat paucicellular and display a sclerotic to myxoid background. However, storiform, whorled, and/or lamellar architecture along with characteristic crack-like artifactual spaces are not typical features of desmoplasticfibroblastoma. In addition, the cells in perineurioma are spindled rather than the plump stellate cells with tapering nuclei, pale eosinophilic cytoplasm, and indistinct cell borders characteristic of desmoplasticfibroblastoma. EMA and GLUT1 immunohistochemical staining reliably differentiates these two entities.[2]

Fibroma of tendon sheath is a well-circumscribed proliferation of spindle cells within a collagenous stroma with peripheral slit-like vessels and occasional cracking artifacts.[2] This entity is a particularly important consideration for acral lesions, such as those involving the fingers, given the overlapping anatomic predilection. A subset of fibromas of tendon sheath harbors USP6 rearrangements, suggesting a relationship to nodular fasciitis or myofibroblastoma.[12] While a

subset of fibromas of tendon sheath has been found to share the cytogenetic abnormality involving 11q12 rearrangement with desmoplasticfibroblastoma, subsequent microarray analysis revealed upregulation of FOSL1 mRNA specifically in desmoplasticfibroblastoma, providing a basis for immunohistochemical distinction.[8,9] From a practical standpoint, fibroma of tendon sheath typically does not involve the dermis and is characteristically attached to a tendon sheath, further aiding in distinction from desmoplastic fibroblastoma.[2]

Desmoid-type fibromatosis is characteristically composed of moderately cellular to hypercellular long, sweeping fascicles of uniform spindled cells with long, thick-walled vessels and perivascular stromal edema.13 However, hypocellular variants more closely mimicking desmoplasticfibroblastoma have been described, and mitotic figures may be observed.13,14 Staining with beta-catenin demonstrates cytoplasmic and nuclear positivity in desmoid fibromatosis, in contrast to desmoplasticfibroblastoma, which is beta-catenin negative.[13,14] Nodular fasciitis has a broad histopathologic spectrum. Classically, it is composed of stellate to spindled cells in a variably cellular stroma, usually with cystic degeneration and extravasated erythrocytes. Late-stage lesions may be less cellular; however, keloidal collagen fibers are typically present and these lesions remain more cellular than desmoplasticfibroblastoma. Immunoreactivity for smooth muscle actin and USP6 rearrangements are identified in most cases.[2]

Calcifying fibrous tumor primarily affects children and young adults and is distinguished by its characteristic psammomatous or dystrophic calcifications and a prominent lymphoplasmacytic infiltrate, features that are entirely absent in desmoplastic fibroblastoma.[15] Elastofibroma, usually found in the subscapular region in older adults, is characterized by pathognomonic wavy eosinophilic elastic fibers within its stroma, which are entirely absent in desmoplastic fibroblastoma.16 Furthermore, elastofibroma is regarded as a reactive fibrous proliferation rather than a true neoplasm, in contrast to the recurrent cytogenetic abnormality supporting the neoplastic nature of collagenous fibroma.[2,16]

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