

NEW ASPECTS ABOUT THE AETHIOPATHOGENESIS OF AN OLD DISEASE - DUPUYTREN'S CONTRACTURE

Millesi H.¹, Hausner T.^{2,3}, Schmidhammer R.^{1,3}

1: Millesi Centre for Surgery of Peripheral Nerves, Vienna, Austria

2: Lorenz Boehler Trauma Hospital, Vienna Austria

3: Austrian Cluster for Tissue Regeneration, Vienna, Austria

Introduction

Dupuytren's Contracture (DD) is regarded by the overwhelming majority of the authors of the last 30 years as a fibromatosis. It starts with a cell proliferation of fibroblasts, mainly myofibroblasts. Fibrous bands are formed which shrink and cause contractures of digits. Related diseases are Ledderhose's disease (LD) at the sole of the foot and Peironie`disease (PD) at the penis. These three diseases, especially DD and LD have many features in common and are completely different in relation to other fibromatosis.

Material & Methods

We studied Dupuytren's contracture and Ledderhose's disease by clinical functional observations, by anatomical observations during surgical exposures and by histomorphometric analysis of tissue gained during surgery.

Results

Anatomy

DD and LD involve the **superficial fascia** of the palmar side of the hand and the plantar side of the foot. In the subcutaneous level there is a fibro-fatty layer down to the finger well suited for pressure absorbing.

Underneath the subcutis another layer of loose connective tissue fills the space between subcutis and deep fascia of the palm covering the interossei muscles. This tissue separates the spaces for the flexor tendons, the neurovascular bundles for the digits, envelopes the fat bodies of the thenar, the hypothenar and the monticuli at the basis of the fingers. This tissue forms a transverse connective tissue band in the palm and two bands under the web of the first interdigital fold. A network of this fibersystem fills the distal half of the palm and the interdigital spaces. It extends to the subcutaneous space of the fingers and is connected to the superficial fascia at this level.

Incorporated into this system are collagen fiber bundles deriving from the tendon of the palmaris longus muscle. The fibers insert at the lower surface of the skin at the level of the distal flexion crease of the palm and flex the MP joints. Other loose fibers ascend to other areas of the skin and descend between the tendons and the neuro-vascular bundles to the deep fascia.

All these fiberbundles are connected with each other by loose fibers which may become collagenized and then contribute to the system of bands. Having in mind this basic consideration it is evident that DD is strictly confined to the system of the superficial fascia of the palmar side of the hand. The same is true for LD with the exception that the toes are basically in a rather hyperextended position of the MTP Joints. Therefore flexion contractures of the toes are rare.

Stress-Strain tests

The collagen connective tissue of the palmar and the plantar aponeurosis is significantly more elastic than that of tendons. For the plantar aponeurosis this property has still a functional value. If the foot is placed on the floor when walking, the plantar aponeurosis is extended and energy is stored. This energy facilitates lifting the foot.

Morphologic studies

In the early phase of DD one meets a thickening of collagen fiber bundles, fusion of fibers to form thick bands and loss of elastic fibers. The cellular proliferation occurs later in already thickened fiber bundles.

Changes of mechanical properties

Values of the stress-strain test, the relaxation, the retardation and the mechanical recovery are already pathologic before morphologic signs appear.

Discussion

DD and LD are diseases of the superficial fascia in its special local (Palmar side of the hand and plantar side of the foot) and functional (Elasticity) expression. The first signs are pathologic changes of the mechanical properties and of the fiber system. The cellular proliferation occurs in collagen fiber bundles which have already lost normal appearance and normal mechanical properties. It is not a tumorlike proliferation but rather a reaction on the above mentioned changes. At the height of cellular proliferation the original fascicular pattern has been lost. The fibroblasts produce new collagen fibers but are not able to reconstruct a normal fascicular pattern. The newly formed scarlike bands undergo contracture.

Conclusion

DD and LD do not belong to the group of fibromatosis. They are located in the superficial fascia of the palmar side of the hand and the plantar side of the foot. Their function is related to energy-storing as elastic tissues in other species.

STATEMENT: our research conforms to the Declaration of Helsinki.