Changes of the visco-elastic properties of the palmar fascia as pathogenetic basis of Dupuytren`s disease.

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Hypothesis

Due to the most popular thesis of the pathogenesis of Dupuytren`s disease (DD) the pathology starts with the occurrence of cellular nodules. In contrast other authors (Millesi 1965) believe that DD is a systemic disease which occurs also in the plantar aponeurosis at the penis as induratio penis plastica and that changes of the properties of the collagen fiber bundles of dense connective tissue also outside of the actual aponeurosis proceed the cellular proliferation. To collect informations about this question the visco-elastic properties were studied.

Method

We studied the residual elongation (1), which is a quantitative description of the viscous component of a visco-elastic tissue, and the so called recovery time (2). A second stress-strain test does not follow the same pattern as the first one. It takes some time until the tissue recovers to the original state in a way that another stress-strain provides the same pattern as the first one.

We have studied:

1) The residual elongation of the following tissues after elongation of 2.5%, 5% and 10%.
   1: Normal palmar aponeurosis of patients without DD.
   2: Normal palmaraponeurosis of patients with DD at another location.
   3: Thickened fiber bundles from patients with DD without occurrence of nodules or contracture bands in the area.
   4: Contracture bands
   5: Advanced contracture bands.

2) The recovery time of specimens of the same 5 groups.

Results

1) Residual elongation:

After 10% elongation the residual elongation in apparently normal tissue of the palmar aponeurosis of patients with DD without any macroscopic or microscopic sign of DD was significantly increased over the control.

Thickened fiber bundles without cellular proliferation had a significant increase in all three categories. The same was observed in group 4 and 5.

2) Mechanical recovery.

The mechanical recovery time of normal palmar aponeurosis of patients without DD was about 10 minutes. This value did not differ significantly in group 2 and 3. There was however an enormous increase in group 4 and 5.

Conclusion

From this study the conclusion can be drawn that the occurrence of cellular proliferation is preceeded by changes of the visco-elastic properties of the fiber bundles of the palmar aponeurosis. The development of bands and the occurrence of contracture are accompanied by an enormous increase of the recovery time.