ELASTIC FIBERS PREVALENCE AND ORGANIZATION IN SCOLIOTIC AND NON-SCOLIOTIC INTERVERTEBRAL DISC ANNULUS FIBROSUS

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Introduction

The intervertebral discs including their integral parts - *annuli fibrosi*, absorb the axial load, allow flexion, extension and rotation of the body. The annulus fibrosus is a complex structure build up of 15 to 25 concentric sheets of collagen fibers (lamellae), proteoglycans and elastic fibers [Pezowicz, 2010]. Elastin fibers, in contrary to collagen fibers, are extensible - after stretch they return to their initial length [Johnson, 1982]. The exact orientation of elastic fibers within annulus fibrous is not easy to be determined because their pattern varies depending on the given region of annulus fibrous. Moreover, elastic fibers tend to contract when samples are cut. Even though, at present, advance visualisation technique (e.g. transmission or scanning microscopy) are available still light microscopy remains the most comprehensive and reliable method to show organisation of elastic fibers of intervertebral disc annulus fibrous.

Materials and method

In this study annulus fibrous samples were collected intraoperatively from three scoliotic young woman (aged 15-17 years). Moreover fresh intervertebral discs of the bovine tails were obtained, post mortem from three individuals and serve as an healthy controls. From both human and bovine samples the outermost parts of annulus fibrous were dissected. Tissue sections were fixed in 4% buffered formalin solution, dehydrated in alcohol series, and embedded in paraffin. Paraffin blocks were cut into 5μm thick sections. In order to visualise elastin fibers sections were stained with Weigert's method.

Results and discussion

The obtained results are demonstrated at Figure 1.

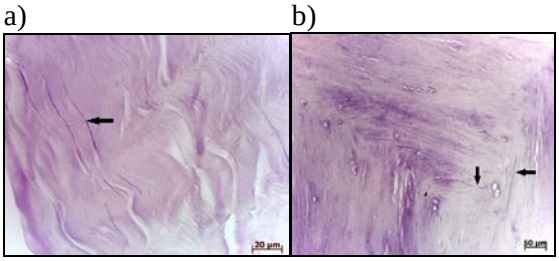

Figure 1: Elastic fibres (arrows) in human annulus fibrosus stained with Weigert's method: a) well visible elastic fibers running parallel to collagen bundles; b) more densely distributed elastin fibers oriented both parallel and vertically with relation to collagen fibers.

In examined sections elastic fibres were dispersed among much more numerous and regularly organised collagen fibers. Weigert's staining was chosen because (unlike Verhoeff and orcein staining) it allows to demonstrate even the finest elastin fibers. Detected elastin fibres, with relation to collagen fibers, were oriented both parallel and vertically [Żak, 2011]. In some scoliotic samples elastic elements tended to exhibit more irregular arrangement including their branching and intermeshing. Diverse distribution of elastin fibers may mirror different loading patterns they are subjected to. Broadening our knowledge, about arrangement and prevalence of elastic fibers within non-scoliotic and scoliotic intervertebral discs may contribute to better understanding of scoliosis pathogenesis and treatment [Yu, 2002].

References

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