

Conclusions Extra articular resection is safe regarding oncological concerns. However, functional results and rate of complications are much higher than trans-articular excision. Therefore, indication for this approach should not be exclusively based on MRI findings. While joint effusion can be easily assessed by clinical examination, invasion of other articular elements remains more difficult to assess and a mini-arthrotomy could be proposed if there is any doubt on the MRIs.

Basic Science

EP-043

Collagen remodeling in a micro-tissue system: preliminary results

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Level III

Introduction and Objective Treatment for adolescent idiopathic scoliosis is applied only after substantial curve progression has occurred, even though early treatment would be more effective. This is because we cannot distinguish between patients with slow or fast progressing curves. We hypothesize that we can distinguish between these groups by investigating collagen remodeling of the intervertebral disc. Recently, strains of mice have been identified with differences in their connective tissue healing capacity and their disc wedging characteristics, i.e. C57BL/6J and LG/J. In this experiment, we determine whether an in-vitro micro-tissue assay can distinguish the differences in collagen remodeling rates of AF cells between these strains.

Materials and Methods Annulus fibrosus (AF) and skin fibroblasts of 8-week-old C57BL/6J en LG/J mice were expanded in a hydrogel in a tissue remodeling platform, consisting of constraining posts and cultured for 48 hours. Hereafter the tissues were released from one opposing set of posts and cultured for an extra 48 hours. Tissue surface area, waistcoat contraction and collagen orientation were measured.

Results 5 C57BL/6J and LG/J AF tissues were analyzed. 48 hours post-release the tissue surface area and waistcoat contraction was 10.49±0.34 mm and 0.79±0.03 mm for C57BL/6J and 9.43±0.33 mm and 0.68±0.02 mm for LG/J (p≤0,001). No difference in collagen orientation was seen.

Conclusions A difference in AF collagen remodeling was seen in terms of changes in surface area and waistcoat contraction, however no difference in collagen orientation was seen. The next step is to determine whether these differences are reproducible in skin fibroblasts which are more clinically accessible. This would pave the way towards development of a skin biopsy bioassay for the prediction of curve progression in human patients.

Basic Science

EP-044

The biomechanical comparison between tens, K-wires and plates for surgical treatment of the pediatric forearm shaft fractures

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Level III

Introduction and Objective There are two main methods for surgical treatment of the forearm shaft fractures in children: elastic stable intramedullary nailing (ESIN) using TENs or K-wires and plating.

Materials and Methods 3D biomechanical computer models of intact ulna and radius, simple transverse diaphyseal fracture of both bones, and with different types of osteosynthesis – ESIN with TENs and K-wires, locking compression plate (LCP) - have been created on CT scans of the ulna and radius by using SolidWorks software. These methods of surgical stabilization of the forearm shaft fractures were evaluated by SolidWorks with Finite Element Method (FEM) comparative analysis of the von Mises stress-strain relations (SSR) under loads (stretching load (10 N); load in the sagittal plane, directed forward and backward (10 N); load in the front plane, directed from the outside to the inside (10 N); torsion (1 Nm)).

Results The largest changes in SSR were observed in the torsion simulation. K-wires and TENs are provide increase of the stress-strain state (SSS) in the area of the fracture (ulna-71.53-119.9 MPa (intact bone-2.43 MPa); radius-57.29-96.93 MPa (intact bone-2.14 MPa)) by redistribution of the forces in distal and proximal forearm. With the LCP model were observed redistribution of the forces in the area where the plate and screws were in contact to the bone, which unload fracture site (especially on the opposite to plate side), reduces SSS (ulna-2.14 MPa; radius-1.3 MPa) in comparison with the intact bones and osteosynthesis using K-wires and TENs.

Conclusions The optimal parameters of the stress-strain relations for fusion of the forearm shaft fracture have achieved from the model with the TENs and K-wires. Otherwise, the unloading of the fracture zone in the LCP model may be the cause of a malunion.

Congenital, Syndromes, Skeletal Dysplasias

EP-045

Incidence and severity of the foot changes in proximal femoral focal deficiency (PFFD)

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