

EXPERIMENTAL SUBSTANTIATION OF MODELING OF ABSCESSSES OF VARIOUS LOCALIZATIONS

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Key words: *experiment, model, abscesses*

Background. The problem of experimental and urgent purulent surgery is the search for new ways of modeling and effective minimally invasive treatment of abscesses of various localizations. Modeling the delimited purulent cavity in the liver, abdomen and soft tissues remains an unresolved problem, despite the many methods of creating abscesses in the literature.

Aim. The aim of the study was to simulate purulent abscesses of the liver, soft tissues and abdominal cavity.

Material and Methods. In an experiment on 20 rabbits of the Chinchilla breed and 40 white laboratory rats, modeling of liver abscesses (20), soft tissues (20) and abscesses in the right ileal region (20) of the abdomen was performed. Initially, a cystic cavity was created by introducing a modernized Fogerty and Foley catheter with a balloon inflated to 2 ml through the trocar under ultrasound control, at the distal end, while the end of the catheter was covered with skin doppler. Five days later, the balloon was emptied and the catheter was removed. The formation of a purulent abscess involved the injection of a suspension of *Staphylococcus aureus* with a microbial load of $2 \text{ ml} \times 10^6 \text{ cfu}$ in a formed aseptic cavity (Patent for invention No. 2601378 on November 14, 2016).

Results and Discussion. The obtained models of suppurative abscesses in the liver, abdomen and soft tissues had corresponding clinical characteristics of the delimited abscess, which was confirmed by instrumental, pathomorphological and microbiological studies. On the fifth-sixth day after infection of the cavity a model of a classical purulent abscess was obtained.

Conclusions. The proposed method for modeling abscesses in the liver, abdomen and soft tissues is low-traumatic, provides a guaranteed formation of abscess, does not require any complicated manipulation and expensive technical equipment.

ACOUSTIC RADIATION FORCE IMPULSE (ARFI) ELASTOGRAPHY QUANTIFICATION OF MUSCLE STIFFNESS OVER A COURSE OF GRADUAL ISOMETRIC CONTRACTIONS: PRELIMINARY STUDY

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Key words: *acoustic Radiation Force Impulse, elastography, muscle stiffness*

Aim. To evaluate the feasibility of quantitative analysis of muscle stiffness by Acoustic Radiation Forced Impulse (ARFI) elastography over a course of graduate isometric voluntary contractions.

Material and Methods. The stiffness of the bilateral biceps muscle of 13 healthy volunteers was measured in real time by ARFI elastography, while the forearm was in neutral extended position, 90 degree self-flexed positions and 90 degree self-flexed position, with altered weights ranging from 1 to 8 kg placed on flattened palmar surfaces consecutively. The determined increases in biceps muscle stiffness were measured for both arms and correlated with the loadings weights adopted at progressive trial stages.

Results and Discussion. The mean shear wave velocity (SWV) values of biceps muscles in a neutral position, in 90 degree flex position and 90 degree flex position with 1 to 8 kg weights on palmar surfaces were $2.162 \pm 0.302 \text{ m/sec}$, $3.382 \pm 0.581 \text{ m/sec}$, and 3.897 ± 0.585 to $5.562 \pm 0.587 \text{ m/sec}$, respectively. Significant correlations between the muscle SWV values and related palmar weights and between the SWV values of right and left sides at different trial stages were identified ($r=0.951$ and $r=0.954$, respectively). A mutual propagation path of deep regions to entire areas was described to account for the distribution of increase in stiffness with increases in palmar weights. The confidence of method regarding inter-observer difference was confirmed by the correlation analyses of the results ($r=0.998$).

Conclusions. ARFI elastography is a feasible imaging modality for quantifying the stiffness of isometrically voluntarily contracting muscles.

STEREOTOPOMETRY OF THE OCCIPITAL CONDYLES OF THE HUMAN SKULL

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Key words: *skull, occipital condyles, stereotopometric*

Aim. Definition of stereotopometric landmarks of the occipital condyles of the human skull.

Material and Methods. 86 mesobasilar skulls (52 males and 34 females) of the first period of mature age (23–35 years) were studied. The coordinates of the anterior (PA), posterior (PP), as well as the most prominent point of the occipital condyle (OC) or lower pole (PI) were determined, while the skull was installed in a stereocraniobasiometer in the Frankfurt plane and the distances from of the studied points to the sagittal (SP), the frontal (FP) and the Frankfurt (FFP) planes were determined.

Results and Discussion. PA OC on the skulls of men is located relative to SP at 12.3 mm, on the skulls of women — at 10.4 mm; FP — 4.3 and 2.1 mm, FFP — 22.9 and 19.7 mm; PI OC on the skulls of men is located relative to SP at 14.8 mm, on the skulls of women — 13.9 mm, FP — 12.7 and 11.1 mm, FFP — 27.3 and 23.0 mm; PP OC on the skulls of men is located relative to SP at 22.8 mm, on the skulls of women — 23.5 mm; FP — 23.1 and 20.7 mm, FFP — 21.6 and 17.3 mm, respectively.

Conclusions. Thus, the coordinates of OC are characterized by sexual dimorphism and bilateral dissymmetry with some right-sided orientation.

MINIMALLY INVASIVE SURGERY OF THE NECK

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Key words: neck, surgery, access, topography

Background. Among the existing operations on the neck, various types of resections of the thyroid gland, parathyroidectomy, endoscopic dilatation of the larynx and trachea became the most important among the existing operations on the neck.

Aim. Indications for these operations are the same pathological processes: tumor of the thyroid gland, thyroid nodules, narrowing of the larynx and trachea of various natures, and others.

Material and Methods. These operations are made from different operational accesses: axillary, presternal, retroauricular, lateral, trans oral approach and others. The choice of access is determined by the localization of the process, but depends on the personal experience and inclinations of the surgeon. Therefore, the topographic and anatomical justification for these accesses (the development of the problem of prompt access to the organs of the neck and its experimental justification) is today one of the topical issues. It is caused by the fact that the main contingent of patients with nodular formations of the

thyroid gland is women. In particular, the patient pays much attention to the cosmetic aspects of the operation, namely, the condition of the scar.

Results and Discussion. At present, there are no data in the literature on the existence of fundamental studies on an objective comparative evaluation of minimally invasive surgical approaches to the organs of the neck.

Conclusions. We plan to give a comparative topographic and anatomical justification for modern methods of interventions on the neck organs on the basis of objective evaluation criteria to improve the results of surgical interventions.

FIBER TYPE COMPOSITION OF THE RAT ILIOPSOAS MUSCLE WITH REGARD TO THE LEVEL OF ITS ORIGIN

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Key words: rat, iliopsoas muscle, fiber types, immunohistochemistry, myosin heavy chain

Background. The iliopsoas of the rat is composed of the psoas major muscle and the iliacus muscle and is generally considered to be a fast muscle. However, previous studies of the fiber type composition of the muscle showed different results.

Aim. Therefore, the aim of our study was to examine the fiber type composition of the rat iliopsoas muscle with regard to its segmental origin.

Material and Methods. At four different levels of its origin, using monoclonal antibodies for myosin heavy chain identification, the percentage and muscle fiber cross sectional areas (CSA) of Type I, IIA, IIB and IIX muscle fibers were identified.

Results. The rat iliopsoas muscle had a predominance of fast muscle fiber types, with the highest percentage and the largest CSA of the fastest IIB muscle fibers. Moreover, our results showed changes in percentages, as well as the CSA-s of muscle fiber types in cranio-caudal direction in the psoas major muscle. There was a decrease of percentages and the CSA-s of type IIB muscle fibers from the cranial towards the caudal part. The results were published in the Journal of Anatomy (J. Anat. 2017. Vol. 230, № 4. P. 542–548.).

Conclusions. The rat iliopsoas muscle is composed of all four muscle fiber types. It is a fast muscle with a predominance of fast type IIB muscle fibers with the largest CSA-s. The composition of the rat psoas major muscles changes in a cranio-caudal direction thus pointing to the more postural role of the caudal part of the muscle.