of a frozen human body» (1853–1859), namely: sawing in 3 mutually perpendicular planes, layerwise cleavage of frozen tissue or selectively thawing them in the necessary areas, the formation of windows with the abandonment of the most important anatomical landmarks, etc., undoubtedly, the most informative was the way of layer cuts. The technology of sawing developed by the great surgeon and anatomist with the subsequent accurate transfer of two-dimensional information from preparations to paper and then to lithographic stones became the prototype of modern methods of radiation visualization of anatomical structures by CT and MRI methods with software digital reconstruction of images in 2–4 D measurements. Pirogov's technology was brilliantly used by A. N. Maksimenkov during the Great Patriotic War to study the surgical anatomy of wound canals in gunshot wounds of extremities. This technology was further developed in the works of E. A. Dyskin, L. N. Aleksandrova, L. B. Ozeretskovsky when studying the problems of terminal wound ballistics of bullet and fragmentation wounds. Over the past 30 years, we have successfully used the method of sawing a frozen body in the study of amputated limb segments in the wounded that have been blown up on anti-personnel mines, and also after modeling of mine-blast injuries on anatomical objects and experimental animals. Due to the complex research performed, it was found out that the case architectonics of the limb segments for the distribution of reversible and irreversible disorders in tissues plays no less important role than the distance from the center of the explosion. The most severe and extended injuries are concentrated in the deep muscles along the bones, fascial septa and the interosseous membrane, as well as loose paravasal and paraneural tissues. The data obtained make it possible to develop a program for a full-fledged audit of injured tissues in the affected, to justify the tasks of surgical treatment of wounds, and, if necessary, the level and method of limb amputation.

MORPHOMETRIC CHARACTERISTICS OF ARTERIES OF AGED PEOPLE BRAIN

Fomkina O. A., Gladilin Yu. A., Muzurova L. V., Zaichenko A. A.

V. I. Razumovsky Saratov State Medical University, Saratov, Russian
oafomkina@mail.ru

Key words: *brain arteries, outer diameter, wall thickness*

Aim. Research — to reveal regularities of dimensional characteristics of arteries of the brain of people at advanced age.

Material and Methods. Investigated samples of anterior cerebral artery (ACA), middle cerebral artery (MCA), posterior cerebral artery (PCA), posterior communicating artery (PComA), basilar artery (BA) and intracranial parts of the vertebral arteries (VA) withdrawn at autopsy of 21 corpses of people of advanced age. Death hasn't been connected with sharp vascular pathology of a brain. Studied the outer diameter, wall thickness, diameter of a gleam of arteries. For assessment of the importance of distinctions used Student's t-criterion for independent selections (distribution normal).

Results and Discussion. The sizes of arteries of a brain at adults of advanced age have no significant bilateral and sexual distinctions and are characterized by average variability (the coefficient of variability 11–25%). Averages the outer diameter, thickness of a wall and diameter of a gleam of the studied arteries (mm): ACA — 2.28±0.05, 0.27±0.01 and 1.74±0.05; MCA — 2.99±0.05, 0.31±0.01 and 2.37±0.05; PCA — 1.36±0.04, 0.24±0.01 and 0.87±0.04; PComA — 2.34±0.06, 0.27±0.01 and 1.79±0.06; BA — 3.45±0.13, 0.41±0.03 and 2.65±0.11; VA — 3.02±0.11, 0.33±0.01 and 2.36±0.09. Differences between the parameters of arteries of the same name are statistically not significant: for the outer diameter of MCA and VA; for thickness of a wall of ACA and PCA, MCA and VA, ACA and PComA, PComA and PCA; for diameter of a gleam of MCA and VAS, VA and BA.

ANATOMICAL SIGNIFICANCE OF THE SPATIAL DISTRIBUTION OF THE PALATOPHARYNGEUS WITH REGARD TO CLOSURE OF THE NASOPHARYNX

*Fukino Keiko [1], Tsutsumi Masahiro [2], Sanudojose [3], Ono Takashi [1], Akita Keiichi [2]**

[1] Department of Orofacial Development and Function, Graduate School of Medical and Dental Sciences, Tokyo Medicaland Dental University (TMDU), Tokyo, Japan; [2] Department of Clinical Anatomy, Graduate School of Medical and Dental Sciences, Tokyo, Medical and Dental University (TMDU), Tokyo, Japan; [3] Department of Anatomy and Embryology, Faculty of Medicine, Complutense University of Madrid, Av. Ciudad Universitaria s/n, Madrid, Spain
* Akita.fana@tmd.ac.jp

Key words: *nasopharyngeal closure, palatopharyngeus, pharyngeal muscle, superior constrictor*

Background. Production of nasopharyngeal closure should be accomplished by the coordination of the various soft palate and pharyngeal muscles. However the anatomical basis of the functional roles of these muscles still remains unclear.

Aim. In the present study, we macroscopically and microscopically examined these muscles in detail, especially palatopharyngeus (PP) in order

to realize whether specific muscle bundles have specific functions during nasopharyngeal closure.

Material and Methods. Forty halves of 21 heads from Japanese cadavers (average 83.9 years) were used (37 halves of 19 heads for macroscopic examinations, and three halves of two heads for histological examinations).

Results and Discussion. The most superior muscle bundle of the superior constrictor (SC) and most lateral muscle bundle of PP originated from the superior surface of the palatine aponeurosis, initially ran in parallel, and subsequently ran superoposteriorward and inferoposteriorward, respectively. PP spread radially on the internal surfaces of the pharyngeal muscles as a single continuous sheet. A fold of the sheet continuing to the median portion of the palatal muscles roughly established the palatopharyngeal arch, and the stylopharyngeus (StP) attached to the base of the arch.

Conclusions. PP as a whole muscle sheet could show various functions: as a sphincter along with SC in some cases and as an elevator along with StP. In addition, PP could also show the function of the medial protrusion by forming the thick palatopharyngeal arch along with StP and SC. It is considered that PP could play a most important role in nasopharyngeal closure.

THE TEACHING OF ANATOMY IN THE DIGITAL ERA. WHERE DO WE STAND?

Furtado I. A., Neto L. L., Gonçalves-Ferreira A. J.*

Institute of Anatomy, Faculty of Medicine, University of Lisbon, Lisbon, Portugal
* ifurtado@medicina.ulisboa.pt

Key words: *3D, digital anatomy, plastination, cadaveric dissection*

Background. In a time of innovation and change it is important to rethink and redirect the teaching of Anatomy according to the new reality.

Aim. In an analysis of teaching and learning, it is necessary to examine, the curriculum, the mode of teaching, the quality of how it is delivered and the infrastructure within which it is delivered (Papa and Vaccarezza-2013).

Material and Methods. The authors reports the options of teaching Anatomy, made by the Institute of Anatomy of the Faculty of Medicine of Lisbon, arising from curricular integration of the Anatomy subjects in modules of the Morphological Sciences Group.

Results and Discussion. Implementation of prossection workshops outside the regular school year, to compensate the reduction of the gross anatomy teaching hours. Involving students in their learning and curricular integration, with options of laboratorial stages, participation in investigation microprojects and tutorial credited experience. In Clinical Anatomy, were used problem-based learning (PBL) and case-based learning (CBL) allowing to horizontal and vertical integration. Implementation of Imaging Workshops with interactive participation of students in anatomic diagnosis. Option for student-centred teaching was made. Modified Thiel embalmed method is practiced. Plastination and 3D printing models were produced for students. It is exploited the excellence of facilities and resources for Anatomy of Cadaveric Dissection.

Conclusions. Anatomic dissection and prossection continues to be the best and most real 3D experience; Digital Anatomy must be a complementary or alternative method for the absence of the resource of anatomical dissection or prosecution, allowing maximization of teaching activity and learning performance.

QUANTIFICATION OF NORMAL MAGNETIC RESONANCE INTERVERTEBRAL SPACE RELATIONSHIPS IN THE SUBAXIAL CERVICAL SPINE: INTRODUCING THE A FACTOR

Fyllos A., Zibis A. H., Markou A., Arvanitis D. L.*

Department of Anatomy, School of Medicine, University of Thessaly, Larissa, Greece
* ahzibis@gmail.com

Key words: *intervertebral disc height, cervical spine, adjacent spinal level*

Aim. This is a study of normal magnetic resonance anatomy of the subaxial cervical spine and aims at creating database values of each normal intervertebral space. When surgically restoring a degenerated disc, it is difficult to estimate the exact amount of perioperative distraction needed. This study proposes that restoration of a collapsed disc could be based on individual measurements of its adjacent, healthier disc with the aid of baseline values.

Material and Methods. We retrospectively reviewed cervical MRIs of 29 asymptomatic subjects (11 men, 18 women, mean age 28,2 years, range 19–40). All intervertebral discs in every subject were grade I or II according to Pfirrmann classification. We measured anterior, middle and posterior disc and vertebral height and disc diameter, and consequently calculated mean disc height, disc convexity index and disc height index (DHI). Inter- and intra-observer agreement has been previously proven to be excellent. Each intervertebral disc height was expressed as a fixed percentage of its adjacent one, the a factor. The height of a collapsed $C_{4–5}$ could be calculated by the simple equation $C_{4–5}=C_{3–4}/a_{3–4}$.

Results and Discussion. Mean disc height- and DHI was significantly different at every spinal level and increasing from $C_{3–4}$ to $C_{6–7}$, anddecreasing from $C_{6–7}$ to C_7–T_1 ($p<0.01$). Similarly, disc diameter