PLENARY LECTURES

Publishing in Anatomy: a ten years experience as Editor in Chief of Surgical and Radiologic Anatomy. Reflections and perspectives

Duparc Fabrice M.[1]
[1]*Rouen University, Anatomy, FRANCE*

Introduction:
Publications in the fields of anatomy and clinical anatomy have evolved considerably within the last ten years, and our aim was to select a few parameters for evaluating these changes.
Material and methods:
Some adjustable variables have been used for showing the evolution of the editorial activity: numbers of submissions, accepted manuscripts, revisions, rejected manuscripts, countries of origin; delays between submission and first decision or final acceptation. The number of participants to the Editorial board has also been used for assessing the development of the activity. The quality of the submissions has been assessed through the number of submissions presented with full agreement to the Instructions for Authors of the journal. The Impact Factor of the journal has been related recorded along the same period. Three sections have been chosen as markers of activity: Original articles, Anatomical Variations, Teaching Anatomy.
Results:
The increasing of submissions has been about 328% within 10 years, and the rates of acceptance or revision decisions remained stable, but the rejection rate moved from 54% to 72%. The electronic submission made shorter the editorial procedure. The editorial board grew from 11 to 37. The quality of the manuscripts was improved. The impact factor has been multiplied by 4. Original articles and anatomical variations increasing rates were 91% and 68% respectively. Teaching anatomy remained a small section with poor augmentation.
Discussion-Conclusion:
The perspectives for the development of anatomy and clinical anatomy are related to the evolution of anatomy from “basics of the medicine” to “anatomical sciences”. No part of Anatomy has been lost during this period of hard increasing activity. Evaluation still needs to be developed about teaching and continuous medical education.

Understanding the neuroanatomy of the larynx to the present day moving towards laryngeal transplantation

Sanudo José[1]

[1]Universidad Complutense de Madrid, Departamento de Anatomía y Embriologia Humanas, Facultad de Medicina, Instituto Universitario de Evaluacion sanitaria, SPAIN

The first laryngeal transplantation was attempted Strome and his team (1998) and though initially meeting with some success the transplanted larynx was removed 14 years later. There are four factors that must be addressed if satisfactory transplantation of the larynx to be achieved: 1) psycho-social and ethico-legal aspects need to be considered; 2) tissue viability vs. rejection must be overcome, 3) restoration of a vascular supply has to be ensured and 4) selective reinnervation of the larynx has to be achieved. The three first factors are being addressed, however the selective reinnevation remains challenging because the nerve supply of the larynx is now known to be much more complex than many accounts imply. This is because: 1) each laryngeal muscle may receive a variable number of nerve branches, 2) there are multiple connections between the different laryngeal nerves, 3) many laryngeal nerves and connections are mixed in nature conveying both motor and sensory fibres and 4) the laryngeal muscles may receive a dual nerve supply, from both the recurrent laryngeal and superior laryngeal nerves.

Singing and sex

Wild J. Martin[1]

[1]*University of Auckland, Anatomy and Medical Imaging, NEW ZEALAND*

According to Holstege and Subramanian (2015), the generation of speech involves two different motor systems, emotional and volitional. Essential for the expression of emotions such as crying and laughter, screaming and yelling, is the periaqueductal grey (PAG). This centre receives descending inputs from the anterior cingulate, insula and orbitofrontal cortices, and has multiple descending projections throughout the medulla, but only one of which – to the nucleus retroambiguus – provides for direct access to the motoneurons innervating muscles involved in vocalization, namely those of the soft palate, pharynx and larynx, and those of the thoracic and abdominal cavities for the production of appropriate subglottal pressure via modulated respiration. The volitional aspects of speech involve the modulation of vocalization by the motor cortex and its corticobulbar projections to muscles of the face, mouth, tongue, larynx and pharynx.

Many non-human animals also express emotions via their vocalizations, birds in particular, which comprise the major vocal animal group other than ourselves. It is of significant comparative interest, therefore, to determine whether birds generate their vocalizations using similar parts and pathways of the brain as we do. This talk will briefly survey some of the functional neuroanatomy relevant to this enquiry, particularly with respect to the songbirds, which, like ourselves, generally learn their songs from parental tutors.

An interesting, non-intuitive aspect of the bird-mammal comparison is that nucleus retroambiguus in both birds and mammals projects not only upon motoneurons involved in vocalization, but also upon motoneurons involved in sexual behaviour.

Some thoughts about why and how singing and sex come to be anatomically linked will be vocally expressed.

ORAL PRESENTATIONS

Anthropometric correlations between parts of the upper and lower limb: Models for personal identification in a Sudanese population

Ahmed Altayeb A.[1]

[1]*King Saud bin Abdulaziz University for Health Sciences, Basic Medical Sciences, College of Medicine, SAUDI ARABIA*

Identification of a deceased individual is an essential component of medicolegal practice. However, personal identification based on commingled limbs or parts of limbs, necessary in investigations of mass disasters or some crimes, is a difficult task. Limb measurements have been utilized in the development of biological parameters for personal identification, but the possibility to estimate the dimensions of parts of limbs other than hands and feet has not been assessed. The present study proposes an approach to estimate the dimensions of various parts of limbs based on other limb measurements.

The study included 320 Sudanese adults, with equal representation of men and women. Nine limb dimensions were measured (five based on the upper limb, four based on the lower limb), and extensive statistical analysis of the distribution of values was performed.

The results showed that all dimensions are sexually dimorphic and that there is a significant positive correlation between the dimensions of various parts of limbs. Regression models (direct and stepwise) were developed to estimate the dimensions of parts of limbs based on measurements pertaining to one or more other parts of limbs.

The study revealed that the dimensions of parts of the upper and lower limb can be estimated from one another. These findings can be used in medicolegal practice and extended to constructive surgery, orthopedics, and prosthesis design for lost limbs.

Morphometric analysis of sternal sexual dimorphism in a contemporary Saudi population

Ahmed Altayeb A.[1], Alshammari Faris O.[1], Alrafiaah Abdulaziz S.[1], Almohaisani Ali A.[1], Omar A. Al-Moherj[1], Alkubaidan Fahad O.[2]

[1]King Saud bin Abdulaziz University for Health Sciences, Basic Medical Sciences, College of Medicine, SAUDI ARABIA, *[2]King Abdulaziz Medical City, Department of Medical Imaging, SAUDI ARABIA*

Sex estimation is an essential step for identifying unknown individuals and usually depends on the existence of highly dimorphic bones, such as the pelvis and skull. Nevertheless, the body integrity can be compromised in certain circumstances, and these bones might be absent; therefore, the ability to utilize other bones for sex estimation is crucial. The aims of this study were to collect baseline data for sternal dimensions in Saudi adults, assess the existence of sexual dimorphism in the sternum, and generate population-specific equations to estimate sex using sternal dimensions. During 2014–2015, 200 thoracic/thoraco-abdominal computed tomography (CT) images (100 men, 100 women) were anonymously collected from King Abdulaziz Medical City. Six measurements and two indices were calculated after 3D reconstruction of the CT scans. Descriptive statistics were calculated, and sexual dimorphism was assessed using independent t-tests. Discriminant function equations were developed for these measurements. Except for the sternal index, men had significantly larger dimensions than women. Sexual dimorphism was highly significant ($p < 0.001$). The best single predictor was the combination of the manubrium and sternal body lengths (89.5%). In the stepwise analysis, the best predictors were the manubrium length, sternal body lengths, manubrium width, and corpus sternal width at the first sternebra, with cross-validated accuracy of 90.5%. Cross-validated accuracy for all measurements ranged between 62.5% and 90.5%. This study is novel in its assessment of sexual dimorphism among Saudis utilizing sternal CT modalities. The findings of the study have important anatomical, anthropological, and forensic applications.

Cutaneous Perforators of the Arm and Anatomic Landmarks For Defining The Flap Donor Sites

Kaya Burak[1], Feigl Georg[2], Gultan Serdar M.[1], Apaydin Nihal[3]

[1]Faculty of Medicine, Department of Plastic and Reconstructive Surgery, Ankara University, TURKEY, [2]Medical University of Graz, Institute of Anatomy, AUSTRIA, [3]Ankara University, Faculty of Medicine, Department of Anatomy, TURKEY

Flaps are one of the basic methods that have been used to restore form and function in plastic and reconstructive surgery. Perforator flaps represents the ultimate point that has been reached in the flap surgery. Tissue or flap receiving its vascular supply via any perforator of the deep fascia is considered a perforator flap. In order to design a perforator flap, the exact location of the cutaneous perforators by the anatomic landmarks must be known. As there are only a limited number of studies searching for the possible perforator flap donor sites on the arm, there is a need for further anatomical studies concerning on the cutaneous perforators and perforator flap donor sites of the arm. In this anatomical study, fourteen Thiel method fixed cadaver upper extremities and 6 light embalmed cadavers were used to determine the cutaneous perforators of the arm. The location of cutaneous perforators was determined by using easily palpable anatomic bony landmarks including acromion, medial epicondyle (ME) and lateral epicondyle (LE). The LE and ME were connected by a horizontal line. The distance between the midpoint of this line and to acromion was measured while the arm is in abduction position. The source artery (brachial artery and its branches) of these perforator arteries were found and the length and diameter of the source artery and the potential flap donor sites on the arm were determined in relation to the defined lines. The mean number of these perforators was 6 on the medial side of the arm most of which (80%) were arising from the superior collateral ulnar artery. The other sources were brachial and inferior collateral artery. On the lateral side there were a mean 7 perforators most of which arose from brachial artery and radial collateral artery. According to the results of our study the ideal location of the flaps on the medial side is more commonly found within 5.6-8.4 cm on the Y axis and 2.4-4.2 on the X axis and on the lateral side within 2.6-4.5 cm on the Y axis and 0.8-2.2 on the x axis. In conclusion determining the perforator flaps the arm in relation to the defined landmarks may provide safe and effective flap surgery.

The Variations of Celiac Artery and the Frequency of the Entity

Arslan Harun[1], Batur Abdussamet[1], Yavuz Alpaslan[1], Alpalan Muhammed[1], Dundar Ilyas[1], Ozgokce Mesut[1]

[1]*Yuzuncu Yil University, Radiology, TURKEY*

Purpose:

Investigation of the study was to clarify the celiac artery abnormalities and their incidence by the routine abdominal CT examination.

Materials and Methods:

In this study, 1346 patients between the age range of 15 and 79 years were enrolled. Patients had abdominopelvic computed tomography (CT) examinations due to various indications and intravenous contrast medium injection was performed in all. A retrospective review of the CTs was done in terms of determining the celiac artery variations/anomalies.

Results:

In 35 of the 1346 patients (%2.60) included in this study had a various type of celiac artery variations/anomalies. In this 35 patients; 14 of them (% 1.04) had a common originated superior mesenteric artery and celiac artery, 17 of them (%1.29) had separated splenic artery and hepatic artery with different origins while 4 of the patients (% 0.29) had the hepatic artery originate from superior mesenteric artery independently.

Conclusion:

The accurate definition of the celiac artery morphology including it's variations/anomalies had a significance especially a head of the related surgical or interventional procedures regarding liver, spleen or mesenteric arteries so that un expected complications of possible interventional difficulties can be prevented. These anomalies can be displayed with routine abdominal CT examinations with intravenous contrast medium administration.

3D printing anatomical models

Bartikian Mickael[1], Ferreira Angélica[1], Neto Lia L.[1,2], Gonçalves-Ferreira António[1,3]
[1]Lisbon Medical School, Anatomy Department, PORTUGAL, *[2]Santa Maria University Hospital, North Lisbon Medical Center, Neuroradiology Department, PORTUGAL*, *[3]Santa Maria University Hospital, North Lisbon Medical Center, Neurosurgery Department, PORTUGAL*

Introduction and Objectives:
The teaching of Human Anatomy is one of the essential pillars of medical education. The increasing number of students, the reduction of contact hours, the shortage of cadavers, and the excessive time that is required to perform a dissection, have diminished this practice. Nowadays, the study of Anatomy is mostly based on images and plastic models. Specimens conserved in formaldehyde and individual bones are scarce and very fragile, thus limiting their handling and the possibility for the students to study at home. To respond to these restrictions, several projects have been conducted in our Institute in order to create plastinated anatomical models of the brain. These models achieved a very positive feedback from the community in our faculty. We are now developing a new project where we use a 3D printer to produce models of the bones of the head, with high quality and sufficient quantity to satisfy the needs for Anatomy classes and also to be available for request to study at home.
Material and Methods:
We selected regular and well-shaped bones of the head upon which we based the 3D models. These bones were scanned using a 16-channel Computerized Tomography (high resolution volumetric acquisition) and the resulting images were then processed with a segmentation software to isolate and reconstruct the structures of interest. The final digital tridimensional objects were converted into a printable file that the 3D printer could read. We are using a filament extrusion type 3D printer, the Prusa i3, currently with a maximum resolution of 0.3x0.3x0.3 mm.
Results and Conclusion:
We have printed successfully a few models of the head bones, such as the temporal, sphenoid, ethmoid and also a skull base. All the models have obtained a good detail, thus demonstrating the practicality of this technology. The efficiency of the production process and its pros and cons are discussed. The potential of 3D printing to create more complex models (e.g. regional, vascular, nervous system structures) that would allow a similar experience compared with a dissection is also reviewed.

Left renal vein anomalies in routine abdominal CT scans

Batur Abdussamet[1], Karakose Serdar[2], Yavuz Alpaslan[1], Bora Aydın[1]

[1]Yuzuncu Yil University, Radiology, TURKEY, *[2]Necmettin Erbakan University, Interventional Radiology, TURKEY*

Objective:

The purpose of this study was to investigate the incidence of left renal vein in routin abdominal computed tomography scans.

Methods:

One thousand and four patients (590 men, 414 women) were evaluated retrospectively with routine abdominal computed tomography scans.

Results:

Sixty three patients of 1004 were identified with renal vein variants (6.3%). Fourty three (4.3%) patients exhibited retroaortic left renal vein and twenty (2 %) patients had circumaortic renal veins.

Conclusion:

The incidence of renal vein variations observed in this study is discussed and compared with that reported in the literature. It is necessary to emphasise that the presence of these renal vein variations in particular must be acknowledged since they have significant clinical importance.

Key words: Left renal vein, computed tomography, variations

Anatomy of Master Knot of Henry: A Morphometric Study on Cadavers

Beger Orhan[1], Elvan Özlem[1], Ün Burçin[1], Uzmansel Deniz[1], Keskinbora Mert[2]
[1]Mersin University, Anatomy, TURKEY, *[2]Istanbul Medipol University, TURKEY*

Aim:
The objective of this study was to evaluate the features of flexor hallucis longus (FHL) and flexor digitorum longus (FDL) regarding the tendon grafts and to reveal the location of Master Knot of Henry (MKH).
Methods:
Twenty feet from ten formalin fixed cadavers were dissected. The location of MKH was identified. Interconnections of FHL and FDL were categorized. According to certain incision techniques, lengths of FHL and FDL tendon grafts were measured.
Results:
MKH was 12.61±1.11 cm proximal to first interphalangeal joint, 1.75±0.39 cm below to navicular tuberosity and 5.93±0.74 cm distal to medial malleolus. The connections of FHL and FDL were classified in 7 types. Tendon graft lengths of FDL according to medial and plantar approaches were 6.14±0.60 cm and 9.37±0.77 cm, respectively. Tendon graft lengths of FHL according to single, double and minimal invasive incision techniques were 5.75±0.63 cm, 7.03±0.86 cm and 20.22±1.32 cm, respectively.
Conclusion:
The exact location of MKH and slips was determined. Two new connections not recorded in literature were found. The awareness of connections between the FHL and FDL, and which are participated in the formation of long flexor tendons of toes, could be important for reducing possible loss of function after tendon transfers postoperatively.

Key Words: Flexor hallucis longus; Flexor digitorum longus; Master Knot of Henry; Slip; Tendon transfer.

The supraorbital vascular-nerve bundle with regard to frontal migraine headache

Berchtold Valeria[1], Brenner Erich[1], Moriggl Bernhard[1], Pauzenberger Reinhard[2], Konschake Marko[1]

[1]Department of Anatomy and Histology, Clinical and Functional Anatomy, Medical University of Innsbruck, AUSTRIA, *[2]Department of Surgery, Division of Plastic and Reconstructive Surgery, Vienna Medical University, AUSTRIA*

Aim:

Recent findings on the pathogenesis of migraine headache support, besides a central vasogenic cause, an alternative peripheral mechanism involving compressed craniofacial nerves. Botulinum Toxin injections as a new treatment approach for migraine headache patients demonstrate efficiency and support this peripheral mechanism, too.

Methods:

The supraorbital region of 11 alcohol-glycerin fixed specimens of both sexes was dissected. Both the supratrochlear (STN) and the supraorbital nerve (SON) were identified and their topographic relationship with the corrugator supercilii muscle (CSM) investigated. The shape of the exit from the orbit of both nerves was defined, interaction of the supraorbital artery (SOA) and the SON determined.

Results:

We showed a new possible compression point of the STN running through the orbital septum. We verified previously described compression points of both STN and SON. Osteofibrose channels, varying in size (Typ I-III) and always being passed by STN and SON, were found constantly. Different types concerning the topographic relationship between STN and CSM (Typ I-V), SON and CSM (Typ I-IV) and SON and SOA (Typ I-IV) were described.

Conclusion:

Our data support the hypothesis of an alternative peripheral mechanism for frontal migraine headache. The CSM is constantly perforated by the SON, and frequently by the STN, too. The topographic proximity between SOA and SON and the osteofibrose channels, being passed by SON and STN, should also be considered as points of potential irritation. A surgical release and Botulinum Toxin-induced paralysis can therefore result in amelioration of frontal migraine headache.

Development and clinical implications of the abdominal wall in fetuses

Biasutto Susana N.[1]

[1]*Faculty of Medical Sciences, National University of Cordoba, Normal Anatomy, ARGENTINA*

Muscles of the abdominal wall are well developed in fetuses older than 10 weeks of gestation instead there are further changes in the structures depending on them.

The objective was to study some of these changes, mainly those related to the inguinal canal and the arcuate line.

Seventy five fetuses between 10 to 25 weeks of gestation, 42 males and 33 females, were dissected. We identified the characteristics and contents of the inguinal canal, the insertion and distribution of the gubernaculum tails, the characteristics of the rectus abdominis muscle and relation between arcuate-pubis length and linea alba length.

Muscular-fibrous layers of the wall were well-differentiated in all fetuses. The relation between the position of deep and superficial rings is important to explain the particular aspect of inguinal canal. The presence of multiple tails (1 to 4), with different insertions, at the distal end of the gubernaculum was frequent in both genders. We found the absence of left rectus abdominis muscle in one case. The thickness of the anterior rectus abdominis sheath did not vary upper to lower the level of the arcuate line. The arcuate line position (measured from the pubis) changed significantly from one to other fetus and represented 1/7 to 1/3 of the linea alba.

Deep inguinal ring moves upwards, bringing the gubernaculum along with it and determining the final aspect of the inguinal canal. This movement is associated to the arquate line varying distance from the pubis. Gubernaculum tail insertions explain the location of ectopic testis.

Decreased Vertebral Artery Hemodynamics in Patients with Loss of Cervical Lordosis

Bulut Mehmet D[1], Alpaycı Mahmut[2], Senkoy Emre[2], Bora Aydın[1], Yazmalar Levent[3], Yavuz Alpaslan[1], Gulsen Ismail[4]

[1]Yuzuncu Yil University, Radiology, TURKEY, *[2]Yuzuncu Yil University Medical Faculty, Physical Medicine and Rehabilitation, TURKEY*, *[3]Dicle University Medical Faculty, Physical Medicine and Rehabilitation, TURKEY*, *[4]Yuzuncu Yil University Medical Faculty, Neurosurgery, TURKEY*

Background:

Because loss of cervical lordosis leads to disrupted biomechanics, the natural lordotic curvature is considered to be an ideal posture for the cervical spine. The vertebral arteries proceed in the transverse foramen of each cervical vertebra. Considering that the vertebral arteries travel in close anatomical relationship to the cervical spine, we speculated that the loss of cervical lordosis may affect vertebral artery hemodynamics. The aim of this study was to compare the vertebral artery values between subjects with and without loss of cervical lordosis.

Material/Methods:

Thirty patients with loss of cervical lordosis and 30 controls matched for age, sex, and body mass index were included in the study. Sixty vertebral arteries in patients with loss of cervical lordosis and 60 in controls without loss of cervical lordosis were evaluated by Doppler ultrasonography. Vertebral artery hemodynamics, including lumen diameter, flow volume, peak systolic velocity, end-diastolic velocity, and resistive index, were measured, and determined values were statistically compared between the patient and the control groups.

Results: The means of diameter (p=0.003), flow volume (p=0.002), and peak systolic velocity (p=0.014) in patients were significantly lower as compared to controls. However, there was no significant difference between the 2 groups in terms of the end-diastolic velocity (p=0.276) and resistive index (p=0.536) parameters.

Conclusions:

The present study revealed a significant association between loss of cervical lordosis and decreased vertebral artery hemodynamics, including diameter, flow volume, and peak systolic velocity. Further studies are required to confirm these findings and to investigate their possible clinical implications.

Keywords: Lordosis • Ultrasonography, Doppler • Vertebral Artery

Photo-Realistic Statistical Exemplars of Skulls: Visualizing Average Sex and Ancestry in High-Resolution for Forensic Anthropology

Caple Jodi M.[1], Stephan Carl N.[1]
[1]*The University of Queensland, AUSTRALIA*

Current depictions of skulls for different sex and ancestral groups have relied on subjectively drawn diagrams that accentuate typical morphology or on photographs of single skulls as holotypes or type specimens. As these qualitative approaches risk bias a better approach would be to generate type specimens by numerically calculating mean skull morphology with computer graphics. This way, the full range of size, shape and texture information can be objectively modeled, producing statistical averages that hold the highest levels of photo-realism. Additionally, the statistical averages can be numerically exaggerated—using contrasting sex or ancestry categories as starting reference points—to produce extreme versions of the morphotypes as useful for visualizing the subtleties of sex and ancestry differentiation in a truly objective manner. Subjective holotypes can, therefore, be replaced by these more objective photo-realistic statistical images to improve references standards used in casework and teaching.

Standardized photographs were taken of skulls in anterior and left lateral views, sourced from the Pretoria Bone Collection, the WM Bass Donated Skeletal Collection, the Robert J. Terry Anatomical Skeletal Collection, the Hamann-Todd Human Osteological Collection, and the Chiba Bone Collection. Photographic averages were calculated in the computer software Psychomorph. Each image was manually delineated by positioning landmarks that were then joined with contour lines to form the outline delineation map. From these delineation maps, the average skull shape was calculated before warping the color information from each individual image to the average shape, and blending each pixel together. Stepwise transformations of the exaggerated exemplars were then generated in +1 % increments. The goal was to transform up to a final step value of +100 %; however, some images were subject to distortion at this level and therefore stopped at a lower percentile.

The exemplars communicate sex and ancestry differences broadly recognized in the literature to be important for sex and ancestry differentiation. In particular, they make the overall robustness of males instantly recognizable. Similar goes for the relative absence of alveolar prognathism in Whites, large anteriorly projecting nasal bones, with a prominent chin, and tall thin mandibular ramus. Their development also potentially provides new opportunities to identify other, previously unrealized, characters useful for sex and ancestry estimation. A graphical user interface (GUI) will also be made available at CRANIOFACIALidentification.com, enabling user-defined viewing of any combination of sex or ancestral group transformations from this study.

Dermatoglyphic features in schizophrenia and psoriasis in patients of Macedonian nationality

Chadikovska Elizabeta[1], Lazarova Dobrila[1], Nakeva-Janevska Natasa[1], Zafirova Biljana[1], Bojadzieva Stojanoska Biljana[1], Trpkovska Biljana[1]
[1]*Medical faculty, Institute of anatomy, MACEDONIA*

Clinical dermatoglyphic study has been conducted with purpose to determine and analyse dermatoglyphic patterns in patients with schizophrenia and psoriasis. Present differencies and result comparisment has been made between healty population and patients with schizophrenia and psoriasis of Macedonian nationality.
Palm prints were taken using Cummins and Midlo ink method. In clinical examinations 240 palm prints from patients with psoriasis and 218 palm prints of both hands in clinically confirmed patients with schizophrenia were obtained. Palm prints were also obtained from 200 healty individuals of Macedonian nationality (100 males and 100 females). Twenty dermatogliphic parametars on the palm prints have been read and the data were classified and correlated between the examined groups.
In patients with schizophrenia we have found more fibular loops and less whorls compared to the healthy examinees. Arches are more aboundat in males but less present in females. Atd angle has lower values in patients. The numbers for TRC и ATRC are also lower in the group of patients. AB, BC and CD ridge count have lower values in females, but higher values in male patients.
For patients with psoriasis significant is higher values for ulnar loops, and lower values for whorles and arches. Lower values are counted for TRC and ATRC in the group of patients. AB ridge count is with higher and BC and CD ridge counts have lower values in the group of patients for both sexes.
In conclusion variability of the dermatoglyphic patterns in some clinical conditions have been presented. The results provide new possibilities for further investigation of dermatoglyphics and their biological and genetic properties. Differencies found in the clinical dermatoglyphic research should be considered as marks who give us possisbility to include them in early detection, screening purposes of schizophrenia and genetic research in psoriasis in the populationes with certain risk.

Key words: dermatoglyphics, palms prints, schizophrenia, psoriasis

Foot and ankle joints movement of dancers and non-dancers: a comparative study

Cho Ho-Jung[1], Kim So-Yeon[1], Kim In-Beom[1], Jung Joon-Yong[2], Kwak Dai-Soon[1]

[1]The Catholic University of Korea, Catholic Institute for Applied Anatomy, SOUTH KOREA, *[2]The Catholic University of Korea, Department of Radiology, SOUTH KOREA*

Aim:

Dancers have more frequent injuries on foot and ankle joints than ordinary people. Especially in regards to ballerinas, it is expected for them to show different ankle joint movements compared to people who have not had any dancing training, since ballerinas repeatedly train plantarflexion with pointe-shoes on. Therefore, this study observed and compared ankle joint movements between ballerinas and ordinary people using x-ray images which are used for Interventional Radiology (AXIOM Artis, Siemens).

Methods:

All 14 female participants were over 18 years of age. Seven non-dancers (mean age: 25.6 years) and seven ballet dancers (mean age: 20.3 years, mean training periods of ballet: 11.0 years) volunteered for this study. We took x-ray images of foot and ankle joint in each position of dorsi flexion, plantar flexion, neutral position and standing position, and then took motion x-ray images from dorsi flexion to plantar flexion. Ranges of motions (ROM) of ankle were measured against the standing position. Also, we analyzed the ratio of movement for each joints from tibia to talus during dorsi and plantar flexion. Each joint's movement was measured using connection lines of bony land marks of talus, navicular, intermediate cuneiform and first metatarsal against the tibial axis.

Results:

The mean ROM of dorsi flexion was 34.6° for non-dancers and 23.9° for dancers. The mean ROM of plantar flexion was 54.8° for non-dancers and 73.5° for dancers. There was significant differences in ROM of borth dorsi and plantar flexion between non-dancers and dancers ($P = 0.01$ and $P < 0.01$, respectively). The mean total ROM throughout dorsi to plantar flexion was calculated as 89.4° in non-dancers and 97.4° in dancers, which showed no critical differences ($P = 0.09$). In neutral position, dancers' feet were found to be more inclined towards the plantar site by around 30.9° in comparison with non-dancers (14.3°, $P < 0.01$). In regards to the ratio of each joint's movements, the highest ratio of movement was shown at the talocrural joint in both dancer and non-dancer groups. The cuneonavicular joint was found to have the lowest ratio of movement in both subject groups. During dorsi flexion, the ratio of the talocrural joint of dancers was higher than that of non-dancers by 10%, but other joints showed lower ratios for dancers compared to non-dancers. Meanwhile, the talocrural joint showed higher ratio of movements in non-dancers, and the ratio of cuneonavicular joint movement was greater in dancers during plantar flexion.

Conclusion:

Dancers showed smaller ROM of dorsi flexion and bigger ROM of plantar flexion in comparison with non-dancers. We also analyzed the ratio of movement for each joint during ankle movements. The cuneonavicular joint is generally known to have limited roles, but the ratio of motions of it was about 7% in dancers during plantar flexion.

Surgical neuroanatomy and three-dimensional evaluation of petrous portion of carotid canal, superior (anterior) semicircular canal, internal acoustic opening and canal structures: a radioana

Cömert Ayhan[1], Dogan Ihsan[2], Cemil Kilinc Mustafa[2], Al-Beyati Eyüp S.[2]
[1]Ankara University, Department of Anatomy, School of Medicine, TURKEY, *[2]Department of Neurological Surgery, Ankara University School of Medicine, TURKEY*

Aim:
Surgically, it is important to estimate the almost correct localization of bony formations which are not encountered during subtemporal middle fossa approaches. Instead of existing anatomically visible neural, vascular and bony landmarks above the anterior surface of petrous part of temporal bone, there are also invisible embedded bony compartments preserving and including important structures inside this region. Knowing the morphological and morphometric relation of superior semicircular canal, carotid canal and internal acoustic opening and canal and their relations will provide more safe surgeries. The aim of our study is to evaluate related structures and to discuss their importance regarding surgical planning and evaluation.
Methods:
Three dimensional reconstructed colored images of superior (anterior) semicircular canal, internal acoustic opening (and canal) and carotid canal of 20 patients with no intracranial pathology were created using Osirix software. Three-D reconstructions were performed on 20 CT scans which were imported into the imaging software OsiriX v.3.7.1. From the superior view, mean angles of these structures' extensions with midsagittal plane were measured and calculated. Additionally, important parameters were measured and related anatomical structures on five cadavers were evaluated.
Results:
The mean angle of carotid canal with midsagittal plane was measured as 120.2 ± 5.9º on the right side and 119.6 ± 6.1º on the left side. The mean angle of internal acoustic opening and canal with midsagittal plane was measured as 75.6 ± 6.4º on the right side, 76.9 ± 6.9 º on the left side. Representation of the corresponding structure was obtained step by step. Preoperative important morphological relations were determined for surgical planning. The mean angle of superior (anterior) semicircular canal with midsagittal plane was measured as 41.1 ± 6.3 º on the right side, 39.2 ± 6.8º on the left side. In cadavers the 3-D course evaluated and reconfirmed anatomically.
Conclusion:
The mentioned anatomical bony structures that protect important neural and vascular elements are prone to intaoperative injury. Preoperative evaluation of locations and morphology of these structures with anatomical landmarks will ensure safe surgeries. This anatomical data and radiological preoperative evaluation can help surgeon to be navigated to understand the complicated surgical neuranatomy accurately.

Overlapping pallial amygdalar projections to the nucleus accumbens and adjacent extended amygdala in the domestic chicken

Csillag András[1], Hanics János[1,2], Alpár Alán[1,2], Székely Andrea D.[1], Teleki Gyöngyi[1]
[1]Semmelweis University, Faculty of Medicine, Department of Anatomy, Histology and Embryology, HUNGARY, *[2]Hungarian Academy of Sciences, MTA-SE NAP B Research Group of Experimental Neuroanatomy and Developmental Biology, HUNGARY*

Aims:
The cell clusters of viscerolimbic (extended amygdala (EA)-related) and accumbic relevance are highly interlaced in the ventrobasal forebrain of chicken, making territorial parcellation difficult. This study is aimed at reassessing of the problem in the avian forebrain.
Methods:
One- to two-week-old domestic chicks; pathway tracing with Alexa Fluor 488-conjugated cholera toxin B subunit, or Fast blue (as retrograde tracers); and Alexa Fluor 594 – conjugated dextran 10 kDa (anterograde, injected stereotaxically. Immunocytochemistry, confocal laser scanning microscopy and 3D image reconstruction.
Results:
Retrograde tracing with choleratoxin B, injected into the nucleus accumbens (Ac) and bed nucleus of stria terminalis, lateral part (BSTL), yielded labeled perikarya in a ring-shaped area of arcopallium, including dorsal and hilar subdivisions, with a wedge-shaped node of dense accumulation in the amygdalopiriform area (APir). The position of source neurons for this arcopallio-subpallial pathway was verified also by anterograde tracing. Three subregions of arcopallium (amygdalopiriform, dorsal, hilar) were injected with dextran (10kDa), and fibers and terminal fields were detected in Ac, BSTL and EA. Most abundant projections to Ac arose from APir. The study enabled precise description of the main output fiber streams of arcopallium: the dorsal stream enters the ventral amygdalofugal tract, and it traverses the EA and the BSTL before reaching the Ac. The ventral stream enters the EA along the ventral subpallial border and terminates in the basal nucleus and ventral pallidum. The course of the pathway was reconstructed in 3D. The dopamine signaling protein, DARPP-32 was present in the Ac but not the BSTL, and it could thus be used as a territorial marker. No colocalization between the calcium binding proteins calbindin, parvalbumin and calretinin, and retrogradely labeled neurons was detected, despite a considerable territorial overlap.
Conclusions:
The findings support the excitatory nature of the arcopallial-accumbens pathway, in agreement with our previous electron microscopic observation in rat and chicken brains, revealing coexistence of L-glutamate and L-aspartate in asymmetric synaptic terminals of amygdalofugal axons in the accumbens core. Convergent amygdalar input to EA, including BSTL, as well as to Ac subregions likely transmits fear related signals to both viscerolimbic (EA) and reward-related (Ac) ventrobasal forebrain regions. Whereas the source neurons of this pathway extend to a wide field of arcopallium, including neighbouring nidopallial and piriform regions, those fibers terminating most rostrally (i.e. also invading the accumbens) tend to arise from the lateral arcopallial subdivision (APir).

Supported by the K-109077 NKFIH-OTKA research grant (A.C.) and the National Brain Research Program of Hungary (MTA-SE NAP B, KTIA_NAP_13-2014-0013 to A.A).

Minimally Invasive Coronary Artery Bypass Grafting: Analysis of Pre-Operative Anatomical Eligibility Parameters Using Computed Tomography

Dillon Kate[1], Johnson Marjorie[1], Chan Ian[2], Kiaii Bob[3]

[1]Western University, Anatomy and Cell Biology, CANADA, *[2]London Health Sciences Centre, Radiology, CANADA*, *[3]London Health Sciences Centre, Cardiac Surgery, CANADA*

Introduction:

The robotic-assisted endoscopic single-vessel small thoracotomy (endo-SVST) bypass procedure is a minimally invasive procedure that confers similar benefits to the conventional full-sternotomy coronary artery bypass revascularization. A limitation of the endo-SVST procedure that still requires attention is the pre-operative selection criteria. Inappropriate selection can result in intra-operative conversions from the endo-SVST to a full-sternotomy resulting in increased patient morbidity, operative times and surgical cost. One of the primary intraoperative concerns necessitating conversion is the inability of the endoscopic camera to visualize the left anterior descending (LAD) coronary artery, the target vessel, under the surrounding epicardial adipose tissue. The aim of this study is to determine if patient body mass index (BMI), chest anthropometric parameters, and the thickness of epicardial adipose tissue overlying the target vessel, examined using both patient data and pre-operative computed tomography (CT) images, are able to predict and thus reduce the need for conversion based on effective pre-operative exclusion criteria.

Methods:

Retrospective analysis of patient pre-operative CT angiography scans from both converted (N=17) and robotic-assisted (N=17) procedures using the DaVinci Surgical Robot was performed. Patient scans were anonymized and measurements were made using 3D Slicer 4.4.0. Where possible, measurements of thoracic cavity dimensions and epicardial adipose thickness were acquired from axial slices, at the most accessible segment of the LAD, in the fourth anterior intercostal space. Independent-samples Student T Tests and Pearson Correlation were performed using SPSS (α=0.05).

Results:

Results indicate that patients who successfully underwent the endo-SVST procedure had significantly less epicardial adipose tissue (p=0.002) overlying the LAD in the transverse measurement than those who were converted to the full-sternotomy intra-operatively. The data also suggests that there are no significant differences between the two groups with respect to the remaining epicardial adipose tissue and chest anthropometric measurements. A moderate, but non-significant, positive correlation R=0.32 (p=0.06) appears to exist between BMI and the thickness of epicardial adipose tissue within the anterior inter-ventricular sulcus.

Conclusions:

These data suggest that a transverse measurement of epicardial adipose tissue overlying the LAD of 7.9±3.2mm may indicate a greater risk for conversion to the full-sternotomy. Using this thickness as the baseline for exclusion reduces the conversion rate for this group by 47%. These data indicate that the relationship between the thickness of epicardial adipose tissue and conversion to full-sternotomy can't be fully explained by a patient's BMI and chest anthropometrics. A prospective analysis of new patient data will be performed to ascertain the validity of the proposed measurements.

Step-by-step Imaging and Surgical Anatomy training systems database for the most common surgical interventions

Dydykin Sergey[1], Zhuravlev Dmitry[2], Scherbyuk Alexsandr[1], Bogoyavlenskaya Tatiana[1]
[1]Sechenov First Moscow State Medical University, Department of Topogracpical Anatomy & Operative Surgery, RUSSIA, *[2]Molnet, RUSSIA*

Virtual learning plays an important role for the surgeon of the future already at the undergraduate stage. It is not only aimed at professional orientation of future doctors of a surgical profile, but also should include familiarity with manual skills, control of the camera manipulation tools. The use of interactive educational complexes fill and complement the lack of biological material.

There is creation of the training complex during the implementation of the joint project of the Department of operative surgery and topographical anatomy to First MSMU n. a. I. M. Sechenov and LLC MOLNET. The training complex can be used by students not only during teaching at the University, but also as the stage of interactive distance education, as well as in home training.

Training complexes will greatly improve the quality of student learning, giving them the opportunity to experience themself in the modern operating room and observe the stages of surgical interventions "in the eyes of the operating surgeon". The student be able to learn the techniques of manipulation by basic and specialized surgical instruments working with this product.

Each step of one type of surgical intervention simulation training complex include the following main components.

• Clinico-pathological features of the diseases in which it is necessary to conduct a specific surgical intervention.

• Unit diagnostic information containing a set of diagnostic studies (x-rays, ultrasound data, MRI) results.

• The surgical intervention step-by-step animation with the use of three-dimensional visualization and animation during which will be considered the optimal process of surgery. The main steps will be presented, with special attention to anatomical structure and used tools for each phase of the operation and also the major mistakes of novice surgeons.

• A test unit comprising a testing for checking the assimilation of educational material on specific surgery.

Thus, based on the functional, technical and consumer characteristics of step-by-step Imaging and Surgical Anatomy training complex, it can be concluded that the high-tech product with high consumer properties is developed by the results of our development to meet modern trends in education and information technology.

Neuroanatomical Changes of Patients with Schizophrenia in Association with the Clinical Symptoms: A Comparative Brain Segmentation Study

Elfaki Amani[1], Sarac Hadzihalilovic Aida[2], Osman Ali Tahir[3], Elfaki Abdelrazag[4], Elsheikh Abdelgani[3], Mohamed Osman Amira[5], Sahin Bunyamin[1]

[1]Ondokuz Mayis University, Faculty of Medicine, Department of Anatomy, TURKEY, *[2]University of Sarajevo, Faculty of Medicine, Department of Anatomy, BOSNIA AND HERZEGOVINA*, *[3]National Ribat University, Faculty of Medicine, Department of Anatomy, SUDAN*, *[4]Ahfad University for Women, Department of Psychiatry, SUDAN*, *[5]International University of Africa, Faculty of Medicine, Department of Anatomy, SUDAN*

Aim:

Volumetric magnetic resonance imaging (MRI) studies provided evidence for brain abnormalities in schizophrenia, but their relationship to specific clinical symptoms and syndromes remains unclear. In our study, gray and white matter volumes in the frontal, parietal and temporal lobe regions were analyzed in patients with schizophrenia to investigate the relationship between brain structures and schizophrenic symptoms. We were especially interested in the possible relationship of structural abnormalities with negative and positive symptoms.

Methods:

57 schizophrenic patients (30 male, 27 female) and 88 control subjects (51 male, 37 female) participated in the study. The study was approved by the ethical committee of the Gezira University/ Sudan. Patients or patient's relatives and controls consented to all procedures. Clinical symptoms of patients were evaluated using Positive and Negative Syndrome Scale. Structural MRI was performed and the DICOM images were evaluated using automatic brain segmentation software (BrainSuite). The volumes of the region of interest were evaluated. Results: Temporal lobe grey and white matter of patients with schizophrenia (110.41±12.55 cm3, 43.81±4.96 cm3, respectively), were less than that of controls (124.14±13.15 cm3, 50.71±6.29 cm3, respectively). Temporal lobe grey and white matter has significant correlation with the most of positive symptoms and some of negative symptoms of patients (P≤0.050). Frontal lobe grey and white matter of patients with schizophrenia (162.86±18.66cm3, 92.91±11.56cm3, respectively), were less than that of controls (180.80±17.81cm3, 105.46±11.12cm3, respectively). Parietal lobe grey and white matter of patients with schizophrenia (72.49±7.54cm3, 42.47±4.51cm3, respectively), were less than that of controls (79.40±6.77cm3, 48.46±5.94cm3, respectively). Grey and white matter of the frontal and parietal lobes has significant correlation with the most of the negative symptoms (P≤0.050).

Conclusion:

The present study supported that patients with schizophrenia have a generalized brain deficit. Temporal lobe grey and white matter disruption may play a crucial role in dysfunction of auditory, language processing, and in cognitive deficits of schizophrenia. While, grey and white matter reduction of frontal and parietal lobe are associated with thought disorder, poverty of speech and flattening of affect in schizophrenia. Finally, our findings suggest that changes in specific areas may influence specific symptoms.

Keywords: Temporal lobe, Frontal lobe, Parietal lobe, Schizophrenia, Positive and negative syndrome scale, Automatic brain segmentation

The anatomy of extracranial part of facial nerve in human fetuses

Elvan Özlem[1], Bobuş Alev[1], Tezer Mesut Sabri[1]
[1]*Mersin University, TURKEY*

Aim:
The anatomic study of the facial nerve (FN) is closely related to the prevention of nerve injury that may occur in facial and neck surgeries. Due to the incomplete cranial maturation in the fetal period and the large dimension of buccal fat pads in the region, the position, neighborhood and the course of developing FN differs from its adult form. Obtaining a detailed anatomic knowledge of this structure in the fetal period is highly important for gaining a better clinical perspective for its surgery. From this perspective, this study was performed to evaluate extracranial part of FN with emphasis on some important morphometric data; its relationship with apparent anatomic landmarks, facial plane and fasciae; differences between the sexes and possible asymmetry of the right and left sides in human fetuses.
Methods:
About 65 hemifaces of formalin fixed human fetuses (ages varying between 22 and 36 weeks of gestation) were dissected under surgical microscope.
Results:
Branching patterns of FN were classified according to classifications in the literature. Positional relations of retromandibular vein and posterior auricular artery with FN were found variable. Superficial muscular aponeurotic system was continuing with temporoparietal fascia (TPF) over the zygoma. TPF was multilayered structure and temporal rami was coursing superficially, within and deep sides of the TPF above the superficial layer of deep temporal fascia and merely it coursed on the surface of the superficial layer of deep temporal fascia, but in no case entering into intermediate fat pad. Soft tissue layers fascial thickness got thinner posterior third if it was divided anterior, middle and posterior parts of the zygoma. Relations of marginal mandibular and the buccal branches with buccal fat pad, parotid duct, angulus mandibula (as it was not prominent in fetuses) and inferior border of mandible were determined.
Conclusions:
Studies have been published to draw attention to relationships of retromandibular vein and posterior auricular artery with FN. Findings of this study clearly revealed that positional relations of with FN were with these structures were variable contrary to the information given in textbooks There are several studies regarding temporal ramii of facial nerve in the temporoparietal region regarding its course and relations within temporoparietal fascial layers due to the confusion of its nomenclature and complexity of anatomic features. The branches of FN with relation to certain landmarks were compared with data in the literature. Although there are several reports in the literature about them in adult cadavers, there are limited reports regarding fetuses. So, understanding the microsurgical anatomy of the extracranial part of FN in the fetal period is utmost important to perform surgical procedures without damaging the FN in the early childhood.

Key words: fetuses, extracranial part of facial nerve, anatomy, branching pattern, SMAS

Flexor tendons of the hand - clinical anatomy

Erić Mirela[1]

[1]*Faculty of Medicine, University of Novi Sad, Department of Anatomy, SERBIA*

The anatomy of the hand is complex, intricate, and fascinating. Its integrity is absolutely essential for our everyday functional living. The hand is the most refined anatomical terminal device known and the leading edge of the sensorium. Further, the hand is second only to the face in terms of visibility and is a vitally important aspect aesthetic and body image. Hand amputation represents a devastating loss of function and independence. With constant use, it is no wonder that hand injuries are common in population. For any physician or therapist treating hand problems, the mastery of such anatomy is fundamental in order to provide the best quality of care.

The back of the hand is the surface that is usually visible and therefore aesthetically important, while the palmar surface, which is usually hidden, is the functional surface. Tendon injuries are the second most common injuries of the hand and therefore an important topic in trauma and orthopedic patients. The flexor tendons run along the palmar surface of the hand, close to the surface of the skin. Because of that flexor tendon injuries are common.

The thumb has one (flexor pollicis longus), while other fingers have 2 flexor tendons (flexor digitorum superficialis and profundus). Verdan divided the flexor tendon into five anatomic zones. Zone II is unique in that flexor digitorum superficialis and profundus are in the same tendon sheath. This zone remain an enigma for the hand surgeons even today but the outcome results have definitely improved due to advances in postoperative motion protocols with development of multistrand core suture techniques. There are five annular and three cruciform pulleys. Fibrous annular pulleys prevent bowstringing, while cruciform pulleys are thin and provide flexibility. The most important are A2 and A4 pulleys.

Closing the gap- assessment of an ultrasound guided selective ventral block of the axillary and intercostobrachial nerves: An anatomical investigation

Feigl Georg C.[1], Aichner Elisabeth[1], Mattersberger Christian[1], Avila Carla[2], Litz Rainer[2]
[1]Institute of Macroscopical and Clinical Anatomy, AUSTRIA, *[2]Department of Anaesthesiology, GERMANY*

Background:
During brachial plexus block at level of the axillary fossa regularly does not reach the axillary and intercostobrachial nerves. An ultrasound guided ventral approach was assessed to block these nerves reaching the upper limb.
Materials and Methods:
46 cadavers (respectively 92 limbs) embalmed with Thiel's method were investigated, the upper limb in abducted position. The quadrangular space was identified by distal to proximal guidance. Latissimus dorsi and teres major were identified as well as the quadrangular space with the passing circumflex humeral artery and the axillary nerve. Pulling the needle back, an additional injection was place more medially in the subfascial axillary space. 2ml of latex were injected in each space and dissected after injection.
Results:
The latex surrounded the axillary nerve in 87 cases and spread ventrally and dorsally to the space as well. In five cases an intramuscular spread was documented, 4 of these five cases were at the very beginning of the investigation. Ventral spread was limited that the radial nerve was reached in 3 cases but median and ulnar nerves were not reached by the latex. The latissimus dorsi and the teres major were easily identifiable and determined to function as important landmarks. The circumflex humeral artery and the axillary nerve were visible in most of the cases, too. Concerning the intercostobrachial the latex surrounded the nerve in all cases.
Conclusion:
The ventral ultrasound guided approach is performable anatomically and provides clear anatomical landmarks. Both nerves were reached. A learning curve is documented.

Distance of the exit point of the supraclavicular nerves through the prevertebral fascia to the area nervosa: to neglect or not?

Feigl Georg C[1], Aichner Elisabeth[1], Avila Carla[2], Litz Rainer[2]
[1]*Institute of Macroscopical and Clinical Anatomy, AUSTRIA*, [2]*Department of Anaesthesia, Bergmannsheil, GERMANY*

Background:
Blocks of the area nervosa at the posterior border of the sternocleidomastoideus muscle between the superficial and deep cervical fascia frequently do not reach the supraclavicular nerves. Therefore we measured the distance of the point of perforation of the supraclavicular nerves through the prevertebral fascia to the area nervosa.
Materials and Methods:
48 cadavers (96 limbs) embalmed with Thiel´s method were investigated. The area nervosa was dissected and the prevertebral fascia exposed and the exit point of the supraclavicular nerves measured.
Results:
the trunk of the supraclavicular nerves perforated the fascia in 90 cases in a distance to the area nervosa in 18mm on the right and 29mm on the left sides (Minimal: 0mm, maximal 29mm right and 40mm left). In 6 cases the medial supraclavicular branches had a separate exit area with the same distance.
Conclusion:
The supraclavicular nerves pierce the prevertebral fascia more caudal which need to be taken into consideration when the nerves should be blocked during a block of the sensitive part of the cervical plexus.

The Anatomy of the interscalene gap: everything that clear for everybody?

Feigl Georg C.[1], Aichner Elisabeth[1], Avila Carla[2], Litz Rainer[2]

[1]Institute of Macroscopical and Clinical Anatomy, AUSTRIA, *[2]Department of Anaesthesiology, Bergmannsheil, GERMANY*

Background:

Due to the fact of many different existing block techniques focusing on the interscalene gap there exist many different terms and anatomical interpretations about the spaces and fascias such as extrafascial versus intrafascial, brachial plexus sheath.

Method:

We base our description on the experience of different publications and the dissection of at least 1000 cadavers in the last 20 years.

Results:

The use of terms extrafascial and intrafascial as well as brachial plexus sheath comes from misinterpretations of the topographical anatomy.

Conclusions:

Anaesthetist should contact anatomists not to create artefacts or new not existing anatomical structures.

Are the headaches manifestation of the severity of brain changes in PTSD suffering patients?

Filipovic Branislav[1], Filipovic Branka[2], Starcevic Ana[1], Aksic Milan[1], Aleksic Dubravka[1], Stijak Lazar[1], Radonjic Vidosava[1]

[1]Faculty of Medicine, University of Belgrade, Serbia, Institute of Anatomy "Niko Miljanic", SERBIA, [2]"Clinical and Hospital Center "Bezanijska Kosa", Department of Gastroenterohepatology, SERBIA

Aim.

In the present study, we have hypothesized that volume changes of the basal nuclei, hippocampus, thalamus, and lateral ventricle in therapy naive, male PTSD patients are more pronounced in those with headaches. To confirm or reject our hypothesis, we have undertaken an extensive study of forty nine PTSD patients.

Methods.

We have undertaken an extensive study of forty-nine PTSD male patients that underwent MRI scanning immediately upon admittance for the treatment. Based on headache frequency, they were classified into three groups: group 1 included patients with headaches at least twice a week; group 2 consisted of patients with headaches less than twice a week; and group 3 consisted of patients without headaches. All MRI scans underwent software-based volume compute and statistical processing. The presence of the depression has been evaluated by Hamilton's depression rating scale of 21 items. The severity of depressive symptoms have been correlated with anatomical changes revealed on MRI.

Results:

39 out of 49 patients with PTSD suffered from headaches. Bilaterally, volume decreases were noted in groups 1 and 2 compared to group 3 for the caudate nucleus, putamen, hippocampus and lateral ventricle. Differences in globus pallidus and thalamus among groups appeared to be insignificant. Results showed that the intensity of the headaches and the level of the volume decrease correlated with the Hamilton's scores.

Conclusion:

The present study revealed a bilateral volume decrease of the caudate nucleus, putamen and hippocampus in PTSD male subjects without therapy. Intensity of volume alterations correlated with Hamilton 's depression rating score; regression analysis uncovered correlated changes in the caudate nucleus, putamen and hippocampus, and an inverse correlation with the volume of the lateral ventricle in the PTSD patients.

Topographic anatomy research that changes what we teach. Research-enriched education using the wrist as an example

Fogg Quentin A.[1]
[1]*Monash University, Centre for Human Anatomy Education, AUSTRALIA*

Aim:
The anatomy applied in contemporary clinical settings is largely based on anatomy learnt in primary health care education, on the job, and through post-graduate courses and conferences. A search of the research literature on any specific region will uncover a multitude of papers questioning this anatomy but offering widely different results. Whilst some clinicians rely on their memory of anatomy learnt in their primary training, others call on the research literature. “Clear” results are often contradicted by other “clear” results based on flawed or poorly communicated research methods; just one of these papers may be taken as conclusive without further critique of the methods used. This is particularly evident in the wrist and hand. Modern textbooks are rarely completely up to date, a natural limitation based on the time they take to write and publish. However, anatomy textbooks are often without changes strongly indicated by the research literature, although this is changing. This study will highlight the differences in wrist anatomy brought about by research and emphasise the clinical importance of these differences.
Methods:
Data from more than 15 years of wrist research (including three PhDs) were collated to give an overall indication of the current evidence-base for wrist anatomy. These data were compared to the wrist research literature and a variety of anatomy textbooks from recent years.
Results:
There is a stark contrast between the wrist anatomy discussed in the research literature and that presented in a variety of textbooks. Key examples include the presence of prominent, individual collateral ligaments in numerous current editions; little evidence of their existence is reported and a number of studies strongly exclude their presence. There was also considerable variation in the connectivity between ligaments, tendons and bones in the wrist; for example, the attachments of the carpal tunnel. The descriptions (specific or implied) in textbooks often confuse and contradict the research data, which may confuse students.
Conclusion:
There are clear advances being made in topographic anatomy which are far too slow in reaching the core teaching materials used in health care education. Anatomy educators should be encouraged to continue to look at topographic anatomy with scientific rigour, explore the literature in their areas of speciality and work with clinicians to help define the clinical importance of structures emphasised. Demonstrating these differences and results in class will encourage questioning and rationalisation of anatomy, rather than passive memorisation. It may also kindle a new wave of interest in topographic anatomy research.

The role of innervation in the physiology of induced pulpitis of rat molars

Csizmazia Dániel[1], Bóta Cynthia[1], Marton Viktória[1], Gerber Gábor[1]
[1]*Semmelweis University, Department of Anatomy, Histology and Embryology, HUNGARY*

Aim:
The dental pulp is a richly innervated tissue. The predominantly unmyelinated primary afferent axons play an important role in nociception. Periferal nerves activated by noxious stimulation not only send information to the central nervous system, but can also induce neurogenic inflammation via the axon reflex.
During this reaction neuropeptides are released from the axon terminals, which produce oedema and an increase of vasopermeability. The enhanced vasopermeability may cause an increase of immuncompetent cells. Our aim was to investigate the effect of autonomic and sensory nerves on the evoked sterile inflammation in the dental pulp.
Methods:
We induced sterile pulpitis in the pulp of the three-three lower molars in adult Wistar rats.
The induction of sterile pulpitis was achieved with an ultrasonic scaler without water cooling placed on the lingual surface of the molar tooth for 60, 30, 15 seconds respectively. In the first group of animals (n=4) 2 days before the induction of pulpitis, the inferior alveolar nerve was axotomized leaving the inferior alveolar artery undamaged. In the second group of animals (n=5), the pterygomandibular space was infiltrated with 4% articain (Septanest N) to block the inferior alveolar nerve. 15 minutes after the procedure, sterile pulpitis was induced using the method described above. The third group (n=4) underwent a sham procedure, in which the inferior alveolar nerve was explored surgically, but was not axotomized. The fourth group (n=4) had symphatectomy in which the right cervical superior ganglion was excised. After 2 days, sterile pulpitis was induced with the same method.
Each animal was transcardially fixed with formaline after 2 weeks survival time. HE stained sections were evaluated using leukocyte counting method.
Results:
Noxious stimuli applied with the ultrasonic scaler evoked an intensity dependent rise in the leukocyte count in the dental pulp. Yet, leukocyte count was significantly less in the pulp of the teeth on the denervated, sympatectomised or anesthetized side than on the contralateral side. This difference was absent in the animals, which had only sham surgery.
Conclusion:
Our data indicates that both somatic and autonomic nerves may be involved in the development of sterile pulpitis.

Those Great Men and their Magnificent Discoveries. A Short Tale on "History of Histology"

Ghallab Ayman M.[1]

[1]*Zagazig University, Faculty of Medicine, Histology Department, Histology, EGYPT*

What is an eponym? Eponym means any histological word, structure, or cell whose name is related to a scientist who discovered it. We have more than 200 eponymous structures in histology.

In the 17th century, the subject of Histology was born after the invention of the microscope and discovery of the cell by Antonie van Leeuwenhoek and Robert Hooke in 1665. Marcello Malpighi (1628-1694) is concidered the Father of histology. His name was given to many structures.

In the 18th century, Marie Francois Bichat (1771-1802) made the first definition of the tissue. He was considered the founder of histology (he described 21 textures) but without microscope. When Napoleon Bonaparte invaded Egypt "Rosetta Stone" was discovered and the mystery of the Ancient Egyptian Heliographic alphabet was solved. After two years Bichat's described the tissues of the body, it can be said that those manuscripts of Bichat were a kind of "Histology Rosetta Stone".

In the 19th century, Johannes Purkinje (1787-1869) was a pioneer in histological techniques, first to use something like a microtome. Theodore Schwann (1810-1882) is a German histologist and cytologist who developed the cell theory. Leopold Auerbach (1828-1897) was one of the first to use histological stains to view the nervous system. Most famous for his Auerbach's plexus.

In the 20th century, Camillo Golgi (1843-1926) known for a metal (silver) impregnation stain of nerve cells called the Golgi method. He shared Nobel Prize in medicine and physiology with Cajal in 1906. In 1931 German engineer, Ernst Ruska and Max Knoll designed and made the first electron microscope and in 1986, Ruska was awarded Nobel Prize as the most important innovations of the 20th century.

So eponym in Histology is really more than just a name, it's honoring those scientists who devoted their lives to make the world a better place, it's history behind a word.

The Anterior Nucleus of Thalamus, the Limbic System and DBS for Epilepsy

Gonçalves-Ferreira Antonio J. C.[1], Rainha Campos Alexandre[1], Lucas Neto Lia[1], Franco Ana[2], Ferreira Sara[3], Andrade Alexandre[3]

[1]Faculty of Medicine, University of Lisbon, Institute of Anatomy, PORTUGAL, *[2]Faculty of Medicine, Lisbon University, Department of Neurology, PORTUGAL*, *[3]Lisbon University, Instituto Biofísica e Engenharia Biomédica, PORTUGAL*

Introduction and Objectives:

The Anterior Nucleus of Thalamus (ANT) is one of the main thalamic nuclei and a key component of the limbic circuitry. It became recently one of the targets of Deep Brain Stimulation (DBS) for the treatment of refractory epilepsy when there is no focal resectable origin, namely in cases of limbic epilepsy. The first multicentric prospective study regarding this procedure was published in 2010, in USA. There is now an European open observational study running in several countries focused on the bilateral accurate targeting of the ANT-DBS to treat such epilepsy. These clinical studies led us to review the main anatomical structures of the human limbic system and the connections of the ANT within it; and to correlate the ANT-DBS targeting with its therapeutic results in our neurosurgical center.

Material and Methods:

We have treated until now 12 cases of adult refractory epilepsy by bilateral ANT-DBS. The focal origin of the epilepsy, the main clinical features, the DBS results and the 3-D references of the ANT targets are presented and discussed. Simultaneously an anatomical 3-D study was started in order to improve the correct ANT stereotactic references.

Results and Discussion:

The majority of our epileptic patients had a favourable clinical evolution with ANT-DBS. The epilepsy results as well as the adverse effects are presented in detail and related to the ANT targeting we used.

E-books of topographic anatomy

Hajek Petr[1]

[1]*Charles University, Faculty of Medicine in Hradec Kralove, Department of Anatomy, CZECH REPUBLIC*

With respect to modern form of education, we publish four electronic books of topographic anatomy. The first one (ready to use in the time of ISCAA meeting) is Topographic Anatomy of the Upper Limb. Series of the following parts of the human body are in progress.

The books are based on our E-learning courses of topographic anatomy running in LMS Moodle almost one decade. Back then we found out that time stress made students to focus on systematic anatomy and to sidetrack the topographical anatomy. For this reason, the courses were supposed to complete current contents of practical classes suitably and to clear blind spots not only in syllabi, but also in motivation of students. Moodle courses were joined with a forum, questionings, and other feedback elements which made us to modify the source. The product is a result of author's work, students' team, and software development company "Code Creator". Each chapter of the book contains a study material (text, interactive pictures, schemes, photos of our dissection specimens, videos) and it is concluded by a quiz as a feedback. All the texts are original works based on knowledge of literature and also experience from own dissection works. The texts are clearly structured by bullets, anatomic terms are highlighted. Interactive pictures come from students' illustrations. They display structures in a picture by colouring or an arrow after clicking on the legend. So this material can serve both as a study material and to self-examination. Last but not least, the book is equipped with an interactive glossary. The glossary contains a list of anatomic terms with a description of about 3 sentences. Each term loaded in the glossary is automatically highlighted in the presented text.

The product is in a form of an application, optimized for tablets. A common e-book works on computers but in small electronic devices the application enables bookmarks and many other tricks. For students who hate to use electronic devices in dissection rooms, a pdf document is placed at the top of each chapter. It is an abstract in extent of about 3 A4 pages, fits to be printed and put into a pocket of a laboratory coat.

We started by a pre-version of Czech e-books. But we decided to give priority to English version. Especially for international students studying in English language it is important to integrate various foreign sources into one complete course to motivate them and also to facilitate the extra effort they have to make while studying abroad.

The project is supported by the Charles University, IP 2016-2018

Can we learn from students' mistakes? - a retrospective analysis of answers at PracticeAnatomy.com

Cierny Marek[1], Papousek Jan[2], Stanislav Vit[2], Kasickova Linda[2], Volny Ondrej[3], Hudák Radovan[4]
[1]University Hospital Brno, Department of Neurology, CZECH REPUBLIC, *[2]Masaryk University, Faculty of Informatics, CZECH REPUBLIC*, *[3]Masaryk University and St. Anne´s University Hospital, Department of Neurology, CZECH REPUBLIC*, *[4]2nd Faculty of Medicine, Charles University in Prague, Department of Anatomy, CZECH REPUBLIC*

Recognizing and naming the anatomical structures on images is an essential initial step in building the knowledge base required for success in pregraduate course of medical anatomy, further study and medical or surgical practice.
When a student answers an anatomical question incorrectly, we would expect him to correct his knowledge with further effort. Now, can the teachers learn anything from the pattern of students' mistakes?
We aim to address this question with aggregate data from users of novel online learning tool freely available at PracticeAnatomy.com (Anatom.cz).
PracticeAnatomy.com (Anatom.cz) is a web-based tool for anatomy review featuring 200 anatomical images from popular textbook Memorix Anatomy. 2.300 questions with 1.800 distinct anatomical terms were used. Users review their knowledge by naming a single highlighted structure or recognize a structure of a given name (in Latin, English or Czech). An innovative predictive model evaluates all the previous answers and chooses the next question in order to maintain a stable proportion of correct answers for a given learner, which facilitates motivation, engagement and learning.
After summarizing basic visitors' information (language, country, registration status), we aimed to identify anatomical structures that were outliers in the following variables: 1. Item difficulty, 2. Distractibility, 3. Interchangeability, and 4. Retention. All variables were calculated using a model of knowledge based on prior answers.
We analyzed 685.000 answers from 25.000 visitors, of whose 1.000 (4%) were registered. Visitors in 90% used Czech user interface (UI) and Latin nomenclature, in 10% English UI and English nomenclature.
Aggregate data of learners' answers at large-scale testing tools may provide feedback to teachers and lecturers, with possible implications for medical anatomy teaching.

A New Approach for Evaluation of the Medial Surface Area of the Brain in Schizophrenia on Midsagittal Section

Sahin Bunyamin[1], Ibrahim Alaa[1], Osman Ali Tahir[2], Mohamed Abdelrahman[3], Ozdemi Fikri[4], Golpinar Murat[1], Elfaki Amani[1]

[1]Ondokuz Mayis University, Faculty of Medicine, Department of Anatomy, TURKEY, *[2]National Ribat University, Faculty of Medicine, Department of Anatomy, SUDAN*, *[3]National Ribat Hospital, Department of Radiology, MRI Section, SUDAN*, *[4]Hitit University, Faculty of Medicine, Department of Anatomy, TURKEY*

Aim:

The previous studies revealed that the size of the brain decreases in the patient suffering from the schizophrenia. The volume assessments were done by means of the Cavalieri principle or the brain segmentation and parcellation. In the Cavalieri principle, the sectional surface areas of the slabs are multiplied by the thickness of image and the total volume is estimated. This procedure may need long time. Some more estimation techniques that require less time may be needed. The aim of the present study is to evaluate the medial surface area of the brain in schizophrenia on midline using stereological analysis.

Methods:

57 schizophrenic patients (30 male- 27 female) and 88 controls (51 male – 37 female) participated in the study which was approved by the ethical committee of the Gezira University/ Sudan. Data was collected using questioner and magnetic resonance imaging scan. DICOM images were analyzed using ImageJ software. Midsagittal section slide was selected using specific criteria. The medial surface area of the brain and midsagittal surface area of intracranial cavity were delineated and the medial brain surface area fraction was estimated.

Results:

The mean of the brain medial surface area of schizophrenics and control groups were 139.61 ±10.03cm2 and 144.85±8.52cm2 respectively, the mean brain medial surface area of the schizophrenics was lower than that of controls ($P<0.050$). Between sex across groups the mean medial surface area of the brain of schizophrenic female (135.97±11.37cm2) was lower than control female (143.82±6.80 cm2) ($P<0.050$). Similarly, the mean midsagittal surface area of the intracranial cavity of schizophrenic and control groups were and 165.01±11.50cm2 170.63±10.90cm2 respectively, the mean of the midsagittal surface area of intracranial cavity of Schizophrenics was lower than the controls ($P<0.050$). Between sexes across groups the mean midsagittal surface area of intracranial cavity of schizophrenic female (159.26 ±11.35cm2) was lower than control female (166.16 ±8.16cm2) ($P<0.050$). There was no significant different concerning the brain medial surface area fraction between groups and sexes across groups ($P>0.05$).

Conclusion:

After controlling the head size, the present findings concluded that the explanation of the volumetric changes of schizophrenia could be due to the brain surface area abnormality. Also the current findings supported the sex dependent differences of the schizophrenia indicated that the abnormalities were severing in female patients. The method used in this study is useful for quantify researches in schizophrenia.

Keywords: Schizophrenia, Medial Surface Area, Brain, Midsagittal Section, Intracranial Cavity, Stereology

Aflibercept counteracts pathologic vaso-proliferation, modulates inflammation and triggers a tip cell-driven vascular regeneration after hypoxic retinal damage in mice

Rojo Arias Jesus Eduardo[1], Montecino Hector[1], Economopoulou Matina[2], Morawietz Henning[3], Funk Richard HW[1], Jászai József[1]

[1]Technische Universität Dresden, Medizinische Fakultät, Institut für Anatomie, GERMANY, *[2]Technische Universität Dresden, Uniklinikum, Klinik und Poliklinik für Augenheilkunde, GERMANY*, *[3]Technische Universität Dresden, Uniklinikum, Medizinische Klinik III, Bereich Gefäßendothel und Mikrozirkulation, GERMANY*

A particularly well-studied paradigm of retinal hypoxic stress is the murine oxygen-induced ischemic retinopathy model (OIR). An exuberant vaso-proliferative response occurs in this model, mimicking late severe forms of proliferative diabetic retinopathy (PDR). Consecutive hyper- and normoxia (relative hypoxia) applied during early post-natal development induce regression of the central retinal vasculature and uncoordinated proliferation of endothelial cells occurs leading to the formation of pathological epiretinal glomeruloid tufts. The murine OIR model offers an excellent system for testing the efficacy of anti-angiogenic substances and studying mechanistic aspects of microvascular regeneration.

The primary objective of our study was to investigate the efficacy of VEGF-Trap (Aflibercept), a recombinant decoy receptor ("receptor body") recognizing ligands of both VEGFR-1 and –2, in inhibiting pathological retinal neovascularization and promoting microvascular regeneration (i.e. ordered revascularization). Besides completing a detailed morphological characterization of the microvascular network upon VEGF-blockade, we also analyzed reactions of microglia/(infiltrating) macrophage cells as well as VEGF/VEGFR related signaling cascades. Our results indicate that Aflibercept application significantly inhibits aberrant vaso-proliferation of the superficial microvascular plexus and triggers a tip cell-driven regenerative mechanism responsible for an accelerated revascularization of the central avascular area in the hypoxia-damaged retina. Furthermore, the substance modulates the inflammatory response associated with the hypoxic damage by decreasing vascular permeability and affects the activation state of phagocytic cells, increasing the proportion of cells with a ramified morphology.

Our results indicate that most of the pathological vascular changes could be reliably reduced by means of Aflibercept in OIR mice, resulting in faster vascular regeneration without significant side effects on normal vascular development/ architecture.

Diseases of Luxembourg dynasty

Kachlik David[1], Steyerova Dana[2]
[1]*Second Faculty of Medicine, Charles University, Department of Anatomy, CZECH REPUBLIC*,
[2]*Regional Hospital Kladno, Otorhinolaryngology, CZECH REPUBLIC*

This year we celebrate 700th anniversary of the birth of the Bohemian king and Roman emperor of the Luxembourg dynasty – Charles (Karel) IV. His father, John (Jan) the Blind lost his vision probably due to glaucoma and rode to find his death to the battle of Crécy in 1346. Charles himself suffered from a complicated fall after being hit during a tournament in 1350, paralyzed with a bilateral fracture of mandible and a trauma of the cervical vertebral column. He died of pneumonia after another fall from a horse which caused a femoral neck fracture. His first son Wenceslaw (Václav) IV suffered from neural problems and died after a shock caused by beginning of Hussite revolt in 1419. His second son, Sigismund (Zikmund) died after gangrene and successive phlegmone of the great toe in 1437. The skeletons (except the lost ones of Sigismund) were studied by the Czech anthropologist Emanuel Vlček who brought after studying the historical sources these final diagnoses.

Scalenovertebral triangle – myth or truth?

Kachlik David[1], Feigl Georg[2]
[1]*Second Faculty of Medicine, Charles University, Department of Anatomy, CZECH REPUBLIC*,
[2]*University of Graz, Department of Anatomy, AUSTRIA*

The scalenovertebral triangle is a topographic space in the depth of the neck. From the anatomical point of view it overlaps from the anterior to the lateral cervical regions. Its borders are not defined and agreed worldwide and majority of the English-written books neglect this space. Only the lateral border by anterior scalene muscle, and caudal border by dome of the pleura are obvious. Dorsally is the space limited by longus colli muscle or if it continues into the intervertebral foramen and epidural space? Medially, is it limited by the inferior oblique part of the longus colli muscle or by the midline cervical organs (oesophagus, trachea)? Ventrally, is it the sternocleidomastoid muscle? And based on the precisely defined borders, the contents should be specified. The scalenovertebral triangle serves in clinical medicine e.g. for instillation of regional anesthesia to stellate ganglion, and that is why its precise anatomy should be defined, approved and taught by anatomists.

FIPAT and current state of morphological nomenclatures

Kachlik David[1]

[1]*Second Faculty of Medicine, Charles University, Department of Anatomy, CZECH REPUBLIC*

The Federative International Programme for Anatomical Terminology (FIPAT) is a group of experts who review, analyze and discuss the terms of the morphological structures of the human body. It was created by IFAA and succeeded the previous FICAT. It is composed of six working groups (for Gross Anatomy, Histology, Embryology, Neuroanatomy, Odontology/Anthropology, Orobiology and two subcommittees (Latin and Informatics), each headed by a coordinator and comprising several advisors coordinators (from 15 countries).
The last meeting of FIPAT (September 2015) proposed to publish a new version of the Terminologia Anatomica and Embryologica and to separate the Terminologia Neuroanatomica. These proposals have been sent to member societies of IFAA for review at the end of 2015 and the final drafts will be presented to IFAA board in Goettingen in September 2016 for approval. The main issue, besides extensions and refinements, is to have only one preferred synonym in Latin, British and American English. In the document, which will be free accessible on internet, other Latin and English synonyms are listed, accompanied with eponyms. Any comment, criticism or proposal can be addressed to any member of FIPAT or via the Discussion forum of the FIPAT website.

The Transitional Muscle of Eyes and Its Complex Relations with Neighboring Muscles

Kampan Natnicha[1], Itsuko Okuda[2], Hisayo Nasu[1], Kumiko Yamaguchi[3], Keiichi Akita[1]

[1]Department of Clinical Anatomy, Tokyo Medical and Dental University (TMDU), JAPAN, [2]Department of Diagnostic Radiology, International University of Health and Welfare, Mita Hospital, JAPAN, [3]Institute of Education, Tokyo Medical and Dental University (TMDU), JAPAN

Aims:

Orbicularis oculi muscle (OOc) is one of the important facial expression muscles. Despite various studies attempted to elucidate the anatomical variations of the muscles surrounding the OOc, including the malaris muscle which is considered as the medial and lateral bundles of the OOc, this complex region has still remained unclear. Thus, the current study aimed to classify and clarify these complex muscle bundles.

Methods:

Fourteen hemi-faces of embalmed Japanese cadavers were dissected carefully to indicate the anatomical structures of the OOc including surrounding muscle bundles and also neighboring muscles. The medial and lateral bundles of the OOc were examined and clarified the patterns of the attachments, and also considered the relations with neighboring muscles.

Results: Medial and lateral bundles of the OOc were found in all specimens. The medial bundle was classified by the origin into four types. Type A (4 specimens, 28.6%), originated from the frontal process of maxilla (FPoM). Type B (2 specimens, 14.3%) and Type C (2 specimens, 14.3%) originated from FPoM with medial palpebral ligament (MPL), and FPoM with depressor supercilii muscle (DS), respectively. Type D (6 specimens, 42.9%), the medial bundle of malaris muscle originated from FPoM together with MPL, and also DS. The lateral bundle of the OOc was found to be clearly originated from the superficial temporal fascia. However, we noticed the complex terminations in both medial and lateral bundles of the OOc. The medial bundle could be divided the terminations into three parts. Part M1 (14 specimens, 100%), the muscle bundle blended with the inferior orbital part of the OOc. Part M2 (14 specimens, 100%), the muscle bundle connected with the lateral bundle of the OOc. Part M3 (4 specimens, 28.6%), the muscle bundle ran downward and blended together with neighboring muscles, namely the levator labii superioris alaeque nasi and levator labii superioris muscles. The lateral bundle of the OOc was divided into two parts. In all specimens, the lateral bundle of Part L1 connected with the medial bundle of the OOc, while the lateral bundle of Part L2 ran downward and blended with the proximal part of the zygomaticus minor muscle with (6 specimens, 42.9%) or without (8 specimens, 57.1%) the zygomaticus major muscle. Although the M1-L1 and M2-L2 could not been noticed the reciprocally connection, however the connection between the M2 and L1 was obviously observed in all specimens.

Conclusion:

These findings regard that the medial and lateral bundles of the orbicularis oculi muscle are the complex muscles having various variations and relations with neighboring muscles reciprocally. Accordingly, this significant complex muscle group should be concurrently considered for promote the efficiency in rejuvenation or cosmetic surgery.

Cornuate type accessory navicular bone or prominent navicular tuberosity?

Kara Alev[1]

[1]*Mersin University, Faculty of Medicine, Anatomy, TURKEY*

Accessory navicular (AN) is one of the most common accessory bone of the foot and classified by Geist into three types. In a cadaver, medial prominent bony extension of navicular bone was encountered bilaterally. It was difficult to distunguish the navicular tuberosity and cornuate type AN, which is the subject of this manuscript as there is no criteria for this dicrimination in the literature.

Its aimed to ensure morphometric data for navicular bone and its medial bony extension regarding to cornuate type AN. For this purpose, radiographs of 77 subjects whom had no foot abnormality were investigated. Widths and anteroposterior lenghts of both native navicular and its medial bony extension were measured on radiographs. The cadaver with bilateral prominent cornuate type AN was dissected to investigate the insertion site of the posterior tibial tendon.

The parameters were analysed statistically in terms of sex and side differences. Paired t test was applied to evaluate the side differences. Student t test was applied to evaluate sex difference.Relation between parameters were evaluated by using pearson correlation test.

In 6 sides the AN was Type 1, in 11 sides AN was type 2. In 3 sides there was a prominent bony extension at the medial side of navicular. The width and anteroposterior lenght were found significantly higher in men than in women. But there were no statistically significant difference between sexes in terms of wMP and apMP ($p=0.781$, $p=0.058$).

In the cadaver presented in this study, the posterior tibial tendon inserted on the medial side of the accessory navicular superiorly. It was not extending to any other bone at the plantar surface.

We suggest that there is a necessity of criteria to distinct a normal navicular tuberosity from the Type 3b AN. Descriptive data about the navicular given in the present study would help to clarify this issue.

Key words: accessory navicular, posterior tibial muscle, flat foot, surgery

The effects of cilostazol, a phosphodiesterase 3A inhibitor, on the number of ovarian follicles: An experimental study

Kirikci Gamze[1], Keskinoz Elif Nedret[2], Alparslan R. Irem[3], Kurtoglu Zeliha[4]
[1]Medical Faculty, Anatomy, TURKEY, *[2]Acibadem University, Department of Anatomy, TURKEY*, *[3]Acibadem University, Vocational School of Health Services, TURKEY*, *[4]Mersin University, Department of Anatomy, TURKEY*

Aims:
Knowing the status of the ovarian reserve is important for determining an infertility treatment method and for evaluating the probability of treatment success. The ovarian reserve is the amount of follicles in the ovary that can be ovulated in the future by the necessary stimulus. Cilostazol (CLZ, Pletal®) is a phosphodiesterase 3A (PDE3A) inhibitors that was evaluated in rodents for non-steroidal contraceptive propertiesis. Although many PDE3A inhibitors have been found to arrest oocyte maturation in different species, including humans, has not yet been fully evaluated in reproduction. So in this study we aimed to evaluate CLZ, if it would trigger the fertility or not. Investigation of the potential effects of CLZ on follicle morpohology and its number as well as on LH expressions those were defined in vitro was designed.
Main methods:
In this experimental study, A total of 30 (12-week-old) Sprague Dawley rats were used. Both the study and control group were composed of six rats. CLZ was used at 20 mg/kg dose. Adult female rats were divided into five groups: control, and experimental(4). The control group did not receive any injection while the experimental group received IP injections of CLZ. Four groups were injected each evening with CLZ (20 mg/100 g body weight/) for 7, 15, 23 and 30 days, respectively. After the treatment period, the ovaries of the rats were extracted, and sections of ovarian tissue were taken for histological and immunohistochemical evaluation.
Resected ovaries were sectioned and examined to determine follicle numbers at each developmental stage, and immunostained to assess LH expression.
Results:
On day 7-15, follicle numbers and LH expression levels at each developmental stage of follicle growth were similar in the respective control groups. On day 23, the total follicle number, and LH expression were significantly greater than the control group. On day 30, the percentages of primordial, primary follicles were significantly greater in the other experimental group and the control group, whereas the percentage of intermediary follicles (early pre-antral, late preantral, and early antral follicles) was significantly greater in the CLZ (30days) group. The atretic follicles decreased in the experimental group. We examined the immunohistochemical localization of LH-R in follicles and the corpus luteum.
Conclusion:
We conclude that CLZ administration increases the number of follicles in rat ovaries and enhances production of LHR. Consequently, short-term CLZ administration leads to a decrease in healthy follicles and an increase in atretic follicles, which contributes to ovarian atrophy. Oocyte number has increased upon administration of the same level of doses at different intervals such as 7 days, 14 days, 23 days and 30 days. The results suggest that, administration of CLZ may have stımulation effects on folliculogenesis and cause fertility in female rats.

Body Painting: increasing public engagement in popular anatomy education

Kirkness Karen S.[1]
[1]*3D Printworks, UNITED KINGDOM*

Body painting has become a mainstream teaching tool in anatomy education. As an innovative learning technique in academic lesson plans, body painting augments traditional dissection practices as a practical means of synthesising anatomical concepts learned through dissecting cadaveric material. As PG McMenamin has written, "The kinesthetic nature and active participation together with the powerful visual images of underlying anatomy appear to contribute to the value of body painting as a teaching exercise." Due to the expensive and extremely resourceintensive nature of maintaining cadavers, public interest groups are limited.
in their access to this material and must instead develop practical means by which to achieve their learning objectives in the subject of anatomy. In this study, the author focused on the measurable effects that body painting had on the achievement of learning objectives in nonacademic groups aiming to learn basic human anatomy concepts.
The author has reviewed the literature on the use and testing of body painting as an engaging and effective teaching tool. In their publication, Body painting to promote selfactive learning of hand anatomy for preclinical medical students, Jariyapong et al report that "Students agreed that the exercise was advantageous and helped facilitate selfactive learning after inclass anatomy lessons." Positive responses such as these are pervasive in the literature published within anatomy education.
In this project, the author has used body painting in the private sector in public engagement events centred on popular understanding of human anatomy. Participants were questioned on their perceived level of understanding of anatomical concepts of a particular region before undertaking the activities, and were then asked to give short presentations following their revision using body painting techniques. Across the board, all participants reported that their familiarity of the region was greatly increased as a result of the body painting. They displayed increased levels of engagement and comprehension when compared to their perceived engagement during lectures. In the current study, the author observed positive responses related to the sensory value of thebody painting experience. This appears to be a consistent experience, as Finn GM and McLachlan JC. have also cited in their 2009 publication, " Sensory factors, such as visual stimuli, especially color, and the tactile nature of the activity, promote recall."
The author extended the participants' learning experience by asking the small groups to present their work to the large group in the form of tenminute presentations on their assigned anatomical region, using their painted subject as a visual aid.
In this way, each group became the "expert" on their area and the body painting experience became a concomitant nearpeer teaching method. The research questions are now ready to be adjusted to encompass related factor of teaching methodology.

Philosophy of teaching the head and neck anatomy for medical and dental students

Kluchová Darina[1], Lovásová Květuše[1], Majerník Jaroslav[2]

[1]Faculty of Medicine, P. J. Safarik University in Kosice, Department of Anatomy, SLOVAKIA, *[2]P.J. Šafárik University in Košice, Department of Medical Informatics, SLOVAKIA*

Introduction:

The head and neck region is structurally complicated area of human body. It is one of the most difficult part for studying anatomy both for medical and dental students. It is clear that knowledge of the head and neck anatomy is the essential for dental students but it should be learned by medical students as well. In the past, dental students were taught in a shared program, so that the same teaching time and teaching methods were used for both types of students. Recently, more anatomists are of the opinion that in anatomy, dental students are best taught separately from medical students in a dental gross anatomy course, where greater emphasis is given to head and neck anatomy.

Aim of study:

To consider the amount of knowledge which should be learned from anatomy of head and neck region and to compare the necessity of this teaching for medical and dental students.

Methods:

The place of head and neck anatomy, curriculum structure, the role and importance of this teaching was considered in all types of medical students.

Results:

The curricula of different schools show various opinions on teaching of head and neck region for medical and dental students. The approaches to using of educational tools are mostly identical for both groups of students (using prosections in the dissecting room, types of lectures, using models and handouts, developing of 3-D anatomical knowledge, etc.), but the most discussed part of teaching this region is the using of appropriate books which would cover the core material.

Conclusion:

Courses of anatomy for dental students should be taught as a separate stand-alone course. Various body regions could be taught for dental and medical students in a different way, but the region of head and neck should be covered for both groups of students in structurally detailed way with the emphasis to clinical importance.

This work was funded by grants KEGA 005UPJŠ-4/2016 and KEGA 017UPJŠ-4/2016.

White matter dissection: A renewed role in modern neuroscience

Latini Francesco[1], Hjortberg Mats[2], Aldskogius Håkan[3], Ryttlefors Mats[1]

[1]Uppsala University, Dpt. of Neuroscience, Section of Neurosurgery, SWEDEN, *[2]Uppsala University, Department of Medical Cell Biology,, Education, SWEDEN*, *[3]Uppsala University, Department of Neuroscience, Regenerative neurobiology, SWEDEN*

Background.

The Klingler's method for white matter dissection revolutionized the study of deep cerebral anatomy. Although this technique made white matter dissection more feasible and widely used, it still presents some intrinsic limitations that can affect both modern research in neuroanatomy and neurosurgical training.

New method.

We evaluated the quality of different methods for specimen preparation based on an intra-carotidal formalin perfusion fixation process. Twenty post-mortem human hemispheres were prepared with this method and dissected in a stepwise manner. The pia mater, arachnoid membrane and vascular structures were then carefully removed under microscopic magnification and the hemispheres were frozen at -15 °C – -20 °C for 6 – 10 days, then slowly defrosted for 12 hours.

Results.

The homogeneous and rapid fixation of the brain allowed documentation of several fine additional anatomical details. Intra-cortical white matter terminations were described during the first stage of dissection on each specimen. No limitations were encountered during dissection of the major associative bundles. On the contrary, the quality of the fixation of the specimens made it possible to isolate them en bloc. Some of the most complex and deep bundles (accumbo-frontal fasciculus and Lingual-amigdale bundle) were dissected without technical limitations. Deep vascular structures were very well preserved and dissected within the white matter until their sub-millimetric terminations.

Comparison with Existing Method.

Short time for preparation, a more homogeneous fixation, no technical limitation for a detailed description of superficial and deep white matter anatomy, the possibility to dissect with a single technique the fibre organization and the white matter vascular architecture are the advantages reported with the perfusion fixation.

Conclusion.

These results provide encouraging data about the possibility to use a perfusion fixation process, which may help in improving the quality of white matter dissection for research, didactic purposes and surgical training.

Anatomy of the heart, it chambers and septums at the person fetuses of 16-22 weeks of development

Liashchenko Diana[1]
[1]*Orenburg State Medical University, Human Anatomy Department, RUSSIA*

Nursing of prematurely newborns with extremely low body weight is carried out last years. Besides the fetal surgery actively is developed. Therefore the purpose of this research is an obtaining new data on fetal anatomy of heart, it chambers and septums at the person fetuses of 16-22 weeks of development. The this research is based on studying of a section material of 80 human fetuses of both sexes of 16-22 weeks of the development received as a result of interruption of normally proceeding pregnancy at healthy women. Methods of macromicroscopic preparation, method of sections according to Pirogov and a histotopographical method have been used in this work.

Results.

The heart as an organ is already almost completely created and located in a pericardium cavity. Distinctly the basis and a top of heart, both ventricles, the right and left atriums, both auricles are defined. In 16-22 weeks growth of heart goes mainly to length which value increases by 57%. A value of width of heart by 22 weeks has increased for 14,5% (from 13,48±3,07mm in 16-17 weeks to 15,43±3,39mm at the end of the period) in the same time. Heart chambers for 16-22 weeks of development grow unevenly and multidirectional. The right and left atriums in the intermediate fetal period of ontogenesis have the anatomic features. The right atrium at a fetus on this term of development is created by final departments of the superior and inferior cava veins, in its cavity there is distinctly expressed valve of the inferior cava vein. The left atrium unlike right has a well-developed cavity. Unlike atriums auricles and ventricles of fetal heart grow more intensively and mainly due to increase in length. The prevalence of the left ventricle length (16,76±1,1mm) over length of right ventricle (13,15±0,9mm) at 22 weeks fetuses attracts attention with the identical thickness of their wall on this term of development (2,99±0,46mm at the left and 3,03±0,49mm on the right).

The interatrial septum in 16-22 weeks of development is dynamically developing structure. The thickness of the interatrial septum changes most intensively in the intermediate fetal period: rate of a gain of this parameter has made 80%, thickness in 16-17 weeks was equal in absolute values 0,54±0,07mm whereas in 22 weeks – 0,97±0,14mm. Studying of the interventricular septum of heart has shown that throughout the considered ontogenesis period both the septum length and its thickness evenly increase. Such parameter as length increases with 10,59±1,85mm in 16-17 weeks to 15,32±2,28mm in 22 weeks at rate of a gain of 45%.

The obtained data can be useful as a morphological basis of an assessment of the ultrasonic examination of pregnant women and during planning medical and diagnostic manipulations for fetuses and prematurely newborns.

Anatomy of the limbic system: MRI and tractography, Klingler's Fiber dissection technique and plastination. Creating 3-D Models for Neuroanatomy Teaching

Lucas Neto Lia[1,2], Cavaco João[1], Neves Maria Eduarda[1], Gaspar Tiago[1], Campos Alexandre[1,3], Oliveira Edson[1,3], Henriques Pedro[1], Gonçalves Ferreira Antonio[1,3]

[1]Anatomy Department, Lisbon Medical School, PORTUGAL, *[2]Neuroradiology Department, PORTUGAL*, *[3]Neurosurgery Department, PORTUGAL*

Background:

The Limbic System (LS) is perhaps one of the most complex regions of the central nervous system. In the last few years, multiple cortical and sub-cortical connections have been added to James Papez's original "limbic circuit" (1937). However, it has been mostly studied in a non-invasive fashion, through magnetic resonance imaging techniques (MRI); anatomical studies using dissection techniques, which allow a better knowledge of the neurosurgical and tridimensional (3D) anatomy of this region, are unfortunately scarce.

During this last year, two anatomical techniques have been developed and implemented in the Anatomy Department of the Lisbon Medical School, in order to create and preserve didactic models: the Klingler fiber dissection technique and Plastination.

The Klingler fiber dissection technique is a classical procedure used in the study of the human brain white matter tracts. It involves the dissection of successive layers of white matter, providing a better understanding of its 3D configuration. Current MRI techniques such as tractography and diffusion tensor imaging (DTI) represent a form of virtual dissection of the living brain, but unfortunately without a resolution as high as the Klinger technique. At last, plastination is a well-established technique, easily applicable to organic tissues. It allows the creation of clean, resistant and accurate anatomical models that are extremely useful in the study of Neuroanatomy. It has been frequently used in brain slices, but seldom in the study of the brain 3D structure.

Objectives:

To create accurate, high definition 3D model of the LS and Papez's Circuit:

In vivo – through MRI based DTI/Tractography in healthy volunteers; Post Mortem – through Klingler's fiber dissection technique, followed by plastination;

To compare the results of tractography with those of Klingler's dissection technique;

To apply these plastinated models in the study of Neuroanatomy.

Methods:

Two healthy, adult, volunteers were submitted to 3TMRI based DTI/Tractography, after informed consent. Four human brains were sequentially submitted to fiber dissection according to Klingler's technique and plastination.

Results:

Plastinated models were developed to allow the anatomic study of the LS through different approaches, identifying the main nuclei and association tracks, such as the hippocampus, fornix, mamillary bodies, mamilo-thalamic tract, anterior thalamic nucleus, corpus callosum and cingulate gyrus. Afterwards the models were compared with 3TMRI based DTI/Tractography images, building an asset of dynamic 3D models.

Conclusions:

Through the combination of the different used techniques, imaging and anatomical models were obtained from preserved biologic tissues that allowed the 3D study of the different components of the human LS. These models can be applied to the teaching of Neuroanatomy

and Neurosciences. The advantages and limitations of these techniques were reciprocally complemented.

Petrosal sinus anatomy in the diagnosis and treatment of Cushsing's Disease

Lucas Neto Lia[1,2], Gomes Ana[3], Basílio Gonçalo[2], Mascarenhas Mário[3], Campos Jorge[2]

[1]Anatomy Department - Lisbon Medical School, PORTUGAL, *[2]Neuroradiology Department, PORTUGAL*, *[3]Serviço de Endocrinologia, Diabetes e Metabolismo, Hospital de Santa Maria, CHLN – EPE, PORTUGAL*

Introduction/ Objectives:

Cushing's disease (CD) is responsible for 80% of endogenous Cushing's syndrome (CS). However, distinguishing the cause of adrenocorticotropic hormone (ACTH) dependent CS – CD versus ectopic CS can be difficult. Bilateral inferior petrosal sinus sampling (IPSS) has the highest diagnostic accuracy in this evaluation because it reflects the hormonal composition of the pituitary venous effluent. The IPS drains the cavernous sinus to the internal jugular vein. It presents a high anatomical variability, often considered relevant to the interpretation of sampling results. The aim of this study was to describe the angiographic anatomy of the IPS, to determine the accuracy of bilateral IPSS in the differential diagnosis of ACTH-dependent CS and to predict adenoma lateralization in CD.

Methods:

Retrospective analysis of the angiographic anatomy of 14 consecutive patients with ACTH-dependent CS, subjected to bilateral IPSS between 2005-2016. Classification of the anatomy of the IPS in 4 types according to Shiu et al. Measurement of ACTH levels from both IPS and peripheral blood before and after corticotropin-releasing-hormone administration. Central-to-peripheral and interpetrosal ratio ACTH levels calculation.

Results:

Of the 14 patients 64,3 % had IPS Type I , 24,1% had IPS Type 2 and 14,3% had IPS type III. None of the patients had IPS type IV. IPSS was suggestive of CD in 12 patients, ectopic CS in one patient and inconclusive in another one. ACTH lateralization was found in 10 patients. Transphenoidal surgery was performed in 9 of the 12 patients with CD and the histologic examination confirmed the diagnosis of ACTH-secreting pituitary adenoma in 7. IPPS localized the tumor correctly in 77.8% of the patients who performed transsphenoidal surgery. Three patients are waiting for surgery.

Anatomical assymmetry and variability of IPS did not impact negatively in the study of adenoma lateralization.

Conclusion:

IPSS is effective in the differential diagnosis of ACTH-dependent CS and useful in planning CD surgical therapy. Petrosal sinus anatomy variability is not detrimental to lateralization studies.

Cadaveric and radiologic study of the anatomical variations of the prostatic arteries. A new classification and review of the literature

Moya-Martín Celia[1], Valderrama-Canales Francisco J.[1], Vázquez-Osorio Teresa[1], Cuesta Julián[2], Friera Alfonsina[2], Gil-Vernet Jose María[3]

[1]Complutense University of Madrid, Department of Human Anatomy & Embryology, SPAIN, *[2]Hospital Universitario de la Princesa, Interventional Radiolgy Service, SPAIN*, *[3]Hospital Quirón Teknon, Urology Service, SPAIN*

Purpose

The prostatic artery (PA) is a vascular structure originated from the internal iliac artery (IIA) that irrigate the prostate. Development of the prostatic arterial embolization (PAE), for the treatment of the benign prostatic hyperplasia (BPH), has raised the interest in knowing the origin patterns of the PA. This study aims to elucidate the vascular patterns of the PA, with two different samples (cadaveric and radiological), compared them with the scarce previous studies, and to propose a new, simple, and inclusive classification of PA variations developed on previous records and our results.

Methods

To perform this study we dissected and examined 10 male adult pelvis sides, ages ranged from 69 to 92. In addition, a retrospective analysis of 34 DSA pelvic angiographies was done, corresponding to 28 patients, ages ranged from 50 to 90 that allow to identify 48 PA. Thus, 58 PA have been analysed and classified.

Results

According to the new classification proposed, results were divided into types, following an approximately cranio-caudal sequence. Type I, the PA directly originates from the anterior division (AD) of the IIA, 12/58 (20.7%); type II, PA sourcing from the obturator artery (OA), 1/58 (1.7%); type III, the gluteal-pudendal trunk (GPT) gives the PA, 17/58 (29.3%); type IV, PA originating from the internal pudendal artery (IPA), 17/58 (29.3%); and type V, PA comes from the middle rectal artery (MRA), 10/58 (17.2%). Other less frequent origins, not present in our sample, but described in the literature, were consigned as type VI.

Conclusions:

Variations in the origin of the PA are numerous and highly differ to those presented in the textbooks. Although our sample is not large, our results compare well with the meta-analysis. A total sample of 575 PA has been reviewed and a new, simple, and complete classification for the origin of the PA is proposed.

Visual rating of hippocampal atrophy on structural MRI for diagnosis of Alzheimer's disease

Kieslich Karel[1], Mrzilkova Jana[1], Bartos Ales[2], Janousek Milan[2], Ibrahim Ibrahim[3], Wurst Zdenek[1], Kuchtova Barbora[1], Musil Vladimir[4], Patzelt Matej[1], Riedlova Jitka[1], Zach Petr[1]

[1]Third Faculty of Medicine Charles Univesity in Prague, Department of Anatomy, CZECH REPUBLIC, *[2]National Institute of Mental Health, Department of Cognitive Disorders, CZECH REPUBLIC*, *[3]Institute for Clinical and Experimental Medicine, Radiodiagnostic and Interventional Radiology Department, CZECH REPUBLIC*, *[4]Third Faculty of Medicine, Charles University, Centre of Scientific Information, CZECH REPUBLIC*

Aim

Diagnosis of Alzheimer's disease (AD) and mild cognitive impairment (MCI) relies largely on cognitive and behavioral symptoms. Although atrophy of the hippocampus on structural MRI as a biomarker of AD may aid the clinical diagnosis, it is seldom used in clinical practice because the quantification of hippocampal volumes requires special expertise and normative values have not been established. We propose a visual rating of hippocampal atrophy usable in routine clinical practice and aim to assess its reliability and preliminarily also its validity.

Methods

Instead of volumetric analysis of the whole hippocampus and normalization for the brain volume, the proposed visual rating assesses hippocampal atrophy on a single coronal MRI slice (optimal slice – OS) as a ratio of the hippocampus size to the size of the adjacent temporal horn of lateral ventricle (HHR). The OS is defined as the first coronal slice in the anteroposterior direction in which nuclei of amygdala are not present. The HHR is expressed as a percentage of the area covered by the hippocampal formation of the area covered by the hippocampal formation and the adjacent temporal horn of lateral ventricle. A series of MRI studies from 207 subjects who had been diagnosed as having AD (95), MCI (26) or being cognitively normal (86) were used. For all of them, a trained neuroanatomist determined the OS (separately for the left and right sides) and measured the HHR morphometrically by manual tracing. Then, 133 participants without prior neuroanatomical knowledge were given the subjects' MRIs and 46 of them were instructed to determine the OS, and 87 of them to visually rate the HHR (rounded to tens) in a set OS. Statistical analysis of their agreement and agreement with the neuroanatomist was done by Bland-Altman plot, and the area under the receiver operator curve (aROC) was calculated for the ability of HHR to correctly classify subjects.

Results

In Bland-Altman plot, the mean difference between the neuroanatomist and the participants in determining the OS was -0.18 slices (limits of agreement: ± 2.72), which is not a clinically significant difference for the subsequent assessment of HHR. The mean difference between the neuroanatomist and the visual rating done by the participants in determining the HHR was 2.23% (limits of agreement: ± 5.72%). The values of aROC for classifying subjects as AD and MCI respectively by the HHR were for the right hippocampus 0.95 and 0.90 respectively and for the left hippocampus 0.89 and 0.87 respectively.

Conclusion

Our data suggest that the proposed visual rating of hippocampal atrophy is equivalent to morphometric analysis, can be performed with minimal amount of training, and correctly classifies AD and MCI patients (even though cut-off scores must be determined by thorough clinical analysis with regard to the desired sensitivity and specificity). Therefore, it could be used to support the diagnosis of AD and MCI in routine clinical practice.

Structural analysis of the anterior and posterior regions of the external anal sphincter; the spatial relationship with the bulbospongiosus and the coccyx

Muro Satoru[1], Baramee Phichaya[1], Suriyut Janyaruk[1], Nasu Hisayo[1], Harada Masayo[1], Yamaguchi Kumiko[1], Akita Keiichi[1]

[1]*Department of Clinical Anatomy, Tokyo Medical and Dental University, JAPAN*

Aim:

As surgical procedures have been developed, the surgeons required more exact configuration of the external anal sphincter. Especially in the anterior and posterior regions of the external anal sphincter, the structural details remain unclear. The aim of this study is to investigate the precise structure of the anterior and posterior regions of the external anal sphincter.

Methods:

Ten formalin embalmed cadavers were used for macroscopic examinations. The specimens were dissected both from median and lateral aspects. Some regions were also investigated using histological examinations. In addition, the horizontal sectional pictures of cadavers proposed by the visible Korean human project (Courtesy of Prof. MinSuk Chung) were used to create 3D computer reconstruction images for compare with the anatomical findings in this study.

Results:

[Anterior region]

In male specimens, some muscle fibers from the anteroinferior region of the external anal sphincter in the median plane extended anteriorly, and connected to the bulbospongiosus. In addition, some muscle fibers running from the lateral surface of the external anal sphincter also connected to the bulbospongiosus. In female specimens, there was no attachment between the external anal sphincter and the bulbospongiosus in the median plane, although a lot of textbooks describe this attachment as the perineal body. However, we found some muscle fibers from the lateral surface of the external anal sphincter went ahead and connected to the bulbospongiosus.

[Posterior region]

The posterior region of the external anal sphincter protruded posteriorly and bent upward. Cord-like tissues (the anococcygeal ligament) from the subcutaneous part of the muscle extended posterosuperiorly and attached to the coccyx in the median plane, then contributed to the shape of the posterior region. The cord-like tissues were histologically composed of collagenous fibers, elastic fibers and the longitudinal muscle fibers penetrating the subcutaneous part of the external anal sphincter. In addition, some muscle fibers of the superficial part of the external anal sphincter ran to posterior. Hence, not only the subcutaneous part but also the superficial part constituted to the posterior protruding.

Conclusion:

The anterior and the posterior regions of the external anal sphincter are formed in similar pattern that the muscle fibers of the inferior part extend upward in the median plane, while the muscle fibers of the middle part extend from the lateral surface. In the anterior region, the external anal sphincter has a direct connection with the bulbospongiosus. In the posterior region, the external anal sphincter connects to the coccyx through the anococcygeal ligament. Therefore, the external anal sphincter and the bulbospongiosus should be considered as a continuous muscle sheet connecting to the coccyx.

Quantitative Evaluation of the Frontal Lobe Abnormalities in Chronic Schizophrenia: a comparative brain segmentation study

Elfaki Amani[1], Nahir Mert[1], Acar Gudek Meltem[1], Osman Ali Tahir[2], Elsheikh Abdelgani[3], Mohamed Osman Amira[4], Sahin Bunyamin[1]

[1]Ondokuz Mayis University, Departments of Anatomy, TURKEY, *[2]National Ribat University, Departments of Anatomy, SUDAN*, *[3]National Ribat University, Departments of Psychiatry, SUDAN*, *[4]International University of Africa, Department of Psychiatry, SUDAN*

Aim:

Frontal lobe dysfunction in schizophrenia has been suggested for many years by several research models. Which is not surprising assumed the importance of this brain region for cognition and behaviour processing, as those two processes are remarkably abnormal in schizophrenia. This study was designed to assess the volume, thickness and surface values of the frontal lobe structures to determine whether patients with schizophrenia have progressive decrease in overall frontal lobe tissue or they have localized volume reduction within frontal lobe.

Method:

This study included 57 patients with schizophrenia (30 male and 27 female) and 88 healthy controls (51 male and 37 female) matching age, body mass index, and handedness. Structural magnetic resonance imaging was performed and the DICOM images were evaluated using automatic brain segmentation software (BrainSuite). The volumes of the region of the interest were evaluated.

Results:

The mean volume of frontal lobe in the schizophrenics (255.87±28.78 cm3) was smaller than that of controls (286.26±26.22 cm3), ($p \leq 0.05$). The mean volumes of the frontal lobe grey and white matter in schizophrenics (162.86±18.66 cm3 and 92.91±11.56 cm3, respectively) were smaller than that of controls (180.80±17.81 cm3 and 105.46±11.12 cm3), ($p \leq 0.05$). The mean cortical area pial in schizophrenics (692.79±72.08 cm2) was smaller than that of control (746.87±63.84 cm2), ($p \leq 0.05$). While, no differences were found between schizophrenics (4,15±0,19 cm) and controls (4,21±0,20 cm) related to the thickness of the frontal lobe ($p > 0.05$).

Conclusion:

The present results tend to support that patients with schizophrenia have a localized diminished grey and white matter volume and cortical area of the frontal lobe in general comparison between schizophrenics and controls. As well as a generalized frontal lobe reduction confirmed when the total volume of frontal lobe was analyzed.

Keywords: Frontal lobe, Schizophrenia, Magnetic resonance imaging, Automatic brain segmentation

Pax2, BMP-2 and BMP-4 protein expressios during the formation of human spinal cord

Namm Aimar[1,2], Arend Andres[1], Aunapuu Marina[1,2]

[1]University of Tartu, Department of Anatomy, ESTONIA, *[2]Estonian University of Life Sciences, Department of Veterinary Medicine, ESTONIA*

Aims of the study.

The evidence from animal studies indicates that proteins Pax2, BMP-2 and BMP-4 play very important role in the early mammalian embryogenesis. In particular these proteins have been shown to regulate dorsal-ventral patterning of the developing spinal cord. In order to see if Pax2, BMP-2 and BMP-4 expression pattern in developing spinal cord of human embryos is equally similar to the situation of other mammalians we aimed in this study to detect the expression of Pax2, BMP-2 and BMP-4 in the developing spinal cord of human embryos.

Methods.

37 human embryos of Carnegie Stages (CS) 10 - 20 were used in this study. The embryos were fixed in the 4% paraformaldehyde and embedded in paraffin blocks. The blocks were serially cut in transversal direction. For immunohistochemistry the paraffin sections were deparaffinized, rehydrated, washed in PBS and distillated water. Non-specific protein binding was attenuated by incubation with normal 1.5% goat serum. Sections were incubated with polyclonal antibodies to Pax2, BMP-2 and BMP-4. Peroxidatic activity was detected with DAB. The sections were counterstained with hematoxylin. The labelling was expressed by a subjective scale from 0 to 3.

Discussion and conclusions.

Data of our investigation indicate obvious expression of Pax2, BMP-2 and BMP-4 in the developing spinal code of human embryos. There seem to be difference in the expression of studied proteins at different development stages and between dorsal-ventral parts of the developing spinal code. Our data show that BMP-s tend to be more expressed in the spinal code in earlier stages, in particular BMP-2 and BMP-4 expression was found to be higher at CS 14 as compared to CS 18. In concordance with experiments performed with mammalians, in this study stronger expression of BMP-s was seen in the dorsal part and weaker in the ventral part of human developing spinal cord. In the wall of the developing spinal cord Pax2 expression was detected in the ventricular, mantel and marginal areas. Pax2 staining was seen to increase throughout the later stages of spinal cord development and significantly stronger expression was found at CS 16 - 20 compared to CS 10. Furthermore, spatially and temporally restricted expression of Pax2 was observed along the compartmental dorsal-ventral axis of the spinal cord as Pax2 staining was weaker in the ventricular layer of ventral part of the developing spinal cord compared with the developing area of dorsal part. Pax2 expression in the developing spinal cord of human embryos mostly resembles descriptions of the role of Pax2 in the neurogenesis of animals where Pax2 is associated with the establishment of the ventral-dorsal boundaries within the developing spinal cord. Our investigation confirmed the idea that Pax2, BMP-2 and BMP-4 are important mediators in the human embryos and may initiate multiple pathways controlling the specification, proliferation and differentiation in the developing spinal cord.

The morphological study of the extraforaminal ligaments in cervical and thoracic levels

Nonthasaen Pawaree[1], Hisayo Nasu[1], Kumiko Yamaguchi[1], Akimoto Nimura[1], Keiichi Akita[1]
[1]Tokyo Medical and Dental University, Clinical Anatomy, JAPAN

Introduction:
The extraforaminal ligaments (EFLs) connecting between bones or between a bone and a spinal nerve root have been reported. We examined the relationships of the EFLs with bones, spinal nerve roots and connective tissues in detail. During dissection, we also found the connecting structures between the spinal nerve roots. In the present report, we focus to clarify the connecting structures among the spinal nerve roots in lower cervical and upper thoracic levels.
Materials and Methods:
Twenty sides from 10 cadavers (2 males, 8 females, average age; 89.5) were dissected. The spinal nerve roots and EFLs were carefully dissected from C4 - T4 vertebrae. After observation of EFLs, the anterior tubercles and the proximal ribs were removed and the connecting tissues between the spinal nerves were dissected.
Results:
We observed three EFLs from C4-T4 in all sides; transforaminal ligaments, radiating ligaments, and costotransverse ligaments. The transforaminal ligaments were observed at C5-C8 levels and were attached to two anterior tubercles of transverse process. The radiating ligaments were composed of anterior and superior parts and were attached to the uncovertebral joint, transverse process and spinal nerve roots at C4-C8 levels. The costotransverse ligaments were composed of superior and inferior parts and were attached from ribs to transverse process at T1-T4 levels. After removed anterior tubercles, interestingly, we found the tissues connecting between the spinal nerve roots at C7-T1 levels in all sides. The tissues consisted of vessels, fats and connective tissues. The tissue connecting C7-C8 spinal nerve roots were found passing through the foramen transversarium at C7 level. Also, the tissue connecting C8-T1 spinal nerve roots were found passing through the foramen costotransversarium at T1 level. The connecting tissue was not observed at C4-C6 and T2-T4 levels.
Conclusion:
In this study, we found the connecting tissues between the spinal nerve roots and the connecting tissues passed through the foramen transversarium and the foramen costotransversarium. Such connecting tissues are observed only in the levels from C7 to T1, and these nerve roots consisted of the lower roots of the brachial plexus. It should be considered that such the connecting tissues are beneficial for stabilizing the brachial plexus.

The Potential Kinematic and Proprioceptive Role of the Ligamentum Mucosum

Norris Madeleine E.[1], Johnson Marjorie[1], Sandig Martin[1], Burkhart Tim[2], Getgood Alan[3]
[1]The University of Western Ontario, Department of Anatomy & Cell Biology, CANADA, *[2]Lawson Health Research Institute, CANADA*, *[3]Fowler Kennedy Sport Medicine Clinic, CANADA*

Introduction:

The ligamentum mucosum (LM) is a non-isometric structure of the knee joint that traverses from the intercondylar notch of the femur to the infrapatellar fat pad (IFP). The LM is composed of dense regular connective tissue and four different morphologies have been identified. Pathological LM appears fibrotic which can lead to impingement, and it has been suggested that this can lead to pathogenesis of anterior knee pain (AKP). However, the relationship between the morphological and biomechanical characteristics of the LM and how this may contribute to AKP has not be investigated. Thus, the aim of this study was to define the mechanical function of the LM and its potential role in proprioception.

Methods:

Fourteen fresh-frozen cadaveric knee specimens (mean (SD) age = 73 (18) years) were dissected to reveal the LM and characterize the morphology. Maintaining the proximal and distal attachments, two specimens were harvested for histological analysis using standard H & E, Masson's trichrome, and mono-clonal mouse anti-human NFP. The remaining five specimens were harvested for biomechanical testing, maintaining the LM attachment to the distal femur, IFP, and corresponding patella. The femur and patella were cemented into separate sections of PVC. The specimens were placed in an Instron materials testing machine and were loaded to failure at 1mm/s. From the force-time curves, the load at failure, stiffness, and strain were determined.

Results:

64% of the knees had a LM present with 50% and 14% categorized as separate and vertical septum type, respectively. The histological analysis confirmed the LM to be ligamentous, composed of dense regular connective tissue. The immunohistochemistry results remain inconclusive as there was no evidence of peripheral nerve with respect to the specimens included in this study. The average peak force of the LM at failure was 31.9 N, and the average stiffness and strain of the LM was 5.1 N/mm and 0.83, respectively.

Conclusions:

While the role of the LM in AKP is not well documented in the current literature, the morphology and histology results are consistent with past research, however the immunohistochemical findings remain inconclusive. This research also demonstrates that the tensile properties of the LM, with respect to specimens included in this study, are considerably less than the primary stabilizers of the knee joint (e.g., ACL and PCL). Thus, the LM would not be capable of reacting appropriately to applied loads on the knee joint. Based on the findings from this study, it is unlikely for the LM to have a meaningful effect on the kinematics of the anterior knee joint and the extensor mechanism. However, further research is warranted to determine whether or not this structure may be implicated in the pathogenesis of anterior knee pain.

Browsing software of head sectioned images for android mobile device

Park Jin Seo[1]

[1]*Dongguk University School of Medicine, Department of Anatomy, SOUTH KOREA*

Aim:

The interpretation of computed tomographs and magnetic resonance images to diagnose patients requires basic knowledge of sectional anatomy. The aim of this research was to present the browsing software based on the head sectioned images of Visible Korean for android mobile device that can be used for learning anywhere sectional anatomy.

Methods:

Using JAVA language on Eclipse Java IDE for web developers for personal computer, the computer engineer programmed the browsing software which sectioned images and segmented images could be viewed continuously in android mobile device. We prepared sectioned images (resolution, 2071 X 2064; color depth, 48 bit color) and segmented images of 231 segmented structures of our previous research. The resolution of images was decreased from 2071 X 2064 to 400 X 458 and put into the browsing software. After transferring the software to android mobile device (Samsung Galaxy S7, Android version 6.0.1), the software was debugged. The software was registered in Google play store.

Result and conclusion:

On the browsing software, the sectioned images could be browsed continuously and zoomed-in and –out. When a structure on the images was touched by using a finger, names of each structure were popped up. This software including the sectioned images and segmented images of male head will hopefully assist students in the study of the topographic anatomy and sectional anatomy of the head, as well as neuroanatomy. For assisting the students, we distribute the software free of charge at Google play store (title, Browsing software (Head); (https://play.google.com/store/apps/details?id=com.anatomy.vkh_android).

Grant sponsor: This work (2012R1A2A2A01012808) was supported by Mid-career Researcher Program through NRF (National Research Foundation) grant funded by the MEST (Ministry of Education, Science and Technology).

Supporting 3D developments for teaching anatomy and histology

Paulsen Friedrich[1,2], Bertelshofer Franziska[3], Brehm Oliver[3], Gaffling Simone[4], Janka Rolf[5], Greiner Günther[3], Jabari Samir[6], Scholz Michael[1], Bräuer Lars[1]

[1]Friedrich Alexander University Erlangen-Nürnberg, Department of Anatomy II, GERMANY, *[2]Friedrich Alexander University Erlangen-Nürnberg, Erlangen Graduate School in Advanced Optical Technologies (SAOT), GERMANY*, *[3]Friedrich Alexander University Erlangen-Nürnberg, Chair for Computer Graphics, GERMANY*, *[4]Friedrich Alexander University Erlangen-Nürnberg, Pattern Recognition Lab, GERMANY*, *[5]Friedrich Alexander University Erlangen-Nürnberg, Institute of Radiology, GERMANY*, *[6]Friedrich Alexander University Erlangen-Nürnberg, Institute of Anatomy I, GERMANY*

A current challenge for medical students is to study and understand the three dimensional structures of the human body by the use of two dimensional teaching materials such as anatomical atlases and textbooks, histological sections and more. Fundamental topics in macroscopy are the structures of the human skull and in histology nearly all tissues and organs. The talk will demonstrate a newly developed browser application termed „Skully“ visualizing stereoscopic models of the bones of the human skull. The user is able to interact with those models, e.g. virtually move them freely to gain insight in the three dimensional structure and the position of the single bones, highlight separate single or even several bones and view textual annotations and explanations. In a developer mode those annotations can be edited easily by anatomy experts or course tutors to provide and save all topic relevant information. Furthermore the application can be used on various platforms, e.g. computers with different operating systems, tablets and mobile phones. Moreover, the talk will give first impressions of a currently developed method for a 3D tissue reconstruction of digitized and digitally based processed histological sections of embryonic and fetal organs for anatomical teaching.

Does the morphology of the internal jugular vein affect the elasticity of the common carotid artery?

Podgórski Michał[1], Winnicka Monika A.[1], Polguj Michał[1], Grzelak Piotr[2], Łukaszewski Maciej[3], Stefańczyk Ludomir[2]

[1]Medical University of Lodz, POLAND, *[2]Medical University of Lodz, Department of Radiology and Diagnostic Imaging, POLAND*, *[3]Polish Mother's Memorial Hospital Research Institute, Department of Diagnostic Imaging, POLAND*

Aim:
Arterial stiffness is an early marker of atherosclerosis. However, its assessment is based on the elastic properties of the artery, which may be influenced by the adjacent internal jugular vein (IJV). The aim of the present study is to evaluate the influence of internal jugular vein morphology on the stiffness of the common carotid artery.
Methods:
Bilateral carotid ultrasound was performed in 248 volunteers. When no carotid plaque was detected (90.9% cases), the distensibility coefficient and β - stiffness index were calculated. In the same individuals the circumferential strain and strain rate of the carotid wall were evaluated with 2D-Speckle Tracking. This newly developed sonographic technique allows to assess the movement of the arterial wall in general as well as for its particular segments. The cross-sectional area of the IJV and degree of its adherence to the carotid wall (angle of adherence) were measured.
Results:
The morphology of the IJV did not influence the standard stiffness parameters nor the global circumferential strain. However, segmental analysis found the segment adjacent to the IJV to have significantly higher strain parameters than its opposite counterpart. In addition, in this segment the strain correlated significantly and positively with IJV cross-sectional area and angle of adherence.
Conclusions:
The passage of the pulse wave creates a nonhomogeneous deformation of the carotid artery wall. The greatest strain is observed in a segment adjacent to the IJV. Bigger size of the vein and greater degree of its adherence implicate more pronounced deformation.

Age related changes in suprascapular notch morphology – a Computed Tomography study.

Podgórski Michał[1], Polguj Michał[2], Topol Mirosław[3], Kusak Artur[4], Łukaszewski Maciej[4], Grzelak Piotr[5]

[1]Medical University of Lodz, POLAND, *[2]Medical University of Lodz, Department of Angiology, POLAND*, *[3]Medical University of Lodz, Department of Anatomy and Histology, POLAND*, *[4]Polish Mother's Memorial Hospital Research Institute, Department of Diagnostic Imaging, POLAND*, *[5]Medical University of Lodz, Department of Diagnostic Imaging, POLAND*

Aim:

Although suprascapular notch characterize with variable morphology, its development is not well studied. On the other hand, this morphology is one of the leading risk factors of the suprascapular nerve neuropathy. We hypothesize that the final form of the suprascapular notch develops postnataly.

Thus aim of this research was to characterize morphology of the suprascapular notch in paediatric population.

Methods:

A retrospective analysis was performed of 291 chest computed tomography examinations of patients under 18 years old. Examinations were taken following other clinical indications (e.g. congenital heart defects, lung diseases, mediastinal masses). The inclusion criteria were as follows no pathologies concerning the scapulae; both scapulae encompassed in a field of view; no artefacts. Based on measurements and visual assessment, the suprascapular notch was classified according to a five-fold classification (type I-deeper than wider; type II-equally deep and wide, type III-wider than deeper; type IV-bony foramen, type V-discreet notch).

Results:

In all, 173 examinations were included (60 females and 113 males). The most common suprascapular notch types were type V (discreet notch, 225 scapulae; 65.0%) and type III (wider than deeper, 114 scapulae; 32.9%). Children with discreet suprascapular notch were significantly younger than children with other types. In types I-III, a positive correlation was found between age and dimensions of the suprascapular notch.

Conclusions:

This study provides the first description of the suprascapular notch in a paediatric population based on computed tomography. It confirms that the suprascapular notch receive its final shape postnataly.

Borderline Anatomy - A new course in the curriculum of Pecs University

Reglődi Dóra[1], Fülöp Balázs D.[1], Farkas József[1], Vicena Viktória[1], Lubics Andrea[1], Tamás Andrea[1], Hollósy Tibor[1]

[1]*University of Pecs, Department of Anatomy, HUNGARY*

A new optional course was introduced in the medical curriculum on the diverse aspects of anatomy. The topics include interesting anatomy-related topics with many different fields of anatomy. Although this knowledge is not necessarily required for the medical curriculum, it might help the student to learn anatomy with more interest and enthusiasm. The course also gives an insight into different kinds of Anatomy curriculum, like what kind of Anatomy a massage therapist or a veterinary needs in comparison to medical students and also shows some other Anatomy teahing systems from different universities worldwide. Expert lecturers were also invited for Dinosaur anatomy and for Anatomy teaching in Art Schools. The main topics are the following: Anatomy and Art (Leonardo's Anatomy to modern artists, parallelism between anatomy stuctures and art, creating art from structures; Rembrandt's painting: Dr Tulp's Anatomy); Anatomy museums and bone collections; Anatomy of Tortures and Body Modicifactions; Anatomy of anthropology (from mummies to skull identifications); Massage and body building anatomy; Anatomy Teaching at other Universities; Eponymes - who is behind the anatomical names?; history of Anatomy and Surgery; Plastic surgery and Anatomy; heavy metal and Anatomy; Cemetary culture and Anatomy; Antropology and comparative Anatomy.

Students are offered to collect an anatomy-related topic themselves and submit a powerpoint presentation instead of writing a test. The experience of the first courses shows that the acceptance of the course is very good, students enjoyed these broad and interesting „borderline" aspects of anatomy and most students enjoyed preparing for a presentation themselves. We have made an exhibition of the works students sent, further popularizing the subject of anatomy.

Evaluation of the Efficiency of the BrainSuite and FreeSurfer for the Brain Segmentation and Parcellation

Sahin Bunyamin[1], Elfaki Amani[1]
[1]*Ondokuz Mayis University, Faculty of Medicine, Department of Anatomy, TURKEY*

Aim:
The relation between the structure and the function is the goal of many neuroscience studies. For this purpose, the magnetic resonance (MR) images are taken, then processed in many software and the results are obtained. The BrainSuite (BS) and FreeSurfer (FS) software are two well-known programs for the structural brain analysis. However, the requirements and knowledge to process the images in those two software changes depending on them. Also the results can change between the software since they use different registration atlases. In this study, we compared the results between two software; in addition, we compared the data obtained between the two groups (control and patient) to see the differences of the results of the software.
Methods:
MR images of 30 Healthy and 30 Schizophrenic males were taken from the image bank of previous study that was approved by the ethical committee of the Gezira University/ Sudan. The images were analyzed using two software, BS and FS. The segmentation and parcellation results of regions of interests (ROIs) belonging to the right hemisphere were used for further analysis. Mean volume of the hemisphere, thalamus and motor cortex; mean pial surface areas of the hemisphere, motor cortex and mean thickness of the hemisphere and motor cortex were compared between the groups and software. Volume fraction of thalamus, surface fraction of motor cortex and thickness fraction of motor cortex within the hemisphere were assessed as normalization of the data. The normalized data were also compared between the groups and software.
Results:
The mean (BS & Controls Vs. BS & Schizophrenics; FS & Controls Vs. FS & Schizophrenics) volume of hemisphere (396.84 Vs. 348.66; 469.72 Vs. 422.33 cm3), the mean volume of motor cortex (27.29 Vs. 25.14; 12.73 Vs. 11.72 cm3), mean pial surface area of hemisphere (1026.75 Vs. 930.15; 879.60 Vs. 794.51 cm2) and pial surface area of motor cortex (62.61 Vs. 58.56; 53.43 Vs. 49.91 cm2) were different between controls and schizophrenics in the results of both software ($p \leq 0.05$). The normalized volume of motor cortex (6.88 and 7.22%) was different between the groups in BS ($p \leq 0.05$). The volume of thalamus (8.14 and 7.44 cm3) and thickness of hemisphere (2.44 and 2.36 mm) were different between the groups in FS ($p \leq 0.05$). The remaining comparisons were not different between the controls and schizophrenics in the results of both software ($p > 0.05$). The comparisons between the results of both software were different for all data except for the normalized volume of the thalamus and normalized surface of the motor cortex ($p \leq 0.05$). The duration of the analyses were 3-4 hours for BS and 6-8 hours for the FreeSurfer.
Conclusion:
The results showed that the obtained ROI data were different between the software except for the normalized values for volume of thalamus and pial surface of motor cortex. However, the group comparisons were mainly similar. The processing time for the FS is more than that of BS.

An anatomic study of the functional relationships between the temporalis with reference to the anterolateral muscle bundle and the facial muscle layer

Sakaguchi-Kuma Tomomi[1], Fukino Keiko[1], Shimazaki Kazuo[1], Yamaguchi Kumiko[2], Okuda Itsuko[3], Ono Takashi[1], Akita Keiichi[2]

[1]*Tokyo Medical and Dental University (TMDU), Department of Orthodontic Sciences, JAPAN*, [2]*Tokyo Medical and Dental University (TMDU), Department of Clinical Anatomy, JAPAN*, [3]*International University of Health and Welfare, Mita Hospital, Department of Diagnostic Radiology, JAPAN*

Aim:

The anterior part of the temporalis, especially the anterolateral muscle bundle is situated close to the overlying structures according to the findings of MR and CT images. Although the masticatory function of the temporalis has been generally accepted, functional significance related to the overlying structures has not been discussed. In the present study, we focused the macroscopic and histological examinations of the temporalis and its overlying structures, then we tried to discuss the functional relationships between them.

Materials and Methods: We dissected ten head halves from five Japanese cadavers. In addition, we made histological sections from four sides of three heads, to observe the connective tissues between the skin and the muscle.

Results:

After removal of the skin, the muscle bundle of the orbicularis oculi and the lateral part of the malaris were broadly expanded on the area posterior to the posterior margin of the zygomatic bone. The temporal fascia was generally consisted with the superficial and deep layers, and between these layers were occupied by the fatty tissues. In addition, in the area superior to the upper margin of the orbit, the deep layer was tightly adjoined with the temporalis muscle. However, inferior to the area, only the posterolateral surface of the anterolateral muscle bundle was adjoined with the deep layer. And the region between the deep layer and the muscle was gradually expanded and filled with the fatty tissue in the inferior part. Therefore, the upper part of the area that was covered by the lateral parts of the orbicularis oculi and the malaris was similar to the area that the deep layer of the temporal fascia adjoined with the anterolateral muscle bundle.

According to the histological findings, the fibrous tissues between the deep and superficial layers of the temporal fascia were observed, and also the fibrous tissues were observed between the superficial layer and the skin. It was often observed that these fibrous tissues passed through the facial muscles. In addition, although it was difficult to identify the muscle fibers macroanatomically on the area of the middle part of the temporal fascia, thin facial muscle layer was observed histologically. The thin muscular layer was connected with the fibrous tissues of the temporal fascia.

Conclusion:

The facial muscle layer was expanded on the broader area than the area observed macroanatomically. The layer should be suspended by the fibrous tissues connected with the temporal fascia. Since the temporalis muscle and the facial muscle layer were isolated by the layers of the temporal fascia and the fatty tissue among them, the temporalis muscle might not affect the facial muscle layer. However, the temporalis muscle, especially the anterior region, should have the suspensory function to the facial muscle layer via connecting fibrous tissues. These findings should contribute to the cosmetic and anti-aging medicine.

Visualization of vascular supply of the palatal mucosa is a useful tool in flap design (review)

Arvin Shahbazi[1], Grimm András[1], Baksa Gábor[1], Gerber Gábor[1], Balint Molnar[1], Andrea D. Székely[1], Péter Windisch[1]

[1]*Semmelweis University, Department of Anatomy, Histology and Embryology, Faculty of Medicine, HUNGARY*

Aims:

The palate is richly supplied by the branches of maxillary and facial arteries. The posterior part of the palate is supplied by the tributaries of the descending palatine artery and the anterior pre-maxillary part is supplied by the branches of facial and nasopalatine arteries. Their tributaries get distributed in a parallel manner to the alveolar ridge. In order to provide a proper blood supply and wound healing, the course of the these vessels should be taken in consideration as a first priority for flap design. Since the primary purpose of the vascular system is to deliver sufficient amount of nutrients and oxygen to supply the tissue, it is critical to prevent the impairment of blood circulation during surgical intervention. The aim of this paper is to review and demonstrate the course of arteries by summarizing different approaches described in the literature.

Materials and methods:

Several techniques exist to demonstrate at both microscopical and macroscopical levels the distribution of the vascular meshwork within the palatal mucosa.

Methyl methacrylate, latex milk or an India ink / formalin mixture is injected in the vessels of unfixed and flushed specimens. Latex milk and corrosion casts are preferred for macroscopical observations, however, India ink injections are mainly used for microscopical analyses due to the excellent diffusion of the latter into the mucosa.

Results:

Numerous anastomoses, formed between the greater, lesser and ascending palatine arteries, were recorded both at the macroscopical and microscopical levels. The greater palatine arteries, together with the accompanying branches, run parallel to the alveolar ridge in a posteroanterior direction. It is worth noting that in edentulous patients no anastomoses were detected, but rather, an avascular zone was apparent at the alveolar ridges.

Conclusions: In harmony with earlier opinions described in the literature, midcrestal incisions are suggested for ridge augmentation and sinus floor elevation in edentulous patients due to the presence of an avascular zone. In the case of dentate patients, a marginal or paramarginal approach will have to be considered.

Key words: surgical incisions, vascular supply, mucosal flap, dental,

Topography of conduction system with complex types of congenital heart defects

Spirina Galina[1]

[1]*Ural State Medical University, department of human Anatomy, RUSSIA*

The aim of this work is to determine the topography patterns of the atrioventricular node, the bundle of the same name and its branches in reference to the heart structure with complex types of congenital heart defects (CHD). The material included 44 heart specimens of newborn and nursing infants with complex types of CHD (complete atrioventricular canal defect, tetralogy of Fallot, atrioventricular septum defect concomitant with common arterial trunk). In order to identify the AV section of conduction system, macro and microscopic dissection was used in conjunction with histological method. Quantitative dissection of interventricular septum portions (sinus, trabecular, conical) was carried out. It was determined that with CHD the position and length of the AV bundle reflects the degree 0f abnormal development of sinus portion. The highest degree of its deformity (CAVC defect) corresponds to the longest bundle up to anatomical bifurcation. The ventricular portion of the bundle is located on the left side of the muscular ridge of the IVS sinus portion at an angle of 60° to the horizontal. The bundle is concave forward and upward, confirming the cup-shaped deformity of the sinus portion. The proximal portion of the right branch is inclined upward at 30° to the horizontal. The initial part of the left bundle makes an angle of 130° to 160° with the AV bundle and is concave forward. The AV node is located at the base of the posterior wall of the right atrium or the posterior section of the right side of the interatrial septum base. In case of tetralogy of Fallot, the AV node is located in front of the coronary sinus opening. In case of type 2 defect, the ventricular portion of the AV bundle is located on the left side of the muscular ridge of the IVS sinus portion. The initial part of the right bundle lies intramuscularly on the left side of the muscular ridge of the sinus portion. The shorter front ridge of the nonbranching part of the left branch forms a curve, which is concave forward and upward. The combination of the IVS defect with the common arterial trunk is referred to as complex type of CHD with predominant abnormal development of the IVS conic part. The AV node is located on the central fibrous body. The ventricular portion of the AV bundle and its anatomical bifurcation are on the left side of the sinus part. The initial portions of the right and left branches make an angle of 130° to 160° with the bundle and are concave forward. The left branch of the bundle has long narrow nonbranching part, which divides into three branches. Modification of position of the AV node, ventricular portion of the AV bundle, its anatomical bifurcation with complex types of CHD reflect the degree of abnormal development of IVS portions. The pronounced deformity of the sinus portion corresponds to the longest AV bundle up to the anatomical bifurcation.

Keywords: congenital heart defects, conduction system

Sternberg's canal incidence, morphology and correlation with sphenoid sinus type

Štoković Nikola[1], Dumić-Čule Ivo[1], Trkulja Vladimir[2], Čuković-Bagić Ivana[3], Lauc Tomislav[4], Grgurević Lovorka[1]

[1]Laboratory for Mineralized Tissues, Center for Translational and Clinical Research, School of Medicine, University of Zagreb, CROATIA, *[2]Department of Pharmacology, School of Medicine, University of Zagreb, CROATIA*, *[3]Department of Paediatric and Preventive Dentistry, School of Dental Medicine, University of Zagreb, CROATIA*, *[4]Department of Anthropology, Faculty of Social Sciences and Humanities, University of Zagreb, CROATIA*

Aim:

Sternberg'canal (lateral craniopharyngeal canal) is a small canal connecting middle cranial fossa and nasopharynx. Canal can be seen in individuals aged 6 or less and is typically closed until the age of 10. However, in some individuals it may persist patent during whole life. Canal is located in the frontal plane medially to the foramen rotundum and has intracranial and extracranial opening. Intracranial opening is medial to the superior orbital fissure; extracranial opening is at the level of vaginal process. Our goal was to investigate the incidence (in adults) and dimensions of Sternberg's canal and to investigate whether there is a correlation between the sinus type and the incidence of Sternberg's canal.

Methods:

103 adult skulls were analysed using CBCT device. Sternberg's canal was detected on coronal plane images. We measured the distance between left and right intracranial (I-I) and extracranial (E-E) openings and the distance between intracranial and extracranial (I-E) openings. On sagittal plane images we determined sinus type (conchal, presellar, sellar or postsellar).

Results:

The canal was present in 17.5% of cases, while a part of the canal in 8.7% of cases. 94.4% of the canals were two-sided and 5.6% of the canals were present only on one side. The prevalence of sinus types was 1% conchal, 19,9% presellar, 45,6% sellar and 33,5% postsellar. The canal was present in 100% conchal, 41.5% presellar, 13.8% sellar and 5.8% postsellar type sinuses. The mean I-I distance was 23,4 mm, mean E-E distance was 10,4 mm and mean I-E distance was 15,4 mm.

Conclusion:

Through our research we have described the incidence, morphology and dimensions of Sternberg's canal. Canal was present in approximately 1/5 of the cases with constant and clear morphology. The existence of canals is significantly associated with the sphenoid sinus type.

Future research should focus on the potential clinical role of canals in connection with structures that may pass through it.

Cochlea-carotid canal relationship and carotid-cochlear interval (CCI)

Štoković Nikola[1], Dumić-Čule Ivo[1], Trkulja Vladimir[2], Lauc Tomislav[3], Čuković-Bagić Ivana[4], Grgurević Lovorka[1]

[1]Laboratory for Mineralized Tissues, Center for Translational and Clinical Research, School of Medicine, University of Zagreb, CROATIA, *[2]Department of Pharmacology, School of Medicine, University of Zagreb, CROATIA*, *[3]Department of Anthropology, Faculty of Social Sciences and Humanities, University of Zagreb, CROATIA*, *[4]Department of Paediatric and Preventive Dentistry, School of Dental Medicine, University of Zagreb, CROATIA*

Aim:

Carotid canal and the cochlea are located in the petrous part of the temporal bone in extremely close relationship. The aim of our study was to investigate position of the carotid canal in relation to the cochlea, values of carotid-cochear interval (CCI, minimum distance between carotid canal and cochlea) and impact of carotid canal position to the values of CCI.

Methods:

102 skulls (204 sides – left and right) were recorded using CBCT (Cone Beam Computed Tomography) device SoredexScanora3D. Relationship between cochlea and carotid canal was evaluated on axial plane images. Relationships between cochlea and carotid canal were assigned into 4 categories: A – lateral canal wall is anteromedial to the basal turn of the cochlea; B – lateral canal wall is anterior to the basal turn of the cochlea; C – lateral canal wall is anterior to the middle turn of cochlea; D – lateral canal wall is anterior to the cupula. Carotid cochlear interval (CCI) was measured in axial and sagittal plane.

Results:

The prevalence of relationships types was: A=11.8%; B=44.1%; C=24%; D=20.1%. The average value of the CCI measured in the axial plane (AP) was 1.13 mm (MIN = 0, MAX = 6.7mm, left = 1.11, right = 1.16) and measured in the sagittal plane (SP) 1.06 mm (MIN = 0, left = 1.05, right = 1.06). Values of CCI according to types of relationships were as follows: A: AP=2.8mm SP= not possible to measure; B: AP=1.27mm SP=1.28; C: AP=0.64mm SP=0.71mm; D: AP=0.44mm SP=0.55mm.

Conclusion:

Relations between carotid canal and cochlea were shown as extremely variable. Variability is encompassing both, carotid canal position relative to the cochlea and CCI. Our results showed that there is a correlation between the type of relations and CCI; CCI values significantly decrease from type A to type D. Relationship between carotid canal and cochlea has extensive clinical significance during the implantation of cochlear implants to prevent penetration of the carotid canal during cochlear implant surgery. Moreover, small CCI can be associated with hearing loss.

Description and Neurochemical Characterization of the Autonomic Pathways Innervating the Lower Gingiva and Lip

Szabó Enikő[1], Köves Katalin[2], Boldogkői Zsolt[3], Csáki Ágnes[2], Lohinai Zsolt[4], Tóth Zsuzsanna[4], Ciofi Philippe[5]

[1]Semmelweis University, Department of Conservative Dentistry, HUNGARY, [2]Faculty of Medicine, Semmelweis University, Department of Anatomy, Histology and Embryology, HUNGARY, [3]Faculty of Medicine, University of Szeged, Department of Medical Biology, HUNGARY, [4]Faculty of Dentistry, Semmelweis University, Department of Conservative Dentistry, HUNGARY, [5]Neurocentre Magendie, INSERM U862, FRANCE

Background:
Ample evidence indicates that the descending pathways from the hypothalamus through the brainstem, the spinal cord and the peripheral ganglia play a role in the autonomic regulation of the lower gingiva and lip.
Aim:
Our goals were 1) to describe the central pathways regulating sympathetic and parasympathetic functions, 2) to examine the distribution of central premotor neurons on both sides, 3) to further clarify which parasympathetic ganglion sends postganglionic fibers to the lower gingiva and lip and 4) to identify the neurochemical nature of the members of these descending pathways.
Methodology:
Retrogradely spreading green fluorescence protein labeled virus was injected into the lower gingiva or lip of Wistar rats. Intact and sympathectomized rats were included in the experiment. After 72-120 hrs of survival the animals were perfused. Virus labelling was looked for in frozen sections of the hypothalamus, brainstem, upper thoracic spinal cord, superior cervical, otic and submandibular ganglia. For neurochemical characterization the frozen sections, where virus labelling was seen, were immunostained for neorupeptide and neurotransmitter immunoreactivity using fluorescence technique. This made the detection of colocalization possible using confocal laser microscopy.
Results:
In both intact and sympathectomized rats, virus labelled neurons of the hypothalamic paraventricular nucleus showed oxytocin, vasopressin, but not cholecystokinin (CCK) and corticotropic hormone releasing hormone (CRH) immunoreactivities. In the perifornical region the virus labelled neurons showed orexin immunoreactivitiy. In sympathectomized rats virus labelling was missing from the raphe nuclei, the locus ceruleus, the ventrolateral medulla, the spinal cord, but labelling further existed in the gigantocellular and the salivatory nuclei suggesting their parasympathetic nature. It was also found that all the three cervical sympathetic ganglia send fibers to the lower gingiva and lip. We also certified that the gingiva receives parasympathetic innervation and that it derives from the otic ganglion, the lip receives parasympathetic innervation from both the otic and submandibular ganglia. In intact and sympathectomized rats the members of the descending pathways were further characterized.
Conclusion:
Our paper demonstrates for the first time that oxytocin, vasopressin and orexin, but not CCK and CRH, immunoreactive hypothalamic neurons may influence both sympathetic and parasympathetic responses of the lower gingiva and lip. These are common command neurons. We also summarized the data step-by-step on the chemical characteristics of the

lower part of both the sympathetic and parasympathetic descending pathways of both the lower gingiva and lip.

Serotonergic innervation and connectivity of the avian ventral tegmental area

Székely Andrea D.[1]

[1]*Semmelweis University, Department of Anatomy, Histology and Embryology, Faculty of Medicine, HUNGARY*

Aims:

The area ventralis tegmentalis of Tsai (VTA), a midbrain monoaminergic cell group, is thought to play a role in memory formation, aversive/ addictive behaviours while representing an essential link within the brain reward cycle. In mammals, the VTA and the raphe nuclei, together with the nucleus accumbens, are considered to be the main subcortical relays of the brain reward circuit, all possessing reciprocal connections with the medial prefrontal cortex, mPFC. In birds, the rostral Wulst, on the basis of its connectivity and neuronal composition, is thought to be homologous to a part of the mammalian ventromedial PFC. Therefore our aim was to find a direct Wulst-VTA neuronal loop to shed light to the hitherto unknown connections as well as to further support our hypothesis of the rostral Wulst being equivalent to a part of the „avian prefrontal cortex".

Methods:

In order to describe the subdivisions, connectivity and the neurotransmitter content of the VTA, together with its electron microscopical structure, enzyme histochemistry, preembedding immunocytochemical techniques, as well as, anterograde and retrograde tract tracing methods were employed.

Results and Conclusions:

The avian VTA contains only two subregions (shell and core) while the mammalian homologue may be subdivided into several subregions.

There is a mainly ipsilateral neuronal loop connecting the VTA to the rostral Wulst, adding to the collection of telencephalic pallial regions, thought to be equivalent to certain specific regions of the mammalian mPFC, including the anterior cingulate, infralimbic and prelimbic cortices.

A reciprocal connection was verified between the VTA and the nucl. linearis caudalis, a mesopontine serotonergic nuclear complex, thought to be homologous to the midbrain raphe nuclei.

We described the distribution of serotonergic axons forming baskets around dopaminergic or unlabelled principal cells of VTA. Furthermore, we detected an unusual, in mammals yet unidentified, group of small, fusiform, serotonergic neurons within the caudolateral aspect of the nucleus.

We found 5HT labelled terminal varicosities containing round synaptic vesicles in contact with small and medium size dendritic profiles of, presumably, principal cells of VTA. The boutons seemed to predominantly form asymmetrical synapses, however, in some cases, long appositions lacking recognised densities were also observed. Furthermore, we are the first to describe the presence of glomerular synapses within the VTA.

Standardization of Sternocleidomastoid for Botulinum Toxin Applications

Torun Bilge İpek[1], Kendir S.[2], Uz A.[2]

[1]Ankara Yildirim Beyazit University Faculty of Medicine, Anatomy, TURKEY, *[2]Ankara University, Faculty of Medicine, Department of Anatomy, TURKEY*

Aim:

Botulinum Toxin is frequently applied to sternocleidomastoid for torticollis treatment. During this application, bulb of jugular vein under sternocleidomastoid makes the interventions dangerous. Also injecting botulinum toxin into the infrahyoid muscles which lie under sternocleidomastoid may cause hoarseness and swallowing disorders. In this study, it was aimed to measure the thickness of sternocleidomastoid and so to make the botulinum toxin application safely without injuring any vascular structures or neighboring muscles.

Methods: In 10 male cadavers, sternocleidomastoid was evaluated in three equal segments (upper, middle and lower). The muscle width and thicknesses at the center of each segment were measured. In 1 male cadaver colored latex was injected into the center of every part of the muscle according to the measurements.

Results:

The respective mean width of upper, medial and lower segments were 33,15 (23 - 41) mm, 36,45 (28 - 45) mm and, 39,35 (15 - 50) mm. The respective mean thicknesses of upper, medial and lower segments were 5,29 (3,87 – 7,68) mm, 5,89 (3,56 – 8,32) mm and 3,60 (0,69 – 7,75) mm. There was no significant difference between sides. The thickest part of the muscle was the middle part while the lower part was the thinnest one. When the coloured latex injected cadaver were dissected it was seen that center of every segment of the muscle was dyed while the neighboring structures were avoided.

Conclusion:

Knowing the thicknesses of the upper, middle and lower segments of sternocleidomastoid will make the Botulinum Toxin applications to this muscle safer and easier.

Key words: sternocleidomastoid, Botulinum Toxin, torticollis, swallowing disorder, muscle thickness

Meniscoids in the shoulder joint

Totlis Trifon[1], Natsis Konstantinos[1]

[1]Laboratory of Anatomy, Faculty of Medicine, School of Health Sciences, Aristotle University of Thessaloniki, GREECE

Synovial joints may be divided by fibrocartilaginous articular discs into separate spaces. These structures are attached to the fibrous capsule. Articular discs may completely separate two joint compartments, such as the temporomandibular joint or partly separate a synovial joint such as the menisci of the knee. Synovial meniscoid folds represent fibroadipose projections of the joint capsule into the joint space and they have been described in various joints of human body. There are reports of such folds in zygoapoficial and atlanto-occipital joints in cerebral spine as well as in metacarpophalangeal and also radiohumeral joint.

Glenoid labrum meniscoid folds are considered to be a normal anatomic variant of the shoulder joint which has been only scarcely described in the literature. The term “labral meniscoid folds” does not refer to labrobicipital complex which has been described as loosely attached to the glenoid rim in a fashion analogous to the lateral meniscus in the knee, nor to synovial folds, but to meniscoid folds which derive from labrum and project to its intra-articular free inner edge.

We conducted an arthroscopic study to investigate the incidence and location of labral meniscoid folds, as well as to classify them into types and detect any possible correlation with gender, side and age of patients. According to our study, the incidence of labral meniscoid folds in shoulder joint is 62.7%. They are located more often at an anterosuperior position of shoulder joints and their incidence tends to be higher in older patients while in male ones they are located in a more anterior position in comparison to female patients where they are located more superiorly. This finding may indicate that meniscoid folds are probably acquired and contribute to anterior stability of the shoulder joint. Further research is necessary to evaluate more thoroughly the functional significance of meniscoid folds and to investigate any possible impact on the pathophysiology of a painful shoulder.

Aplasia of the right vertebral artery: an incidental autopsy finding and its pointed significance in clinical practice

Trandafilović Milena M.[1], Vasović Ljiljana P.[1], Vlajković Slobodan R.[1]
[1]*Faculty of Medicine, University of Niš, Department of Anatomy, SERBIA*

Aim:
In continuation of investigation of the aplasia of the right vertebral artery (VA), we analyzed morphological status and associated pathological changes of other arteries of the carotid and vertebrobasilar systems.
Methods:
Case reports of the right VA aplasia from online available articles and library archives at the Faculty of Medicine of Niš dated from year 1968 to 2016 have been examined. This abnormality in 59 cases— patients and cadavers of (un)known gender that were investigated in different countries have been reviewed.
Results:
General and special characteristics of these cases were as follows: 1) Aplasia of the right VA was discovered in patients or cadavers aging from day 14 to year 79; 2) the right VA was entirely absent in 96.6% of cases; 3) aplasia of the right VA was presented in 52.5%, and associated with aplasia of the left VA in 47.4% of cases; 4) simultaneous aplasia of other seven different arteries were found in 30.5% of cases; 5) various primitive carotid-vertebrobasilar anastomoses (CVBAs) persisted in 89.8% of cases; 6) an absence of CVBA in only 7/31 cases of single right VA aplasia; and 7) persistence of the primitive hypoglossal artery is more frequent in cases of single right VA, while persistence of the primitive proatlantal intersegmental artery is more frequent in cases of aplasia of both VAs. Angiographically documented stenosis of one or more arteries of the carotid system (30.5%), as well as the presence of single or multiple aneurysms (23.7%) characterized cases of the right VA aplasia.
Conclusion:
Presented cases of the right VA aplasia inspire the author to investigate and compare morphological status and associated abnormalities in cases of the left VA aplasia with previous ones.

Biomechanical Modelling as a Progressive Tool in Clinics and Clinical Anatomy

Vaclav Baca[1,2,3], Horak Z.[2,3], Otcenasek M.[2,4], Kachlik D.[5], Grill R.[2,4], Dzupa V.[2,6]

[1]Charles University in Prague, Department of Anatomy, Third Faculty of Medicine, CZECH REPUBLIC, *[2]Charles University in Prague, Center for Integrated Study of Pelvis, Third Faculty of Medicine, CZECH REPUBLIC*, *[3]College of Polytechnics Jihlava, CZECH REPUBLIC*, *[4]Charles University in Prague and FNKV Prague, Department of Urology, Third Faculty of Medicine, CZECH REPUBLIC*, *[5]Charles University in Prague, Department of Anatomy, Second Faculty of Medicine, CZECH REPUBLIC*, *[6]Charles University in Prague and FNKV Prague, Department of Orthopaedics and Traumatology, Third Faculty of Medicine, CZECH REPUBLIC*

Clinical anatomy represents a specific field that should bring answers to the questions of clinicians how to get the most from the structure and mechanical properties of the human body for the benefit of the planned medical intervention. This is to ensure that the diagnostic or therapeutic procedure was carried out with the least possible risk and maximized efficiency, therefore, the greatest benefit for the patient. It is not about a stark description of the topographical situation, but about the relationship of the situation to the possibilities of what the least destructive approach, grafting or implantation and, last but not least leading to consequential functionality and reliability. Following the development of technology and the usage of specific technical devices and instruments is preferably not only to understand the biological processes, but also the mechanical properties of the biological material (tissue) and implanted artificial compensations, plates and screws. It is not only the mechanical tests, in case of living organisms there are simulation tools that enable virtual modeling of the load and thus predict the behavior of a biological system at physiological load and after surgery (e.g. in orthopedics and traumatology, urology and gynecology). Combining technical expertise and knowledge of the properties and behavior of the organism deals with biomechanics, which in conjunction with the anatomy, especially topographical and developmental ones, can bring answers to many questions that clinicians bring from their medical practice.

Supported by grant CZ216/3100/24018 (INO/02/01/0017/2010)

Comparison of Traditional versus Computer Based Anatomical Education: Influence of Spatial Ability on Learning Outcomes

Van Nuland Sonya E.[1], Rogers Kem A.[1]
[1]*University of Western Ontario, Anatomy and Cell Biology, CANADA*

Growing class sizes and a reduction in laboratory hours have increased the popularity of commercial anatomy e-learning tools. Our previous research (n=70) compared a simple 2-dimensional e-learning tool (A.D.A.M. Interactive Anatomy) to a more complex tool that allows for a more 3-dimensional perspective (Netter's 3D Interactive Anatomy; DOI 10.1002/ase.1589). Despite the differences in how these e-learning tools present information, student ability to learn anatomical material, and their mental effort while doing so, known as cognitive load, were identical between e-learning tools. However, when students with low spatial ability studied anatomical content with the more complex tool (Netter's 3D Interactive Anatomy), their performance scores were significantly lower than those students with high spatial ability (p=0.007, R2=0.103). These results indicate that e-learning tool software design can differentially influence students based on their spatial ability, but questions remain regarding how these e-learning tools compare to more traditional learning processes, such as physically manipulating a skeleton. Using a novel dual-task methodology with a cross over design, undergraduate anatomy students from The University of Western Ontario, Canada (n=75) were evaluated as they studied a bony joint using a physical skeleton as well as a simple commercial software program (A.D.A.M. Interactive Anatomy). We hypothesized that the acquisition of anatomical knowledge by students, regardless of their spatial ability, will be superior when learning is associated with a real model, rather than currently available e-learning tools. Students were assessed using a baseline knowledge test, Stroop observation task response times (a measure of cognitive load), MRT scores (a measure of spatial ability) and an anatomy post-test (a measure of learning). Results suggested that while students may experience more cognitive load while studying using a physical skeleton, it does not detrimentally impact their performance; in fact student performance was significantly higher when they studied using the skeleton. Furthermore our results also demonstrated that students with low spatial ability are at a significant disadvantage when they learn the bony anatomy of a joint and are tested on images of the contralateral joint. This study highlights a major weakness in the strategy to move traditional anatomical education online, and suggests that we should be teaching both anatomy and surgical procedures on both sides of the human body, to ensure that all students, regardless of spatial ability, can take their anatomical knowledge into the clinic and perform successfully.

Latest news in microscopic anatomy of the human uterine tube

Varga Ivan[1], Miko Michal[1], Kajanová Marianna[2], Urban Ladislav[2], Polák Stefan[1]

[1]Comenius University in Bratislava, Faculty of Medicine, Institute of Histology and Embryology, SLOVAKIA, *[2]Department of Gynaecology and Obstetrics, ForLife General Hospital in Komárno, SLOVAKIA*

Thanks to huge advances in the field of microscopic technique there prevails a notion in the general public, but probably also in the scientific community that currently it is not possible to discover a novel organ, tissue or cell in the human body. As a matter of fact, over many decades and centuries already every single part of the body must have been completely reviewed. Thereby, recent research of the structure of the female reproductive system has brought surprising conclusions. In our lecture, we would be to highlight three remarkable findings occurring within the uterine tube, which are often neglected in recent literature: functional morphology of telocytes, presence of the system of lymphatic channels in the connective tissue core of mucosal folds and normality of the occurrence of Walthard cell nests. Surprising discovery over the last decade have been findings that in the organs of the female reproductive system, and as well in other parts of the human body, there are located previously unrecognized cells – telocytes - with extremely long cytoplasmic processes. Telocytes are localized in a muscular layer, but they are also part of connective tissue of the mucosa and are likely responsible for coordination of the smooth muscle activity in the uterine tubes. We visualized them via different methods of immunohistochemistry (antibodies again c-kit, CD34 and vimentin), and discussed about their localization and possible function. Via methods of immunohistochemistry, we demonstrated the endothelial cells of vessels (antibodies again factor VIII, CD34 and podoplanin D2-40), and we focused our research on the description of the localization and course of lymphatic vessels in the tunica mucosa (inside mucosal folds) of uterine tubes.

Just below the mesothelium of tunica serosa and adjacent board ligament we can find often small clusters of epithelial cells called Walthard cell nests (according to their discoverer, a Swiss gynecologist Max Walthard who provided a comprehensive description of them in 1903). Microscopically, they are composed of polygonal epithelium-like cells and may occasionally be cystic and reach 2 – 3 mm in size. These epithelial cell-clusters are probably derived from the mesothelium by invagination, and are often neglected in recent histology textbooks.

“Memorix histology” - 9 ways of learning histology from a single book

Varga Ivan[1], Balko Ján[2], Tonar Zbynek[3], Kachlik David[4], Hudák Radovan[4]

[1]Comenius University in Bratislava, Faculty of Medicine, Institute of Histology and Embryology, SLOVAKIA, *[2]Department of Pathology and Molecular Medicine, Second Faculty of Medicine, Charles University in Prague, CZECH REPUBLIC*, *[3]Department of Histology and Embryology, Faculty of Medicine in Pilsen, Charles University in Prague, CZECH REPUBLIC*, *[4]Department of Anatomy, Second Faculty of Medicine, Charles University, Prague, CZECH REPUBLIC*

“If you can't explain it simply, you don't understand it well enough”. This paraphrase of Albert Einstein's thought is as valid as ever. We are living in an age of rapid increase of information, which places escalating demands on students who are under the pressure of incredible progresses in biomedical sciences. It is thus vitally important from the student’s point of view to choose and absorb the most essential information, as well as to retain information relevant for their future medical careers. It is also important that information is presented in understandable and student-friendly manner. The goal of our new textbook “Memorix Histologie” (Memorix Histology, firstly in Czech language) is to teach histology in a way that will prepare students for their future medical careers, keep them motivated and support memory consolidation so that they can recall their knowledge of microscopic anatomy easily. This comprehensive histological textbook was composed and written by a team comprising medical students and young Assistant / Associate Professors. All chapters consist from 9 fundamental pillars – 9 different ways of learning of histology:

1) Continuous text as a part of introduction of each chapter, creates approximately 20% of the textbook
2) Text in paragraphs, for fast learning and better transparency of important terms, creates the majority of our textbook
3) Interesting facts – increase interest for the study of histology
4) Clinical notes and applications – interconnecting theoretical knowledge with the clinical praxis
5) Schematic drawing – in our histological textbook the drawings are the most significant and convincing part: providing good quality, informative and self-explanatory figures are a major positive aspect of Memorix histologie
6) Representative microphotographs and electron-microphotographs from transmission electron microscope
7) Decision algorithm (“tree”) – how it is possible distinguish and describe different histological slides in the praxis
8) Tables and schemes, for a simple summary of the information
9) Questions and figures for the final repetition.

During the process of preparation we met different difficulties, especially with the non-unique histological terminology in different textbooks and also in the internationally accepted Terminologia Histologica (FICAT 2008), which contains all accepted terms for cellular structures, tissue and organs at the microscopic level. Finally, all the important histological facts and principles supplemented by functional, developmental and clinical correlations are covered in this 560-page text, supported by more than 1000 simple illustrative schematic drawing, and more than 200 microphotographs, electron micrographs, tables and algorithms how to describe histological slides. The original Memorix educational system has been created

in collaboration with experts in adult learning and implemented in this book, similarly as to the previous Memorix Anatomy.

Algometry testing in women with lumbar radiculopathy

Vučinić Nikola[1], Erić Mirela[1], Tomašević-Todorović Snežana[2], Savić Mirjana[2], Marić Dušica[1]
[1]Department of Anatomy, Faculty of Medicine, University of Novi Sad, SERBIA, *[2]Department of Physical Medicine and Rehabilitation, University of Novi Sad, Clinic for Medical Rehabilitation, Clinical Center of Vojvodina, Novi Sad, SERBIA*

Aim:
Algometry, as quantitative sensory testing, is seeing increased use in clinical practice and the prevalence of musculosceletal pain is found to be higher among women. The aim of this study was to compare pressure pain threshold (PPT) in trigger points on the left and on the right side of low back region in lumbar radiculopathy.
Methods:
Thirty women hospitalized with lumbar radiculopathy and verified by magnetic resonance imaging (MRI) was included in our study. Pressure pain threshold was measured at five points bilaterally, at the beginning and at the end of hospitalization (treatment lasted an average of 2 weeks), using an electronic pressure algometer. Muscles frequently afflicted by trigger points were examined. Pressure pain threshold values are given in Newtons (N)/ centimeter $(cm)^2$.
Results:
On the left side of low back region average PPT was 31.42 N/cm^2 (at the beginning of hospitilization) and 36.20 N/cm^2 (at the end of hospitalization) in range of 0 to 59.40 N/cm^2. On the right side of low back region average PPT was 31.77 N/cm^2 (at the beginning of hospitilization) and 36.06 N/cm^2 (at the end of hospitalization) in range of 0 to 59.15 N/cm^2.
The results showed that the pain in patients was reduced after treatment, and that there was no significant difference in PPT values before and after treatment between the left and right side.
Conclusion:
Algometric examination in patients with lumbal radiculopathy serve as a reference for clinical diagnosis of abnormal tenderness and may be useful as part of a protocol to evaluate clinical change (improving or worsening as a result of certain treatment).

Key words: Algometry, Pressure pain threshold, Women, Lumbar radiculopathy

Anatomy of Treitz's muscle of anal canal

Yamaguchi Kumiko[1], Muro Satoru[1], Akita Keiichi[1]
[1]*Tokyo Medical and Dental University (TMDU), JAPAN*

Aim

Treitz's muscle (M. submucosae ani) is one of the components of the anal cushions. It lays beneath the mucosa, and surrounds the lower part of anal canal. Treitz's muscle has been considered to have two origin. Some fibers are described to emerge from the internal anal sphincter (IAS), and others are thought to emerge from the conjoined longitudinal muscle (LM), and penetrate the IAS. Distal end of the LM are known to penetrate the EAS. In this study, we examined the structure of the smooth muscle fibers around the anal canal to understand their function.

Materials and Methods

Ten Japanese cadavers were used for this study. For gross anatomy, we cut the five pelvises in median line, and removed mucosal layer under the operation microscope. For histological analyses, we embedded the anal canal and surrounding structures from the other five cadavers, and made frontal and/or sagittal 5μm sections. Sections were stained by Hematoxylin and Eosin, or Elastica van Gieson stain. Immunohistochemical study was also performed with anti-smooth muscle antibody and anti-skeletal muscle antibody.

Results

After removal of mucosa, longitudinal muscle fibers were observed to extend over subcutaneous part of external anal sphincter (EAS). This longitudinal muscle fibers were emerged from the IAS. The circular fibers of the IAS seemed to curve inwards and downwards to form the longitudinal muscle fibers. The fibers passed downwards into anal submucosa below the pectinate line.

On the histological sections, three layers of smooth muscle was observed. Longitudinal muscle fibers of Treitz's muscle were observed just beneath the mucosal layer. In the region lower to the IAS, subcutaneous part of the EAS observed. Treitz's muscle was observed between skin and subcutaneous part of the EAS, and extended to the end of anal canal. Circulated muscle fibers of IAS observed intermediately, and LM were observed deeply. On the internal surface of IAS, fibers of Treitz's muscle and IAS were connected each other. On the other hand, on the external surface of IAS, thin connective tissue layer was observed between IAS and LM. This thin connective tissue layer separated the IAS and LM, and connection of muscle fibers were not observed. Some fibers of the thin connective tissue seemed to extend inwards and downwards to penetrate the IAS, but these fibers were not stained with anti-smooth muscle antibody. Fibers of LM penetrated EAS and extended to the skin.

Conclusion

According to the present findings, longitudinal fibers of Treitz's muscle are extended from circular IAS, and run downward covering the medial surface of the subcutaneous part of the EAS. In addition, LM penetrated EAS, and thought to have functional relationship with EAS. Closure of anus and length of the anal canal would have coordinated function.

Anterior hepatic grooves accompanied by Chilaiditi sign: a retrospective radiological analysis of a neglected anatomical fact

Yavuz Alpaslan[1], Batur Abdussamet[1], Bulut Mehmet D.[1], Bora Aydın[1], Göya Cemil[2], Andic Cagatay[3], Beyazal Mehmet[4], Olmez Sehmuz[5]

[1]Yuzuncu Yil University, Radiology, TURKEY, [2]Dicle University Medical Faculty, Radiology, TURKEY, [3]Baskent University, Interventional Radiology, TURKEY, [4]Recep Tayyip Erdogan University, Radiology, TURKEY, [5]Yuzuncu Yil University Medical Faculty, Internal Medicine, Hepatology, TURKEY

Purpose:

To evaluate anterior hepatic grooves (AHGs) associated with hepato-diaphragmatic mesocolic indentations (Chilaiditi sign) and to delineate the incidence and potential clinical significance of this association.

Material and Methods:

Between November 2011 and June 2014, abdominal computed tomography examinations of 2,314 patients with varied indications were retrospectively reviewed. Patients were surveyed consecutively for the Chilaiditi sign and syndrome, and cases with grooves at the antero-inferior hepatic surface enclosing the adjacent mesocolic indents were determined. The incidence of AHGs and their predominance by gender and age were determined. The potential clinical significance of AHGs associated with Chilaiditi syndrome and their possible effect on liver volume were assessed.

Results:

The incidences of AHGs were similar between genders ($p = .461$ and $p = .646$) and age ($p = .113$ and .621, respectively) among total cohort and patients with Chilaiditi sign, respectively. There was no significant correlation between AHGs and Chilaiditi syndrome ($p = .506$); no efficacies of AHGs to liver volume were assessed ($p = .413$).

Conclusions:

The AHGs are rare adaptive changes in shape of the liver without a significant effect on liver volume. This overlooked phenomenon is likely derived from the Chilaiditi sign, but has no significant correlation with Chilaiditi syndrome. Future studies with extended series are encouraged to reveal the possible significance of this phenomenon based on concerned surgical interventions.