

and 6<sup>th</sup> week of gestation. If we assume there won't be variations during the following weeks this knowledge is important during esophagus surgical procedures in neonates and early childhood (esophagus fistulas, hernia of hiatus, gastro-esophageal reflux, etc.). The objective of this study was to observe vagus nerves in the thorax, describe the variations in number, position and distribution and determining the relation with the gastric rotation. We dissected vagus nerves from the inferior neck to the abdomen, in 30 fetuses with 12 and 23 weeks of gestation. Recurrent nerves were identified. Dissection of the 2<sup>nd</sup> third of the thorax let us observe the cardiac and pulmonary branches which were cut to continue dissecting the nerves around the esophagus. Final position at the hiatus was described and the diaphragm was opened to access the abdominal portion. The gastric rotation was associated with nerves position. Vagus nerves entered the thorax laterally to the common carotid arteries and included in the same sheath. At this level it had a big diameter. After giving the recurrent nerve, the main branch addressed to the pulmonary pedicle and provided the cardiac and pulmonary branches. Under the tracheal division, vagus nerves remained as a thin branch (1/3 or 1/4). Both nerves showed many variations under the pulmonary pedicle and at the diaphragmatic hiatus. The 2 cases with unrotated stomach had a multiple divided right nerve and an anterior left nerve. According to our observations the distribution and position of the vagus nerves in the thorax is variable and complex. It does not seem so easy to associate vagus nerves location with the stomach rotation.

#### **BRACHIOCEPHALIC TRUNK ANOMALIES AND VARIATIONS**

S. N. BIASUTTO, R. R. CECENARRO, G. A. F. CECCÓN, M. L. ÁLVAREZ, M. DE LA ROSA, P. A. BORTOLÍN

*Institute of Normal Anatomy, Faculty of Medical Sciences, National University of Cordoba, Cordoba, Argentina*

Knowledge of anatomical anomalies and variations on the brachiocephalic trunk (BCT) are important in medical practice, mainly for the interpretation of diagnostic images, in surgical procedures of thorax and neck, and may also be of high risk for life. We studied 50 fetuses, of both genders, between 12 and 21 weeks of gestation and described the variations we found according they happened at the origin, the position or the branching of the brachiocephalic trunk. We reviewed the literature and organized the articles (most of the case reports on eventual findings) following the same criteria. Fifteen percent of the studied fetuses were female. On 9 occasions we observed a common origin of the brachiocephalic trunk and the left common carotid artery. We found one case where there was no brachiocephalic trunk, as the right common carotid artery originated from a common trunk with the left common carotid artery, but the right subclavian artery was a branch of the left pulmonary artery. Another case showed the emergence at the BCT division of a third descending branch to the

pulmonary pedicle, as an anastomosis to the right pulmonary artery. The remaining cases presented in the manner usually described; there were not positional variations. Some other variations and anomalies found in the literature are mentioned and correlated with our findings. Some of those cases were not compatible with life but most of them are asymptomatic and only eventually found surgically or during studies by diagnostic images. The anatomical information was associated to the clinical aspects and therapeutic procedures described in the published papers.

#### **THE LIGAMENTUM CAPITIS FEMORIS – AN ANATOMICAL EVALUATION OF FUNCTION IN SITU**

P. BINDER<sup>1</sup>, S. NEUHÜTTNER<sup>2</sup>, C. LAMPERT<sup>3</sup>, E. BRENNER<sup>1</sup>

*<sup>1</sup> Division of Clinical and Functional Anatomy, Medical University Innsbruck, AT. <sup>2</sup> Department of Orthopaedic Surgery and Traumatology, Cantonal Hospital St. Gallen, CH. <sup>3</sup> Orthopaedics 'Am Rosenberg', St. Gallen, CH*

**Introduction:** Reviewing the literature there is evidence that lesions of the Lig. capitis femoris (LCF) can have a pathologic value. Hitherto, the arthroscopically performed reduction, resection, or trimming of ruptured or injured ligaments causing impingement are state-of-the-art. Latest examinations of the LCF found similarities with the anterior cruciate ligament (ACL). This leads to the question whether reconstructions of the LCF are worth to be considered. **Material and Methods:** Twenty-one cadaver hips were dissected down to the joint capsule and bone. Parts of the lamina quadrangularis were removed to open the fossa acetabuli from the pelvic side. Both, 30° and 70° angled optics were used to examine the performance of the LCF during different movements. **Results:** Each form of the LCF described in the literature was found. We could separate only two distinct bundles, and proof a „continuous recruitment of fibres" when approaching different positions; in nearly each movement parts of the LCF get tightened. The LCF gets the highest tension in flexion-adduction-external rotation, and in extension-abduction-external rotation. The most relaxed position for the LCF is in 0° rotation (extension or flexion), whereas each kind of rotation (internal or external) tightens different sections of the LCF. The more the rotation gets, the more fibres are recruited. **Discussion:** This technique of examining the LCF offers the opportunity to evaluate the actions of the LCF during the full range of motion, and the tensioning of fibres in different positions, respectively. It is one of the first studies on the LCF performed in situ. The LCF gets tensioned in each form of rotation, independent of the flexion-extension. In flexion-adduction-internal rotation (impingement-position), the posterior fibres are strongly tensioned. The other positions show tensioning of different fibres, depending on the motion. This supports the theory of the mechanic stabilising effect of the LCF in hip joints.

## LECTURES FOR MEDICAL STUDENTS USING VIRTUAL PROJECTIONS

Adriana BOLEKOVA<sup>1</sup>, Darina KLUCHOVA<sup>1</sup>,  
Kvetuse LOVASOVA<sup>1</sup>, Jaroslav MAJERNIK<sup>2</sup>

<sup>1</sup>*Department of Anatomy, PJS University, Faculty of Medicine, Kosice, Slovak Republic.*

<sup>2</sup>*Department of Medical Informatics, PJS University, Faculty of Medicine, Kosice, Slovak Republic*

**Background:** The aim of this work is to report on the results of the innovation in teaching gross anatomy. Seeing that the imagination is one of the most difficult aspects in education of anatomy, our lectures are improved by presentation of 3D virtual models, with the aim of more effective and more illustrative education. **Materials and Methods:** 3D projection systems are based on principles of virtual reality and are presented in the lecture room. The students feel an existence of 3D space using specialized glasses. This virtual system consists of three components: large screen projection, teacher workstation and 3D camera. **Results:** The students' responses are very positive. However, the using of virtual projection is limited to lecture room. Due to this, the Department of Medical Informatics transformed education materials into the 2D pictures playable also outside the projection system. These can be equipped by audio and text comments and/or explanations of teachers. At the present, the movies are prepared according to the syllabus for Anatomy guaranteed by our department. **Conclusion:** This method uses a variety of sophisticated applications and it offers students the possibilities of more detailed study of human body, its organs and their topographical relations. Using 3D virtual projections they can easily understand the space relationships and synopsis of anatomical structures without the necessity of memorization, students increase self reliance on practical lessons as well. The innovation helps students to prepare for anatomy in a better way.

## ASSESSMENTS ON THE MORPHOMETRY OF THE AORTIC ARCH

P. BORDEI, A. BAZ, A.M. BĂRDAȘ, C. DINA,  
A.M. MANOLE

*Department of Anatomy, Faculty of medicine, University "Ovidius" Constanta, Romania*

**Aim of study.** Some assessments on the caliber of the ascending aorta and aortic arch by their measurement at different levels: at origin, in the middle portion of the ascending aorta, prior to the origin of the brachiocephalic trunk, posterior to the origin of the left subclavian artery. We also measured the distance between the ascending aorta and the descending portion of the aortic arch and the distance between the inferior face of the aortic arch and the pulmonary artery. **Materials and methods.** The study was performed on a total of 44 angioCT's, 32 male and 12 female cases. **Results.** The diameter at origin of the ascending portion of the aorta was between 25.8 to 37.6 mm in males and from 27 to 28.9 mm in females, with a difference between mean values of 2.73 mm for males. The diameter in the middle portion of the

ascending aorta was 26.1 to 38.5 mm in males and from 28 to 30.2 mm in females, with a difference between mean values of 4.34 mm for males. The aortic diameter prior to the origin of the brachiocephalic trunk was of 26.4 to 29.4 mm in males and from 25.8 to 37.5 mm in females, with a difference between mean values of 2.61 mm for males. The aortic diameter posterior to the left subclavian artery origin was 20.2 to 28.4 mm in males and from 21.3 to 24.1 mm in females, with a difference between the mean values of only 0.97 mm for males. The transverse distance between the ascending aorta and the descending part of the aortic arch was 33.9 to 38.5 mm in males and from 40 to 68.6 mm in females; this distance allows the classification into narrow, medium and large aortic arches. The vertical distance between the inferior surface of the aortic arch and the pulmonary artery was 3 to 12.5 mm in males and 7.5 to 11.1 mm in females. **Conclusions.** The differences in size between genders favor males with differences of 0.97 to 4.34 mm; the frequency of medium and large aortic arch shows a small difference in favor of females, of only 4.17% of cases.

## CLINICAL SIGNIFICANCE OF THE ENDING LEVEL OF THE ABDOMINAL AORTA

P. BORDEI, G. BUTOI, C. DĂNĂLACHE, C. IONESCU, D. ILIESCU

*Department of Anatomy, Faculty of medicine, University "Ovidius" Constanta, Romania*

**Aim of the study.** The assessment of the level of bifurcation of the abdominal aorta in relation with the vertebral column and with the origin of the inferior vena cava, in both sexes. **Materials and methods.** The study was performed by dissecting the adult and fetal human cadavers, by plastic injection followed by corrosion and/or dissection and the study of Doppler ultrasound and abdominal angiographies, simple and angioCT's. **Results.** In relation to the vertebral column, the abdominal aortic bifurcation was studied in 96 cases, finding it between middle 1/3 of the L3 vertebra and upper 1/3 of the L5 vertebra. The level of the aortic bifurcation related to the mid-vertebral line was assessed on 94 cases, finding that in 50 cases (53.19% of cases) it was to the left, in 26 cases (27.66% of cases) the bifurcation was located on the midline and in 18 cases (19.15% of cases), it was at the right of the midline. The deviation from mid-vertebral line ranged from 1-2 mm to 15 mm. In relation to the origin of the inferior vena cava, we followed the aortic bifurcation on 38 cases, finding that most often, in 27 cases, the aorta bifurcate above the level of origin of the inferior vena cava, with a distance between 2 to 45 mm. In 7 cases the aortic bifurcation was located below the origin of the inferior vena cava and in 4 cases the bifurcation was located at the same level. The subiliac angle was measured on 48 cases, and we found it 21.4 to 75.90° in males and 19.8 to 47.40° in females. **Conclusions.** Given the high frequency of pathology of these vessels (atherosclerosis, stenosis, aneurysms, thrombosis), it is absolutely necessary to know the normal anatomy of these vessels and the angiographic examination should precede any surgery in the region.