CROSS-SECTIONAL APPROACH TO ANATOMY pdf

1: The Radiology Assistant : Infrahyoid neck

I n contrast to the peripheral nerve location with paraesthesiae or neurostimulation, sonographic techniques provide real-time information on the cross-sectional anatomy of the examined area.

In this article we will focus on: Anatomy of the Infrahyoid Neck Surgical triangles The infrahyoid neck is the region of the neck extending from the hyoid bone to the thoracic inlet. Traditionally the anatomy of the infrahyoid neck has been subdivided into a group of surgical triangles whose borders are readily palpable bones and muscles figure. These triangles have a cranial-caudal orientation and therefore are difficult to correlate with cross-sectional imaging. Notice the musculus omohyoideus in the illustration. It is a group of four pairs of muscles in the anterior part of the neck: They are all attached to the hyoid bone and look like a strap. The other strap-muscles are not drawn in this illustration. The infrahyoid neck is separated from the suprahyoid neck by the hyoid bone arrow In the spatial approach to the anatomy of the infrahyoid neck, the cross-sectional anatomy is described as a series of spaces defined by the various layers of the deep cervical fascia. This facilitates the understanding and interpretation of cross-sectional imaging modalities like CT and MRI 1. Some of these infrahyoid spaces are continuous with the suprahyoid neck and some are continuous with the superior mediastinum. Spaces defined by the deep cervical fascia Spaces of the infrahyoid neck The infrahyoid neck is divided into 5 major anatomical compartments or spaces by the various layers of the cervical fascia 2. These spaces are well recognized in the axial plane and therefore suited for analysis on axial CT or MR. Visceral space Central compartment containing several viscera like the larynx, thyroid, hypopharynx and cervical esophagus. Carotid space Paired space just lateral to the visceral compartment which contains the internal carotid artery, internal jugular vein and several neural structures. Retropharyngeal space A small virtual space containing only fat continuous with the suprahyoid space and the middle mediastinum. Posterior Cervical Space Paired space posterolateral to the carotid space. It contains fat, lymph nodes and neural elements. Perivertebral space This large space completely encircles the vertebral body including the pre- and paravertebral muscles. On the left a CT image of a patient with massive subcutaneous emphysema after a motor vehicle accident. Air has dissected along the layers of the cervical fascia. Notice that you are able to find all five spaces - they are now outlined by air. Systematic approach The systematic approach to pathology in the infrahyoid neck is a three-step procedure: In which space is the lesion located? What are the normal contents of this space? What pathology arises from these contents and can we recognize a specific radiological pattern and does this correspond to the clinical information? Visceral space The visceral space extends from the hyoid to the anterior mediastinum and does not extend into the suprahyoid space. On the left the normal contents and derived pathology of the visceral space. The CT section is at the level of the supraglottic larynx and the thyroid cartilage. They are all connected to the hyoid and depress the hyoid bone and larynx during swallowing and speaking. These muscles are long and flat much like a strap. We will now continue with a few cases. Although we have provided the diagnosis in these cases, we still want you to follow the 3-step approach. Laryngocele On the left a patient with a swelling on the right side of the neck. Study the image and decide in which space the lesion is located. The swelling is centered within the borders of the thyroid cartilage. Therefore this must be pathology arising in the visceral space. Ilona Schmallfuss Step 2: Study the images and decide which structures in the visceral space are present at this level and which are not. The CT section shows the lesion present at the level of the supraglottic larynx and the thyroid cartilage. So we are much too cranial for trachea, thyroid gland, parathyroid glands and recurrent laryngeal nerve, which lies in the tracheo-esophageal groove. Paratracheal Level VI lymph nodes are located around the larynx and not within the larynx, so they can be ruled out. The hypopharynx is posterior to the lesion and has a normal appearance. Embryological remnants like thyroglossal duct cyst can be considered, but these are typically embedded in the laryngeal strap musculature and therefore should be located anterior to the thyroid cartilage. So the only normal anatomy from which this lesion could have arisen is the larynx. Pattern recognition This lesion presents as a cystic lesion with sharply defined, enhancing boundaries. The lesion is located in the supraglottic larynx in the right paraglottic space and also has an extralaryngeal component, which explains the

lump on the right side of the neck. At endoscopy a large submucosal swelling on the right was seen in the larynx. Squamous cell cancer, which is a mucosal disease, can therefore be dismissed. When we think about the radiological appearance of the four submucosal entities mentioned in the table on the left, we can make the following remarks: This lesion however has no calcifications. Primary laryngocele has no underlying cause. Secondary laryngocele arises due to pathology in the laryngeal ventricle, which is a slit-like opening between the true and the false vocal cords. A secondary laryngocele is frequently caused by a squamous cell carcinoma, as in this case. At endoscopy the tumor may be obscured by the laryngocele itself. Coronal CT image through the larynx with normal anatomy: Fluid-filled secondary internal and external laryngocele due to a small enhancing tumor in the laryngeal ventricle T obstructing the laryngeal ventricle. On the left side, an air-filled primary internal and external laryngocele. Mechanism of a laryngocele The laryngeal ventricle v is a slit-like opening between the false and true vocal cords image far left. It is the anatomic landmark between supraglottis and glottis. The ventricle extends laterally and then cranially into the paraglottic space. When the opening of the laryngeal ventricle is completely obstructed by tumor, the mucosa in the paraglottic space continues to produce fluid. This results in a fluid-filled internal laryngocele. Eventually the paraglottic space becomes filled up and the internal laryngocele will become external by extending outside of the larynx through the thyro-hyoid membrane. When the opening of the laryngeal ventricle is partially obstructed, a pressure-valve mechanism may result in an air-containing internal laryngocele which may, eventually, become external right image, red arrow. Squamous cell carcinoma On the left, a CT-image at the level of the thyroid cartilage. There is an irregular mass centered in the right piriform sinus. This mass is in the visceral space. In this region the most common tumor is a squamous cell carcinoma. This was proven at biopsy. Notice the retropharyngeal space yellow arrow. This is a virtual space containing only some fat. Squamous cell carcinoma 2 On the left, contiguous slices in a craniocaudal direction at the level of the larynx. Study this case, which is quite similar to a previously discussed case and then continue reading. Mass with fluid density on the right at the level of the supraglottic larynx, i. There is a small extralaryngeal component. Caudal to this laryngocele is a small enhancing tumor in the laryngeal ventricle red arrow. Biopsy revealed squamous cell carcinoma. On the left side there is an air-filled laryngocele blue arrow. The vocal cords v are normal. Multinodular goiter Strap muscles on right side yellow arrow and presumed position of strap muscles on the left blue arrow Multinodular goiter Step 1: Which space On the left a patient with a swelling on the left side of the neck, which has existed for years. The swelling is adjacent to the left lamina of the thyroid cartilage. The strap musculature seems to be draped over the lesion blue arrow. Therefore this lesion lies within the visceral space. Normal contents Analysis of the normal anatomical contents of the visceral space rules out many possible tissues and organs from which this pathology may arise: Larynx and hypopharynx This mass is located outside of the larynx and hypopharynx. The hypopharynx is slightly displaced due to the retropharyngeal extension of the mass and the lesion lies cranial to the trachea. Embryological remnants Remnants like thyroglossal duct cyst can be considered but these lesions are usually cystic. Paratracheal lymph nodes These are located outside of the strap musculature. Recurrent laryngeal nerve This nerve is located within the tracheo-esophageal groove. By exclusion we can say that this mass arises either from the thyroid gland or the parathyroid glands. Multinodular goiter with intrathoracic extention Step 3: Pattern recognition and clinical information On the chest film we notice a displacement of the trachea to the right by an upper mediastinal mass. So the mass is located within the visceral space and extends into the anterior mediastinum, since the trachea is located within the anterior mediastinum. It is well-defined towards the surrounding fat and there are a few scattered coarse calcifications. When we combine these findings, we recognize the radiological pattern of a benign multinodular goiter. This diagnosis is compatible with the clinical information that the swelling in the neck has been present for years. There was no enhancement on the post Gadolinium study not shown It is a midline cystic lesion, party external and partly internal to the hyoid bone and located in the visceral space.

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2: Duke University School of Medicine, "Cross-sectional Anatomy Tutor"

Fulfillment by Amazon (FBA) is a service we offer sellers that lets them store their products in Amazon's fulfillment centers, and we directly pack, ship, and provide customer service for these products.

VII VII The three vertical planes scissurae hosting the hepatic veins, and a transverse plane passing through the right and left portal vein branches are used to describe the segments of the liver 1, 5. The three vertical scissurae hosting the hepatic veins divide the liver into four sectors and a transverse plane passing through the right and left portal vein branches divides these sectors into the eight segments, which are numbered clockwise on the frontal view. These segments can be described in a straightforward approach by combining the definitions of two systems including the Bismuth, and Goldsmith and Woodburne systems Table 1. These liver segments, including the caudate lobe, can be described on the basis of this approach as follows: T1-weighted axial hepatic venous a and hepatic arterial dominant bâ€”e phase 3D-GE images acquired at different levels demonstrate the segments of liver, which are determined based on the distribution of diagonal planes lines hosting hepatic veins according to Goldsmith and Woodburne classification. T1-weighted axial hepatic venous a and hepatic arterial dominant bâ€”e phase 3D-GE images acquired at different levels demonstrate the segments of liver, which are determined based on the distribution of diagonal planes hosting hepatic veins lines and transverse planes hosting portal veins according to Bismuth classification. Left Lateral inferior segment. Left lateral superior segment. Left medial superior segment. Left medial inferior segment. Right anterior inferior segment. Right posterior inferior segment. Right posterior superior segment. Right anterior superior segment. In the Bismuth system, each segment has an independent vascular supply, including arterial, portal, and venous supplies, as well as independent lymphatic and biliary drainage 1â€”5. The caudate lobe has been described as a separate sector in the Bismuth system 1, 5. The caudate lob or segment I is located posteriorly, and positioned between the fissure for ligamentum venosum, the inferior vena cava IVC , and porta hepatis Figure 1. It is anatomically different from other segments as it may often have direct connections to the IVC through hepatic veins, which are different from the main hepatic veins 1, 5. The caudate lobe may also be supplied by both branches of the right and left hepatic arteries, and both branches of right and left portal veins 1, 5. The corresponding branches of the hepatic arteries, portal veins, and tributaries of the bile ducts are intra-segmental and serve the corresponding segments of the liver by traveling together, while the hepatic veins run independently and are located inter-segmental 1, 5. The hepatic arteries, hepatic veins, portal veins, and bile ducts demonstrate frequent variations which may affect surgical procedures in liver transplantations and liver resections. Normal variations of the liver segments Only gold members can continue reading. Log In or Register to continue Share this:

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3: Anatomy: A Definition

Start studying CROSS SECTIONAL ANATOMY. Learn vocabulary, terms, and more with flashcards, games, and other study tools.

Download To view all publication components, extract i. This publication predates our implementation of the Educational Summary Report in and thus displays a different format than newer publications. This module serves as a learning guide to normal cross-sectional anatomy of the head and neck for preclinical students enrolled in clinically-oriented human anatomy. The module was created from a series of digitized images of head and neck anatomical cross-sections available in the Texas Tech University Health Sciences Center anatomy laboratory that were converted into interactive roll-over files using Adobe Flash. This self-directed learning module was designed for students in medical school or comparable curricula. This learning module is best used in conjunction with a dissection-based anatomy course to reinforce the didactic and practical experiences. During orientation to gross anatomy, students are provided an in-person demonstration for how to access the online learning modules and use them to study and self-assess. Students also have access to the physical cross-sections and labeled keys in the laboratory. There are nine cross sections and associated Flash files for sections of head and neck taken from superior to inferior. The same unlabeled images were also used on laboratory quizzes, practicals, and written examinations. Effectiveness was evaluated during the initial years of deployment. Students reported satisfaction with having well-defined study materials for learning cross-sectional anatomy. Some students felt the images were helpful in understanding the three dimensional relationships encountered during dissection. These qualitative observations were supported by improvements in average learner performance on anatomy exams during the first year of implementation, These scores were significantly higher than those recorded prior to implementation of instructional technology into the curriculum. The assignment of the digitized Flash images for self-directed learning has optimized class time. The module promotes active self-directed learning by providing concise study materials to assess knowledge of locating and identifying structures in cross-section images with immediate feedback. Now students spend scheduled class time in active dissection. This approach also addressed the paucity of qualified teaching faculty in the dissection laboratory. Learning cross-sectional anatomy not only enhanced understanding of three dimensional relationships during dissection, but also prepares the students for using cross-sectional imaging modalities such as CT and MRI in their clinical years. Keywords Educational Objectives By the end of this session, learners will be able to: List the key structures in the head and neck that can be visualized in anatomical cross sections. Identify key structures in the head and neck anatomical cross section images. Describe the relationship of key structures of the head and neck that can be visualized in anatomical cross sections i.

4: Cross-Sectional Anatomy | Medical Books

Cross-sectional anatomy is based on three-dimensional gross anatomy that is viewed in a two-dimensional axial plane - it is essential that you have, or are concurrently developing, a through understanding of human gross anatomy.

5: About NetAnatomy

The cross-sectional anatomy of the normal adrenal gland is identical on CT and MRI. The right adrenal gland lies more cranially in the abdomen than the left adrenal. It is superior to the upper pole of the right kidney, whereas the left adrenal gland is anteromedial to the upper pole of the left kidney.

6: Duke Med Curriculum Materials Development

The goals of the radiology module in the gross anatomy course are. To gain a thorough understanding of

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three-dimensional relationships by learning anatomy in various imaging modalities, especially cross sectional imaging.

7: Approaching Cross-Sections

Offering a cross-sectional approach that includes SEO, desktop and mobile-friendly site creation, directory listings, and more, Prospect Genius's Web advertising campaign works to make sure that Murphy's Appliance Heating & Cooling can be found easily and quickly by Englewood-area residents who are looking for professional appliance repair and HVAC services.

8: Wrist and Hand | Clinical Gate

Full text Full text is available as a scanned copy of the original print version. Get a printable copy (PDF file) of the complete article (83K), or click on a page image below to browse page by page.

9: Head and Neck Cross-Sectional Anatomy Learning Module

It is now common to precede the word anatomy with an adjective that defines the mode of observation, e.g., gross anatomy or microscopic anatomy, that defines a particular field of anatomical interest, e.g., developmental anatomy or neuroanatomy, or that defines the approach one takes in the study of the body, e.g., regional anatomy (by body.

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