Learning outcomes

Knowledge of the physical principles, technical aspects and clinical application of the ultrasound waves and of the alternative imaging technologies in medicine. In particular the students should be able to understand the image formation and the modes of echo display. Knowledge and the significance of the artifacts. To describe the basic interpretation paradigms for the normal structures of the small and large animals. The students will be able to read images and interpret the main abnormal echographic findings.

Course contents

Basic principles of the ultrasound: wavelength, frequency and propagation velocity. Transducers. Scanner controls. Modes of echo display: A-mode, B-mode, M-mode, realtime B-mode. Interation of sound with tissues. Image orientation, interpretation and terminology. Doppler: physical principles, pulsed, continuous, color and power Doppler. Interpretation of the Doppler spectral display. Artifacts: identification and knowledge of the formation mechanism. Ultrasound guided biopsy. Clinical application of ultrasound in small and large animals. The abdomen: liver, spleen, stomach and duodenum, pancreas, small intestines and colon, kidneys, adrenal glands, urinary bladder, prostate, uterus and ovaries, abdominal lymph nodes, abdominal vessels. The neck: main vessels, thyroid gland, lymph nodes, salivary glands. The torax: mediastinum and diaphragm, pleural structures and pulmonary diseases. The heart: echocardiography, normal examination. The main echocardiographic M-mode and B-mode measurements. The evaluation of cardiac function.

Review of properties of x-rays. The basic concept of making a radiograph. Scatter radiation and grids. Image receptors: the cassette, intensifying screens, x-ray films. Film identification. Film processing. Contrast media. Iodine and barium preparations. Negative-contrast agents. Hazards of ionizing radiation and practical application of radiation safety. Radiographic positioning for small and large animals. Visual perception and radiographic interpretation. Thorax of companion animals and of equidae. The larynx and trachea. The esophagus. The thoracic wall. The diaphragm. The mediastinum. The pleural space. The heart and great vessels. The pulmonary vasculature. The lung. Abdomen of companion animals. The peritoneal space. The liver and spleen. The kidneys and urinary bladder. The prostate and uterus. The stomach, small and large bowel. Contrast studies of gastrointestinal and urinary system.

Reminders on the appropriate terminology regarding the radiographic projections in orthopedic of the small and large animals. Radiographic appearance of the normal long bone : epiphysis, diaphysis, growth plate, metaphysis, cortex, medullary cavity, trabecular bone and subchondral bone, periosteum, nutrient foramen, vascular channels. Position/distribution of the lesion, radiopacity, margins delineation, type of osteolysis, type of periosteal reaction, involvement of the adjacent soft tissues, evolution of the lesion, criteria of aggressivity, fractures, fractures healing, healing complications. Osteomyelitis, sequester, hypertrophic osteodystrophy, bone neoplasms, hypertrophic osteopathy. Radiographic appearance of the joint, cartilage, capsule, ligament and meniscus, fat pad, joint space, sesamoid bones. Radiographic appearance of the principal joint diseases. Osteoarthrosis, arthritis, osteochondrosis, dysplasia, luxation/subluxation, joint neoplasms.

List of the limiting factors encountered in radiography of exotic animals. Description of the standard radiographic projections of the small mammals, birds and reptiles. Main anatomic characteristics of the rabbit, furet, birds and reptiles. Identification of the most common pathologies in exotics.Basic physical principles of computed tomography, magnetic resonance imaging, nuclear medicine and their indications.

Readings/Bibliography

Atlas of small animal ultrasonography

Dominique Penninck e Marc-André d'Anjou

Blackwell Publishing Ed. - Ames Iowa USA 2015

Textbook of Veterinary Diagnostic Radiology.

Thrall D.E.:

W.B. Saunders. Philadelphia. VI° Ed. 2013

Teaching methods

Lectures using app. *Poll Everywhere;* clinical cases and US laboratories; *Moodle* Platform.

Assessment methods

Multiple choice test during the labs and final oral examination of a radiographic study of a normal or pathological subject and a ultrasound study of a normal or pathological subject.

Teaching tools

Clinical cases