ULTRASOUND OF EMERGENCY CASES
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The purpose of this lecture is to present the new trends and applications of ultrasonography (USG) in the small animal veterinary emergency setting. Ultrasonographic findings of each clinical condition mentioned here are widely available in the literature and beyond the scope of this presentation.

The demand for ultrasound in emergency medicine is growing as clinicians become increasingly aware of its diagnostic potential. Major advances in the technology of ultrasound have given the clinician a diagnostic advantage. The major goals of the critical care/emergency clinician should be the early recognition and treatment of medical and surgical conditions before irreversible organ damage occurs. Real time USG provides veterinarians with a rapid, noninvasive assessment of multiple organs structure and function (cardiac).

Different from searching for the definitive accurate diagnosis, USG in the emergency setting has the main purpose of recognizing potentially treatable life-threatening conditions. Ultrasonographic findings often dictate the need for specific management and/or surgical therapy. Results of this exam are often critical in making the correct and fast decision for an animal. An experienced medical surgeon uses to say: "You can miss the diagnosis but not the right approach". As an example: for a large middle-age dog suddenly prostrated and with a palpable abdominal mass, the early recognition of hemoperitoneum is more important than characterizing the mass, specific tumor type and signs of metastasis. Occasionally, we may establish the diagnosis and the best approach, as in intestinal intussusception or pyometra.

Patients hit by car and suffering from blunt abdominal trauma can benefit from emergency USG for hemorrhage detection still during the golden hour and be taken (or not) to surgery as soon as possible. Patients in the intensive care unit (ICU) are often immobile and encumbered with fluid lines, O2 supplementation, etc. Portable ultrasound machines allow the ultrasonographic study to be made bedside with minimal disturbance to the patient, no need for transportation and moving of members of the clinical team.

In human medicine, emergency USG is now considered in many countries a subspecialty of diagnostic imaging. These professionals often train surgical, clinical and ER residents on the recognition of the most common potentially fatal diseases that require immediate intervention.

Two types of emergency USG can be performed and both of them have advantages and disadvantages which have caused great debate among the medical scientific community. The most accepted form is the emergency USG performed by board certified and experienced sonographers/radiologists, with big equipment, dark lightening on a quiet comfortable room in the imaging department where a complete and detailed abdominal exam is made.

Bedside emergency USG, done with portable (sometimes hand or belt-held) machines, in the noisy and lights on emergency ward, ICU bed, road shoulder or helicopters is performed by trained paramedics, surgeons, residents or ER physicians. These professionals receive a training course on USG with variable duration, to be prepared to recognize eight common life-threatening conditions in human patients. The exam is highly focused and needs a yes-no answer to a simple question: Is there pericardial effusion? Is there blood in the abdomen? Is there evidence of obstructive uropathy?

Bedside emergency USG done in the ER by non-imaging professionals gained attention and is now done in many human hospitals ERs all around the world for one main reason as defended by ER physicians and residents: emergency ultrasound services are not widely available after regular business hours. In-house ultrasound services 24 hours a day were reported to be uncommon even in large teaching medical institutions in the United States. There are strong disagreement between radiologists and emergency physicians regarding the clinical value of ultrasound in the emergency department. One study showed that in the United States the vast majority of radiologists rejected the idea of emergency ultrasound done by physicians in the ER; other studies showed great improvement in patient care, lesser delay for surgical indication, lower costs and more rational use of hospital resources and other imaging modalities after the implementation of bedside USG in the ER.

Apparently, in veterinary medicine we have not got to that point of discussion yet, but we sure will. Good quality portable and affordable ultrasound machines are widely available in the market and as defended by some human ER physicians: "radiologists and sonographers can not fence their turf". Even in the ER TV series we can notice that they have replaced diagnostic peritoneal...
lavage for ultrasound guided paracentesis done by the emergency attending surgeon or resident in trauma patients. Veterinarians will get there.

Little has been written about veterinary emergency USG, either formal or bedside. We have been doing emergency ultrasound for 8 years now, both formal examination and bedside (depending on the patient’s condition), done by radiologists only. Emergency USG examination has showed to be an invaluable tool in the ER for traumatic and non-traumatic abdominal and thoracic conditions of dogs and cats. Clinical contribution may be to the diagnosis, therapeutic decision (clinical or surgical), recognition of secondary potentially fatal complications, rational selection of other exams, cost reduction and interventional USG-guided emergency therapeutic or diagnostic procedures.

**Abdominal Conditions / Diseases:**

- Pancreatitis
- Pyometra / hemometra / fetal death
- Prostatic abscess
- Obstructive uropathy (kidney / ureter)
- Biliary obstruction
- Hemoperitoneum
  - Mass rupture
  - Blunt abdominal trauma
  - Surgical complication
- Indirect signs of peritonitis (sentinel signs)
- Intestinal intussusception
- Linear FB

**Thoracic Conditions / Diseases:**

- Pleural effusion
- Pericardial effusion

**Interventional Emergency Guided Procedures**

(diagnostic/therapeutic/temporization)

- Thoracocentesis
- Pericardiocentesis
- Pyelocentesis
  - Diagnostic
  - Hydronephrosis temporization
- Paracentesis
- Cystocentesis
- Prostatic abscess drainage
  - Diagnostic
  - Temporization

Emergency USG may replace or delay the need for radiographic examination of the abdomen in circumstances such as: pancreatitis, pyometra, intussusception or blunt abdominal trauma. We emphasize that for some clinical conditions, the radiographic examination (with or without contrast techniques) must be done:

- Vomiting (R/O TGI FB, TGI perforation, bowel obstruction)
- Suspect urinary rupture (IVP and/or retrograde uretrocystography.)
- Suspect uretral obstruction
- Thorax in trauma and dyspnec patients

**References:**

HELLER, M & JEHLE, D In: Ultrasound in emergency medicine. WB Saunders Co. 1995

