Diagnostic Tools: Equine Dentistry

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Equine Field Service Clinician
Objectives

• Know 3 useful diagnostic tools.
• What is most important aspect about dental radiology?
• Know 3 standard radiographs of equine skull.
• Know landmarks of taking radiographs of cheek teeth
• Importance of Scintigraphy for dental disease
• Know Computed Tomography general uses of algorithms for dental diagnostics
Dental Exam
Oral Endoscopy

• Exploration, visualization, magnification and recording of lesions
• Flexible fiberoptic or videoendoscope
• Rigid telescope (laparoscope)
  – 40-50 cm telescope with 30-90° viewing angle
Dental Stick (by Dr. Fritz)
Dental Stick

- Detailed exam
- 90 degree camera
- Record medical record
- Educate owners
- Educate Students
Upper Respiratory Endoscopy

- Unilateral Nasal Discharge
  - Sinus disease
    - Nasomaxillary opening
- Mass
  - Neoplastic
  - Foreign Body
Dental Imaging

• Radiography
  – superimposition
    • 2-D image of 3-D structure
  – Most important
    • Technique/Radiology Safety
Radiology

• Technique/Safety
  – Patient prep
    • Heavy Sedation (α-2 agonist – add butorphanol?)
    • Rest nose (stool or head stand)
    • Fabric halter (no metal)
Radiology

• Technique/Safety
  – Patient prep
    • Lidocaine spray in the mouth for intraoral radiographs
      – A few minutes
Radiology

• Technique/Safety
  – Imaging system
    • Fast screens (rare-earth screens)
      – Less motion/less exposure
    • Computed systems (CR)/Direct Digital Radiographs (DR)
      – High quality able to adjust factors
        » Brightness, contrast, and magnification
Radiology

• Uses
  – Periapical dental disease
  – Head trauma
  – Developmental abnormalities
  – Periodontal disease
Radiology

• Standard Radiographs
  – Lateral
  – Lateral oblique
  – Dorso-ventral
Radiology

• AVDC/AVD convention
  – image as looking at the horse.
  – When presenting the image of the right arcades (100 & 400) the horse’s nose should be pointing to the viewer’s right.
  – nose should be pointing to the viewer’s left when presenting the image of the left arcades (200 & 300)
  – Maxillary incisor radiographs should be oriented with crowns pointing down, with 100s on the left.
  – Mandibular incisors should be oriented with crown pointing up, and with 400s on the viewer’s left.
Radiology

- **Regions**
  - Incisors/canines
    - Intra-oral
    - Lateral
  - Sinus
    - Lateral/Lateral oblique
  - Maxillary cheek teeth
    - Lateral/Lateral oblique
  - Mandible cheek teeth
    - Lateral/Lateral oblique
  - Skull
    - Dorso-vental
  - Cheek teeth occlusal aspect
    - Open-mouthe oblique
Radiology

- Off set mandibular arcade DV
  - Offset wood blocks for incisor
Radiology

• Incisors/Canines
  – Intra-oral
    • Smallest cassette
    • In-between incisors and caudle as much as possible
    • 60-80° from dorsal plane (hard palate)
    • Center on -01 teeth (unless other focus)
  – Lateral
    • Adding 5-10° rostro-caudal may help separate canines
Radiology

• Position is key
  – Facial Crest, Diastema, and Medial Canthus of Eye
  – Area of interest against plate
Radiology

• Oblique radiographs
  – dorsolateral-ventrolateral (Maxillary apical area)
  – ventrolateral-dorsolateral (Mandibular apical area)
  – Open mouth oblique
  • Occlusal surface (both maxillary and mandibular cheek teeth)
Radiology

• Open mouth oblique (maxillary cheek teeth)
  – Apical region
    • 30 degrees DV (beam-apical region maxillary cheek teeth)
    • 60 degree DV (view through interarchade space)
  – Crown region
    • 30 degrees VD (beam-crown region maxillary cheek teeth)
Radiology

• Open mouth oblique (mandibular cheek teeth)
  – Apical region
    • 30 degrees DV (beam-apical region mandibular cheek teeth)
  – Crown region
    • 30 degrees VD (beam-crown region mandibular cheek teeth)
    • 15 degree DV (view through interarchade space)
Radiology

• Monday Lab:
  A. Highlight apical root area of 409 (best shot)
  B. Highlight occlusal surface of 207 (best shot)
Radiology

• Monday Lab:
  A. Highlight apical root area of 409 (best shot)
Radiology

• Monday Lab:
  A. Highlight apical root area of 409 (best shot)
Radiology

• Monday Lab:
  B. Highlight occlusal surface of 207 (best shot)
Radiology

• Monday Lab:

B. Highlight occlusal surface of 207 (best shot)
Which one?
Radiology

• Contrast
  – Draining Tract
    • Paper clip
    • Dull probe
    • Barium
  – Area of interest marker
Scintigraphy

• $^{99m}$ Technetium ($^{99m}$Tc)
  – Bound to phosphate (bone remodeling)
  – Detects active physiological process
    • Periapical infections
    • Other skull lesions
  – Motion causes distortion (blurring)
Computed Tomography

• Cross section images of tissue
  – Contrast of bone and soft tissue
  – Localize/specific area of interest (equine head)
    • Fractures
    • Dental disease
    • Infection
    • Neoplasia
Computed Tomography

• Algorithms
  – Soft-tissue
  – Bone/tooth (higher resolution)
    • Can separate out cementum, enamel, and dentin

• General anesthesia
  – New: Standing sedated CT head

• 2-D and 3-D images
  – 3-D requires special table to move head through the machine
Computed Tomography
What’s great about CT?

• You can see thru stuff
• A narrow x-ray beam produces signals cross-sectional images or “slices” of the anatomy
• 3-D images can be formed
  – 3-D printers!
• “Human” tables will not work with horse weights; but the table is critical, as it is set to move the selected slice distance
• Bigger tables are made to accommodate the weight and move appropriately
Equine computed tomography (CT)

Elizabeth M. Santschi DVM, DACVS
What is CT?

Basically a spinning radiograph generator and detector
3D reconstruction

• Can be very helpful to surgeons to plan internal fixation, determine the extent of tumor, trauma or infection, and to find foreign bodies
3-D printer
Magnetic Resonance Imaging

• Useful for soft-tissue imaging
  – Not ideal for dental imaging
  – Periodontal disease
    • Looking at Periodontal Ligament

Moon et al, 2013
MRI-Equine
Questions
MacGyver

• Build your own
  – Radiograph Halter system
  – Dental oral block