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INTRODUCTION
The diagnosis of diseases of the paranasal sinus system in the horse presents a challenge to the clinician. Most horses suffering from paranasal sinus disease present with a similar spectrum of clinical signs, including unilateral nasal discharge, epiphora, facial swelling, decreased nasal airflow and malodorous breath. Clinical examination and radiography are usually sufficient to confirm the presence of a sinus disorder. The diagnostic challenge lies in establishing the aetiology and pathogenesis of the sinus disease. To achieve this additional diagnostic methods are required to determine the nature, size, location and chronicity of primary and secondary disorders. This information is essential for prognosis and choosing the correct treatment. These diagnostic methods include direct visualisation of the sinuses after trephination, histopathological and microbiological analysis of sinus content and advanced imaging modalities, such as scintigraphy and computed tomography.

RADIOGRAPHY
The sinuses are air-filled structures surrounded by thin bones, and therefore providing excellent radiographic contrast, which means a portable x-ray unit is perfectly adequate. Disease processes usually result in the presence of fluid or soft tissue masses within the sinuses. The laterolateral projection provides a good overview. It results, however, in superimposition of the sinuses and the nasal cavity, making it difficult to determine which structures are affected. Oblique and ventrodorsal radiographs allow separation of the sinuses and nasal cavity. These projections are more difficult to obtain and often require heavy sedation (Gibbs et al. 1987). Oblique radiographs with higher exposures are required if dental involvement is suspected (Lane et al. 1987). Radiography has satisfactory specificity, but low sensitivity, in the diagnosis of periapical abscesses (Weller et al. 2001). One particular problem in horses that have developed secondary sinusitis is that the tooth roots may be obscured by pus in the sinus. Repeat radiography after drainage of the sinus often improves radiographic appearance of tooth roots. The main radiographic signs of sinusitis include horizontal fluid lines and soft tissue opacities within the sinuses. Radiographic changes observed in periapical abscesses of the maxillary cheek teeth are: clubbing of the affected tooth root, loss of the definition of the lamina dura, increased opacity around the tooth root. A detailed description of radiographic changes in the equine head is provided by Wyn-Jones (1985).

The identification of maxillary and frontal fractures - especially if nondisplaced - is often challenging. Fracture lines are visible only if they are oriented on a tangent to the direction of the x-ray beam. Visualisation may therefore require multiple, lesion-orientated projections. In some cases a fluid line in the frontal portion of the conchofrontal sinus is visible due to haemorrhage following the trauma. In some horses the fracture can only be identified radiographically once new bone formation has occurred.

Radiological interpretation of the equine skull is generally challenging due to the superimposition of a multitude of structures with similar radiodensity (Wyn-Jones 1985). Intranasal and intraoral radiographs reduce superimposition and have shown promising results in pilot studies (Barakzai and Dixon 2003).

SCINTIGRAPHY
Scintigraphy is the only imaging modality available for horses that images metabolism instead of morphology. After i.v. injection of a radiopharmaceutical (technetium99 phosphonate in musculoskeletal applications at doses of GBq/100 kg) the area of interest is imaged with a gamma camera and the radioactivity registered.

A recent study investigated the use of scintigraphy in horses with paranasal sinus disorders (Barakzai et al. 2006). Equine primary sinusitis has been associated with a diffuse increase in uptake in both primary and secondary sinusitis. In more than 50% of horses diagnosed with primary sinusitis focal areas of marked increase in uptake were observed, presumably caused by localised areas of bone remodelling. This resulted in false-positive diagnosis of dental sinusitis when the uptake was located close to tooth root apices. Scintigraphy proved to be useful, however, for ruling out periapical disease in many cases of primary sinusitis where there was no focal uptake over cheek teeth apices. Surprisingly in this study radiography was more sensitive (85% vs. 79%) and less specific (79% vs. 92%) than scintigraphy.
It has been demonstrated that horses with dental disease show significant increase in scintigraphic activity over the affected tooth compared to the contralateral tooth, with a typical pattern for different diseases. The sensitivity of scintigraphy was excellent (95.5%), whereas the specificity was moderate (86.4%). In contrast, radiography had excellent specificity (95.0%) and a low sensitivity (51.5%). The greatest sensitivity and specificity were achieved by evaluating radiographs and scintigrams together. The objective scintigraphic density ratios were found to be significantly different between diseased and control horses. The results of this study suggest that, if a density ratio of 1.5 or greater between a suspected diseased tooth and its contralateral number is regarded as abnormal, only 1% false positive diagnoses and 20% false negative diagnoses will occur (Weller et al. 2001).

REFERENCES

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