Short Communication
Endoscopic Diagnosis of Some Oro-dental Disorders in Donkeys (Equus asinus)

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Abstract

Background and Objective: Oro-dental disorders are serious conditions in donkeys and their early diagnosis is essential for prevention of further progression and successful treatment. This study was aimed to investigate the usefulness of the flexible oral endoscopy as a diagnostic modality for some oro-dental disorders in donkeys. Methodology: During 2016, 25 donkeys with various oro-dental clinical signs were subjected to a routine oral examination at the surgery clinic. These donkeys aged 1-8 years and included 20 males and 5 females. Under general anesthesia, full visual, manual and endoscopic examinations of the gingiva, teeth, hard palate, soft palate and tongue were carried out. The visual and manual examinations were carried out with the aid of a strong headlight, long handled equine dental mirror and mouth gag. Oral endoscopic examination was performed for detection of any abnormal lesion by using video endoscope, protected with a rigid metal sheath and recorded onto an analogue videotape. Results: All donkeys had either single (N = 3) or mixed (N = 22) oro-dental disorders. The recorded oro-dental disorders included; periodontal disease (88%), dental tartar (80%), diastema (68%), dental carious (40%), sharp teeth (36%), wounds of hard and soft palates (16%), oral candidiasis (16%), gingival wounds (12%) and impacted deciduous tooth (4%). All endoscopic findings of these disorders were recorded. Conclusion: The oro-dental disorders are common in donkeys and this study discovers the beneficial role of endoscopy in diagnosis of these disorders.

Key words: Dental tartar, diastema, dental caries, Oral candidiasis, periodontal disease, sharp teeth

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.
INTRODUCTION

High populations of donkeys are distributed all over the world, especially in Egypt, which has 1.6 million donkeys\(^1\).

In many countries, oro-dental disorders in equine are very common welfare problems, especially in donkeys\(^2\)\(^-\)\(^5\). Previous studies have been investigated that donkeys are very stoic animals and a high population of them suffers from various asymptomatic oro-dental disorders\(^6\).

Congenital defects and the management regime enforced through domestication are the most common causes for development of oro-dental disorders\(^7\).

Although there are significant advances in oral examination of donkeys on the last decade\(^6\), a complete visual examination especially the caudal oral structures remains difficult. This difficulty is due to the small mouth opening, long oral cavity, large and powerful tongue that hinders visualization and restricted buccal space with tight adherence of the cheeks and skin to the skull\(^8\)\(^-\)\(^9\). Recent diagnostic tools including radiography\(^3\), sinoscopy\(^9\), gamma scintigraphy\(^10\) and computed tomography\(^11\) have been used with some limitations for diagnosis of oro-dental disorders in donkeys. Therefore, intra-oral endoscopy has been suggested as a more specific and sensitive diagnostic tool than other conventional examination methods, particularly for disorders of the caudal oral cavity\(^12\).

This study was designed in order to facilitate the early and efficient diagnosis of the oro-dental disorders in donkeys. To achieve this target, the authors hypothesized that endoscopy could play an important role in the diagnosis of oro-dental disorders in donkeys which will greatly help the veterinarians in the practice. Therefore, this study was designed to determine the role of oral endoscopy as a new diagnostic tool for oro-dental disorders in donkeys.

MATERIALS AND METHODS

Animals: The study was carried out on 25 donkeys during the period extending from January to December 2016. These animals included 20 males and 5 females. The age of these donkeys ranged between 1 and 8 years. These donkeys were admitted to the surgery clinic at Faculty of Veterinary Medicine, Cairo University, Egypt. All of the donkeys had common signs of oro-dental disorders including; loss of appetite, loss of weight, disturbed mastication, prolonged food intake, excessive salivation, halitosis and quidding.

Clinical examination: Under general anesthesia using intravenous administration of Xylazine HCl (Xylajet\(^\text{®},\) ADWIA, Egypt) at a dose of 1 mg kg\(^{-1}\) b.wt., and Thiopental sodium (Thiopental sodium\(^\text{®},\) EPICO, Egypt) at a dose of 5 mg kg\(^{-1}\), full visual and manual examinations were carried out for gingiva, teeth, hard palate, soft palate and tongue. The visual and manual examinations were carried out with the aid of a strong headlight, a long handled equine dental mirror and a mouth gag.

**Endoscopic examination:** Before video endoscopic examination, the mouth was washed several times with water for good images. Under the same general anesthesia, oral endoscopic examination was performed for detection of any abnormal lesion by using video endoscope, protected with a rigid metal sheath and recorded onto an analogue videotape. The endoscopic images were captured for oral cavity of the examined donkeys using video-endoscopy unit (Eickemeyer-China) supplied with halogen light source (Vet Lux-150 Watt) and insertion tube (3 m length). The endoscopic examination was begun with incisors, canines, hard and soft palates, the occlusal and caudal surfaces of the cheek teeth, gingiva and tongue.

**Laboratory diagnosis:** Samples were collected from the oral ulcerative lesion for detection of Candida species.

Quantitative samples cultures were collected by sterile swap from the oral ulcerative lesions using standard laboratory methods. Colonies suspicious for Candida spp. were identified using CHROMagar\textsuperscript{™} Candida plates (Laboratorios Conda, Biotech Spain) according to the manufacturer’s guidelines, Isolates were then identified to their species level with the RapID\textsuperscript{™} Yeast Plus system (Remel, KS).

**Treatment:** All donkeys were treated either with conservative or surgical treatment as usual.

RESULTS

The results of the present study revealed that all of the presented donkeys (25) suffered from either single (N = 3) or mixed oro-dental disorders (N = 22). The recorded oro-dental disorders and their prevalence were collected in (Table 1).

**Teeth disorders:** Periodontal disease was the most common disorder in the examined donkeys. It was reported in 22 donkeys representing 88% of the total examined donkeys. All stages of the periodontal disease with various degrees of dental tartar were recorded in the examined animals (Fig. 1a). Dental tartar was recorded in 20 donkeys representing 80% of
Table 1: Prevalence of oro-dental disorders in the examined donkeys

<table>
<thead>
<tr>
<th>Disorders</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodontal disease</td>
<td>22</td>
<td>88</td>
</tr>
<tr>
<td>Dental tartar</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>Diastema</td>
<td>17</td>
<td>68</td>
</tr>
<tr>
<td>Dental caries</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Sharp teeth</td>
<td>9</td>
<td>36</td>
</tr>
<tr>
<td>Wounds of hard and soft palates</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Oral candidiasis</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Gingival wounds</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Impacted deciduous tooth</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Sharp teeth were observed in 9 donkeys representing 36% of the total examined donkeys. Oral endoscopy revealed sharpness in the buccal surface of the upper cheek teeth and lingual surface of the lower cheek teeth (Fig. 1a, d). Additionally, oral endoscopy showed several lacerations in the oral cavity.

Oral endoscopy in a 2-year-old female donkey showed impacted (unerupted) deciduous 3rd incisor (corner) tooth with swelling and ulceration at its site (Fig. 1f).

**Hard and soft palates disorders:** Hard palate candidiasis was clearly seen by oral endoscopy in 4 donkeys representing 16% of the total examined donkeys. The age of the affected donkeys was 1-3 years. Brownish ulcerative lesions were seen at the hard palate of the affected donkeys (Fig. 2a). Laboratory investigation of the collected samples revealed green colonies of *Candida albicans* (Fig. 2b).

Recent wounds of the hard and soft palates were clearly observed by oral endoscopy in 3 donkeys representing 12% of the total examined donkeys. These wounds were either single (Fig. 2c) or multiple (Fig. 2d). Old ulcerative wound was also seen during oral endoscopy in a female donkey representing...
4% of the total examined donkeys (Fig. 2e). Laboratory investigation revealed no Candida albicans in this ulcer.

**Gingival wounds:** Oral endoscopy revealed gingival wounds in 3 donkeys representing 12% of the total examined donkeys. All of these wounds were recent (Fig. 2f).

**DISCUSSION**

In the present study, oral endoscopy was used successfully for diagnosis of periodontal disease, dental tartar, diastema, dental caries, sharp teeth, oral candidiasis, wounds of hard and soft palates, gingival wounds and unerupted tooth in donkeys. The use of endoscopy is easy, quick and accurate technique for diagnosis of disorders in equine. Additionally, highly detailed images are obtained by oral endoscopy due to the high magnification of the endoscope. Moreover, oral endoscopy facilitates close examination of the intra-oral structures and spaces which are difficult to access by other tools. The only limitation is the inability of endoscopy to diagnose the disorders of apical and alveolar portions of teeth. Radiography has traditionally interest for diagnosis of the disorders of the invisible portions of teeth. In this respect, other imaging techniques such as scintigraphy and computed tomography have several difficulties and inaccurate diagnosis for intra-oral structures.

In contrast to Giorgis et al. and Dixon et al., who recorded dental disorders in the too old animals, the age of the presented donkeys in this study ranged between 1-8 years. This could be attributed to green grass and short fiber diet which were given to the examined donkeys. This type of diet helps in development of several dental disorders.

In the current study, periodontal disease and dental tartar were the most common disorders in donkeys. These disorders mainly involved cheek teeth. Similar findings were reported in previous studies. The high prevalence of periodontal disease in the examined donkeys was attributed to periodontal food impaction adjacent to dental tartar and diastema. This is in agreement with the results of a previous study.

A diastema is a space between two teeth, most commonly between the incisors and molars. The food is forced into this space and decayed causing gingivitis and ultimately leading to periodontal disease in the surrounding teeth. In the present study, diastema was very common (68%) in the live examined donkeys. Du Toit et al. and Dixon et al. found cheek teeth diastema in 85% of old dead donkeys. This difference in incidence is due to under diagnosis of diastema in live equine as it can be difficult to visualize. Only 41.2% of diastema included incisors and 58.8% included maxillary and mandibular cheek teeth. Similar findings were reported before.
Regarding dental caries, it was identified mainly at the masticatory surface of cheek teeth. This is due to the uneven masticatory surface which keeps the food for long time and consequently decaying of the tooth occurs. This agrees with the previous results\textsuperscript{19}. Borkent and Dixon\textsuperscript{20} classified dental caries in equine into; peripheral dental caries and infundibular dental caries, with peripheral caries appearing to be increasingly recognized.

Sharp teeth were reported in 36% of the total examined donkeys. This high incidence is due to anatomical consideration, maxilla is wider than mandible and feeding of the donkeys on soft food and green grass for long time. These sharp teeth cause lacerations and ulcers to the tongue and to the sides of cheek and consequently leading to painful chewing and quidding.

In the present study, oral candidiasis was diagnosed in young donkeys (1-3 years). This could be attributed to low immunity of young donkeys. In this respect, McClure \textit{et al.}\textsuperscript{21} recorded immunodeficiency manifested by oral candidiasis and bacterial sepsitcemia in foals.

Wounds of gingiva, hard and soft palates were common in the examined donkeys due to the biting habit of donkeys.

**CONCLUSION**

This study concludes that oral endoscopy is a beneficial new diagnostic modality for diagnosis of oro-dental disorders in donkeys. Thus a new diagnostic tool for oro-dental disorders in donkeys may be arrived at veterinary practice.

**SIGNIFICANCE STATEMENT**

This study will help the researchers and veterinarians to uncover the critical disorders of oro-dental structures especially those of the caudal part of the oral cavity that are difficult to be diagnosed by the routine procedures.

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**REFERENCES**


