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Diagnosis and Surgical Management of Prevalent Dental Affections in Horses of Equestrian Clubs

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Key words:
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ABSTRACT

The present work was carried out in the period between "March 2015 to December 2016" the total number of examined horses was 354 horses, 92 horses had dental affections including 52 Equestrian horses, 34 Riding horses, 6 Funeral dragging horses. These horses were of both sexes and their ages were ranged between 3 years up to 22years old. The examined horses were collected from Armed Equestrian club, El Gzera club, El haram farms, Cairo stadium, El Shams club and Wadi Degla club.

The horses were divided according to usage into 3 groups, first group was used as riding horses, second group was used as equestrian horses and third group was used as funeral dragging horses. First group ; which involved 52 equestrian horses, 49 male horses and 3 female ones. Second group , which involved 34 riding horses, 13male horses and 21 female ones. Third group, which involved 6 funeral dragging horses, they all are male horses.

The examined horses in this study were subjected to comprehensive study including history, type of horse (Riding, Funeral dragging and Equestrian), the time of last floating, post treatment care and follow- up.

The prevalent dental affections in Egyptian equestrian clubs that were found are dental tartar, sharp enamel points, dental caries, rostral hook, periodontal disease, diestemata (diastasis dentium), incisor tooth fracture, parrot mouth, bit seat, caudal hook and canine tooth fracture.

Periodical examination is essential in detection and treatment of dental affections; furthermore, using of power float, mouthwashes, curetting of teeth and extraction of teeth gave good results in treatment of these dental affections. Delaying or neglecting treatment of dental affections leads to sever complications.

1. INTRODUCTION

Dental disease is the main oral disorder of horses and is of major importance in equine veterinary practice, with up to 10% of practice time involving dental-related work (BEVA, 1965).

The purpose of the equine dental examination is to determine whether a pathologic condition exists and to evaluate the effect of that condition on the horse's health and (pence, 2002).

Regular dental care will benefit the health and subsequent performance of the horse. The question of who is and who should be providing routine dental care to horses can be a heated topic and Colic is one of the most common emergencies seen by equine practitioners Nationwide (Lowder, 2001).

It is impossible (and dangerous) to properly examine a horse's mouth without the use of a full mouth gag (speculum) (Scrutchfield, 1999a).

Dentistry should be scheduled every 4 to *6* months for those horses that have teeth with occlusal areas not in wear and for those that are expected to perform at a high level (pence, 2002).

It is important for the oral examination to be performed in a controlled environment to avoid potential distractions that could stimulate the horse (Menzies et al, 2011).

Appropriate ambient lighting is necessary, and good-quality intraoral illumination is essential to enable a thorough oral examination without causing clinician eye strain and fatigue. A task–ambient

lighting ratio not exceeding 10 to 1 is recommended (young et al., 1987 and Preston et al., 1978).
Equipment that satisfies and assists in the performance of a thorough oral examination includes adjustable halter and lead rope, dental halter (padded metal noseband) and rope, full-mouth speculum, light, bucket of dilute antiseptic, dose syringe, hand towel or paper towels, flexible fiber optic endoscope (if available) and timer (Pence, 2002).
The clinical signs associated with dental diseases are losing weight in spite of good appetite, failure in gain weight, dribbling grain, obvious showing abnormalities, signs of facial tenderness, accumulating wads of grass or hay between the buccal gingiva and the cheek teeth (quidding), soaking hay in water before eating it, drooling, foul breath, excessive whole grain particles in feces, discharge from nostrils, fistulous discharge from the jaw or face and swelling on the lower jaw or face (pence, 2002).

Other signs of dental disease (especially of apical infections) include facial -swellings, especially of the mandible or the rostral maxilla (O'Connor, 1930). Palpation through the cheeks may reveal food pocketing or detect major dental irregularities (such as a missing tooth or a large overgrowth) of the rostral three to four upper CT. Even if no such abnormality is palpated, the presence of pain (i.e., the horse pulling away or flinching) during this procedure may indicate the presence of sharp overgrowths on the buccal aspect of the upper CT (Scrutchfield &Schumacher, 1993 and Easley 1999a).

Incisors teeth affections are divided to congenital and acquired disorders. Congenital disorders are: over bite (Easley, 1999b), under bite (Pence, 2002), retained deciduous incisors (Alexander et al., 2001) and Supernumerary permanent incisors (Dixon et al., 1999a). Acquired disorders are incisor fractures (Dixon et al., 1999a), incisor occlusal surface abnormalities (Kempson et al., 2003) and incisor diastema (Collins and Dixon, 2005).
Canine teeth affections are divided to congenital and acquired disorders. Congenital disorders are impacted tooth (Pence, 2002). Acquired disorders are dental calculus (tartar) and dental infection (Dixon and Dacre, 2005).
Wolf teeth was found un erupted rostral to the teeth are commonly referred to as blind wolf teeth (Pence, 2002).
Cheek teeth affections are divided to congenital disorders, abnormal position, disorder of wear and disease of cheek teeth. Congenital disorders are retained deciduous cheek teeth and supernumerary cheek teeth (Dixon and Dacre, 2005). Abnormal position are rostral positioning of the upper cheek teeth, disparity in the length of the cheek teeth rows and diastema(ta) (Carmalt, 2003). Disorders of wear are sharp enamel points, step mouth (Dixon and Dacre, 2005), smooth mouth (Kempson et al., 2003), wave mouth and shear mouth(Peter et al., 2011), hooks (ramps) (Koontz, 2016) and Bit seat (Bettiol and Dixon, 2011). Diseases of cheek teeth are Trauma (Dixon et al., 2000a), fracture, Periodontal disease, dental tumors (Dixon and Dacre, 2005), dental decay (Timothy and Joseph, 2014), dental plaque(tartar) (Pence, 2002) and dental foreign body (Saulez et al., 2009).
Treatment of sharp enamel points, rostral hooks and caudal hooks involved reducing the overlong portion of the tooth by power float and dealing with bit seat by rounding and carefully smoothing rostral corners of the upper, lower #6s help in good performance in bit (Pence, 2002).
Canine tooth fracture needed to be extracted (Dixon and Dacre, 2005).
Treatment of periodontal disease by cleaning out periodontal pockets, and packing pockets with an antibiotic gel. Instruments needed to clean periodontal pockets include a variety of dental picks, scalers, and rinsing equipment (Pence, 2002).
Management of dental caries by cleaning and filling these areas with a composite may arrest the decomposition of the tooth each carious lesion must be approached as a unique situation and evaluated for severity of decomposition of the infundibular enamel (pence, 2002).
Removal of overgrown transverse ridges opposite diastemata may reduce food impaction (Barakzai and Dixon, 2003).

2. MATERIALS & METHODS

The present work was carried out in the period between “March 2015 to December 2016” the total number of examined horses was 354 horses, 92 horses had dental affections including 52 Equestrian horses, 34 Riding horses, 6 Funeral dragging horses. These horses were of both sexes and their ages were ranged between 3 years up to 22years old. The examined horses were collected from Armed equestrian club, El Gzera club, El haram farms, Cairo stadium, El Shams club and Wadi Degla club.
The horses were divided according to usage into 3 groups, first group was used as riding horses, second group was used as equestrian horses and third group

was used as funeral dragging horses. First group ; which involved 52 equestrian horses, 49 male horses and 3 female ones. Second group , which involved 34 riding horses, 13male horses and 21 female ones. Third group, which involved 6 funeral dragging horses, they all are male horses.

The examined horses in this study were subjected to comprehensive study including history, type of horse (Riding, Funeral dragging or Equestrian), the time of last floating, post treatment care and follow-up.

The history of each examined horse was obtained from its owner. The type, sex, age, time of last floating was recorded.

Equipment used in this study of a thorough oral examination includes lead rope, ☺high power headlamp, *full mouth speculum, bucket of dilute antiseptic (+Betadine), dose syringe, hand towel, ***tooth elevator, *tooth extractor, *power float and **smart cam **(Fig: 1)**. If the horse does not relax or at least tolerate the initial examination, we sedated the horse by (=TranquiVed Xylazine HCl Injection or ¥Sedivet 1%).

After care was consisted of injection of antibiotic that is against abroad spectrum of microbes streptopenicilline (pen&strep) at a dose of 1mg/20kg bwt, I/M. for 3 days, injection of ∞tetanus antitoxin vaccine in single dose of 6000 IU/horse by S/C, usage of betadine & ≠allamycine spray locally in case of injuries and tooth extraction daily 3 times for a week, avoid feeding horse before 12 hours after application of anesthesia and the horses were observed for minimum a week post .

3. RESULTS

In the present study, total number of examined horses was 354 horses, 92 horses had dental affections by ratio about 26%.The prevalent dental affections in horses of Egyptian equestrian clubs that were found are dental tartar, sharp enamel points, dental caries, rostral hook, periodontal disease, diestemata, incisor tooth fracture, parrot mouth, bit seat, caudal hook and canine tooth fracture.

In dental tartar, The age of examined equestrian horses suffering from dental tartar was (7-15years old), in riding horses was varying from (4-16 years old), while in funeral dragging horses was varying from (14-22 years old). Treatment involved removal of tartar, curetting the tooth by tooth elevator and disinfection by *tincture iodine 2% **(Fig: 2, 5).**

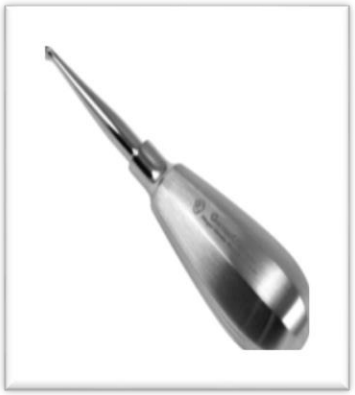
Sharp enamel points were found in equestrian horses at age (7-14years old), in riding horses was varying from (4-16 years old), while in funeral dragging horses was varying from (12-16 years old).Treatment involved teeth should be floated by power float in stages, e.g., at three to six monthly intervals to prevent pulpar exposure, Digitally loose teeth can be extracted orally using tooth extractor in standing sedated horses, thoroughly washing the mouth with Betadine and make stab wound in the hematomed soft palate that resulted from sharp points of teeth helps horse to eat well **(Fig: 2).**

Dental caries were recorded in equestrian horses at age (8-13years old), in riding horses was varying from (12-16 years old) while, in funeral dragging horses was varying from (20-24 years old). Treatment involved cleaning the tooth well by tooth elevator, rinsing it by water then by tincture iodine2.0%. Degenerated tooth material should be debrided, repeating **hexitol mouthwashes is the best treatment of dental caries and decreasing the proportion of dietary simple carbohydrates (grains such as barley and oats) slow down progression of the disease **(Fig: 2).**

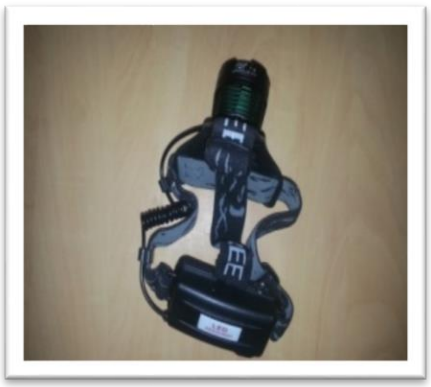
Rostral hook was observed in equestrian horses at age (12-15years old), in riding horses was varying from (9-20 years old).Treatment involving reducing the overlong portion of the tooth by using power float. **(Fig: 4).**

Periodontal disease was noticed in equestrian horses at age (8-15years old), while in riding horses was varying from (4-15 years old).Treatment involves (Treat primary cause in case of secondary periodontal disease, cleaning out periodontal pockets, and packing pockets with an antibiotic gel(€Doxirobe gel).widening the periodontal pocket helps in treating this disease, recheck and retreat the pocket at intervals of 14 days until the pocket has healed, injection of the horse by anti inflammatory drug(®finadyne) and antibiotic(©Pen&Strep) for 5 days and feeding treated horse with easily digested food like hay, Egyptian clover and bran for 3 weeks. **(Fig: 9).**

☺**High power headlamp:-**Its chip is CREE T6 Led, made in China.
*** full-mouth speculum, tooth extractor and power float** are produced by Horse Dental Equipment Company.
+Betadine :- Its active principle is 5%providone iodine , It is used locally and produced by Ranbaxy Laboratories Limited, India.
*****Tooth elevator** :- It is produced by GerVet USA company.
= TranquiVed Xylazine HCl :-Its active principle is Xylazine Hcl, its dose is 0.5 ml /100kg.bw by I/V and produced by VEDCO.
¥Sedivet 1% :- Its active principle is(Romifidine Hcl), It is used in dose (0.4 - 1.2 mL/100 kg b w.) through I/V and produced by Boehringer Ingelheim.
****smart Cam:-**digital oral camera, made in China, by ShanGhai Handy Medical Equipment co, model HD-110.
∞ **Tetanus antitoxin : -** Its active principle is (Antitetanic serum), It is used I/V by dosage of 6000IU and produced by Egypt.
≠**Allamycine spray : -** Its active principle is (Oxytetracycline spray), used locally and produced by Norbook, laboratories(GB)Limited.

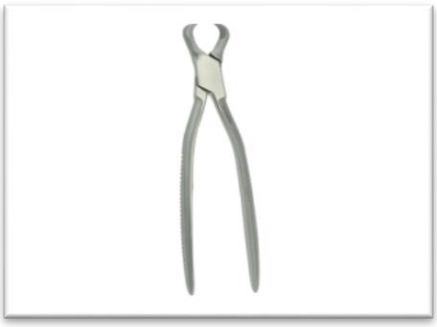


A-Tooth elevator



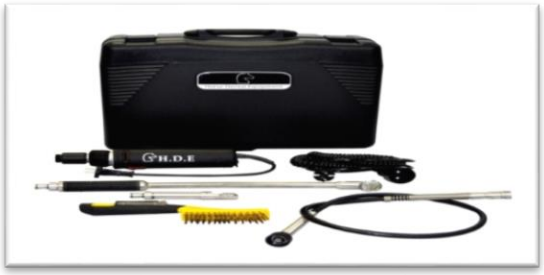
B-High power headlamp

C-Oral speculum

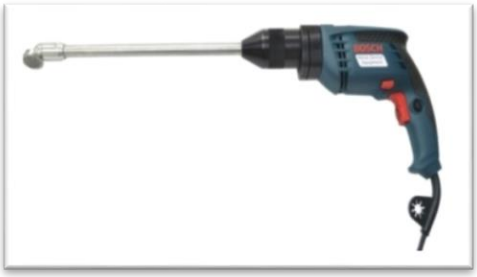


D-Tooth Extractor

E-Smart cam



F-Equipment box & another power float



G-Power Float

Fig (1) Dental equipment that was used (A-Tooth elevator, B-high power headlamp, C-oral speculum, D-Tooth extractor, E-Smart cam and (F, G) power float).

Diestmata was seen in equestrian horses at age (9-13years old), while in riding horses was varying from (13-15 years old).Treatment involved cleaning out periodontal pockets, we make widening at the position of distemata by tooth elevator and reduction the overlong portion of the opposite tooth. **(Fig: 9).**

Incisor tooth fracture was recorded in equestrian horses at age (12-14years old), while in riding horses was varying from (3-5 years old). The tooth was remaining vital and continuing to erupt normally. Treatment involved antibiotic (Pen&Strep), and anti-inflammatory (finadyne). In the acute stages, but extraction the fractured incisors with exposed pulp by tooth extractor, following an incisor fracture, the opposing incisor(s) will overgrow into the site of the shortened or absent incisor(s) due to lack of attrition and these overgrowing incisors were floated twice yearly. **(Fig: 6).**

Parrot mouth was reported in equestrian horses at age (11-13 years old).Dealing with this affection by reduction the overlong portion of the opposite tooth by power float.

Bit seat was observed in equestrian horses at age (10-12 years old). It causes discomfort when it presses soft tissue in the mouth against the rostral surface of 06s.Treatment of this affection by making the bit seat rounded by power float. **(Fig: 7).**

Caudal hook was found in riding horses at age (19-21 years old).Treatment involving reducing the overlong portion of the tooth by using power float.

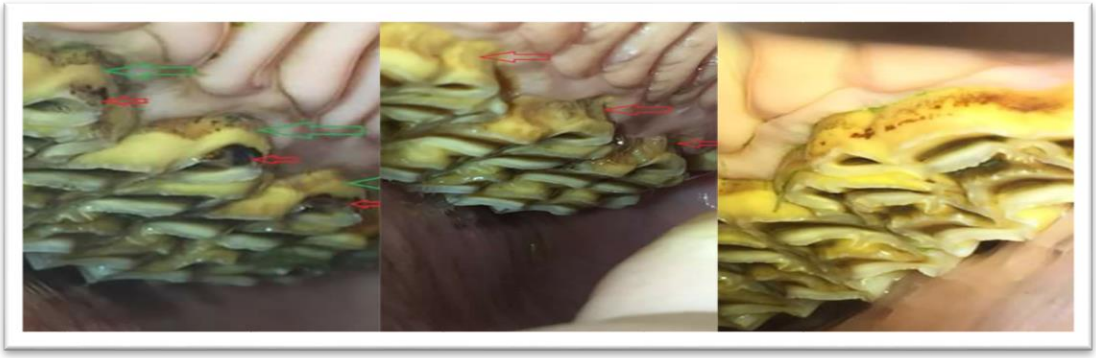
Canine tooth fracture was noticed in riding horses at age (12years old).Canine tooth extraction is the best treatment by tooth extractor and suturing gum with absorbable sutures. **(Fig: 8).**

All cases presented in this investigation showed appearance of the affections in males more than females except in caudal hook affection that presented in females only.

We found also the recurrence of presence dental tartar after 3 months and well seen after 6 months, the recurrence of presence sharp enamel points after 4 months and well observed after 6 months, the recurrence of presence rostral hook after 9 months and well observed after 12 months, the recurrence of presence bit seat after 9 months and well observed after 12 months, Recurrence of presence caudal hook after 12months and well observed after 15 months.

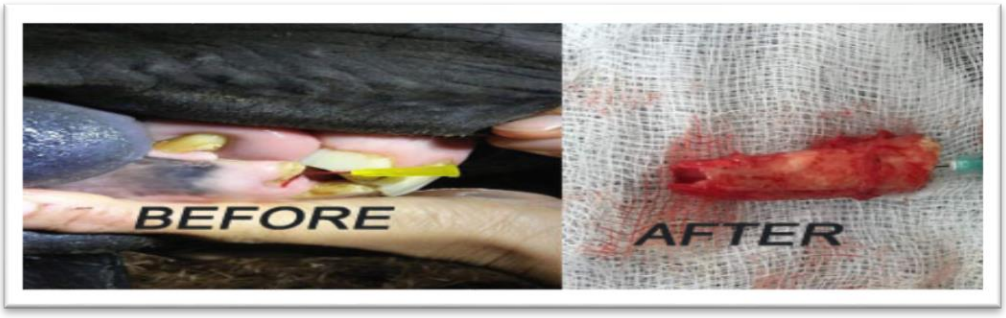
Table (1): Include groups of horses, number, sex, age and type of dental affections.

Type of horse	Equestrian		Riding		Funeral dragging		Total number
Number	52		34		6		92
Age/y	7-16		4-20		14-22		
Sex	M	F	M	F	M	F	
	49	3	13	21	6	0	
(Teeth and oral) affections							
Dental tartar	33		36		6		75
Sharp enamel points	18		18		3		39
Dental caries	18		12		3		33
Periodontal disease	12		6		-		18
Rostral hook	6		6		3		15
Diestemata	9		6		-		15
Incisor tooth fracture	3		3		-		6
Parrot mouth	3		-		-		3
Bit seat	3		-		-		3
Caudal hook	-		3		-		3
Fracture of canine	-		1		-		1

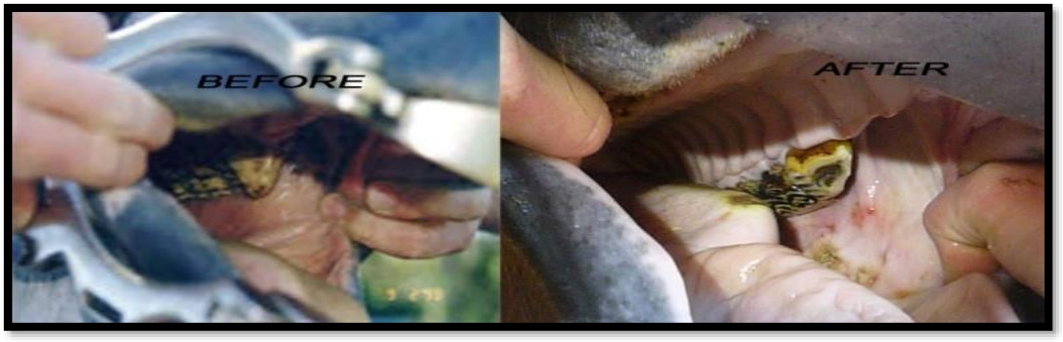


A B C

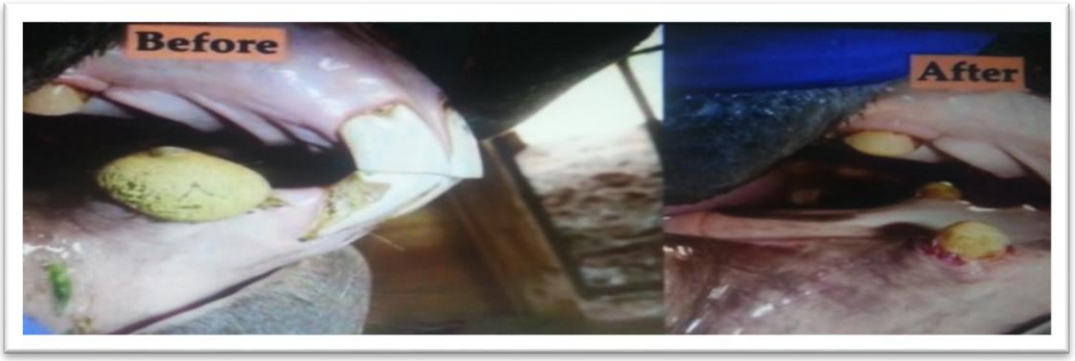
(Fig: 2) Riding horse, Female, 12 years old, suffered from dental tartar, teeth decay and sharp enamel point, in cheek teeth (108-111) 4th pre molar till third molar .From about 5 months, there is tartar(green arrows) and decay(red arrows). After treatment: new healthy layer and decayed area is disappeared in **"c image".**



(Fig: 3) Young horse approximately 3 years, suffered from a very painful pulp infection with fractured mandibular incisor(403). Gum looks healthy. The pulp filled with foul smelling blood tinged purulent exudates. We extract the tooth.



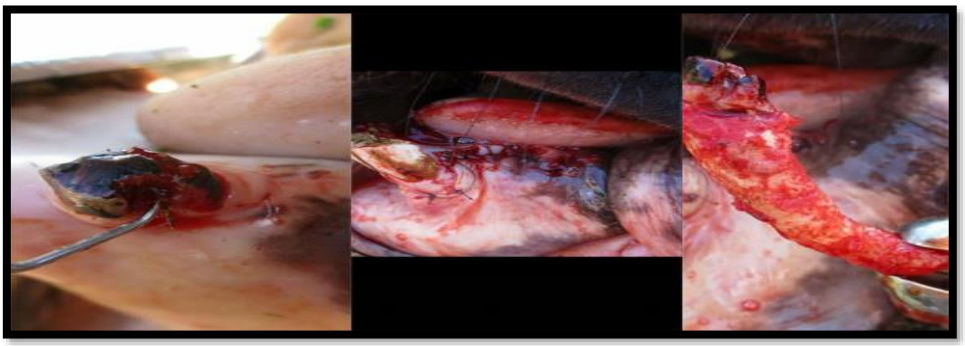
(Fig: 4) Equestrian horse 13years old, suffered from rostral hook in (206) 2nd pre molar, dental caries and dental tartar as in "before" picture and "after" picture clears after treatment.



(Fig: 5) Riding horse, 12 years old, suffered from tartar in lower right canine tooth (404) as in" before image". After treatment is cleared in "after" image.

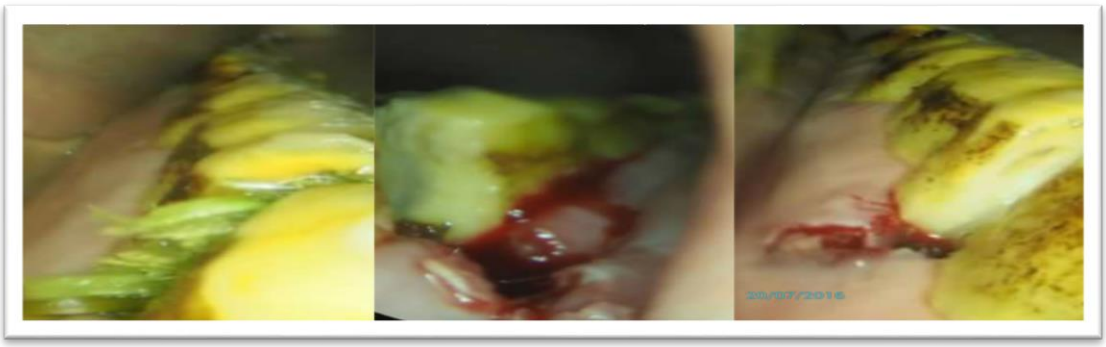
(Fig: 6) Equestrian horse, 13 years old, Suffered from fissure in gum because of hitting irony door of its stable and dental trauma in (201,202) After treatment is cleared in "after" image.

(Fig: 7) Equestrian horse, 11 years old. Suffered from (bit seat) and dental tartar in (106,406) 2nd pre molar, as in " before"image. After treatment is cleared in "after" image.



A B C

(Fig: 8) Riding horse, male, 12 years old, , suffered from fracture in lower left canine tooth(304). We extract this tooth by tooth extractor and suturing gum with absorbable sutures as in (B, C) images.



A B C

(Fig: 9) Equestrian horse, male 16 years old, suffering from distemata and periodontal disease between "308-309" 4th pre molar till 3rd molar, as in before image. After treatment is cleared in "c" image.

4. DISCUSSION

In the present study, total number of examined horses was 354 horses, 92 horses had dental affections by ratio about 26%.The prevalent dental affections in Egyptian equestrian clubs that were found are dental tartar, sharp enamel points, dental caries, rostral hook, periodontal disease, diestemata, incisor tooth fracture, parrot mouth, bit seat, caudal hook and canine tooth fracture, while BEVA (1965) reported that dental diseases were up to 10% of dental related-work.

Sharp enamel points were recorded in (39) horses from 92 horses. These results were met with that obtained by (Becker, 1962).

It was found that if the horse does not relax or at least tolerate the initial examination, sedation is indicated by (TranquiVed Xylazine HCl Injection or Sedivet 1%) and this is agreed with that of (Brigham& Duncanson, 2000b and Ramzan, 2002). In the same time pence (2002) added that detomidine, xylazine and butorphanol are excellent sedatives for dental examinations and procedures to prevent ataxia.

Clinically, foul breath and halitosis was one of signs that were found in dental tartar, sharp enamel points, dental caries, rostral hook, periodontal disease, diestemata, incisor tooth fracture, bit seat, caudal hook and canine tooth fracture, this result was coincide with that mentioned by (pence, 2002). On the other hand Dixon et al. (2000a) and Dixon et al. (2000b) indicated that halitosis may be present only if widespread periodontal disease, or less commonly, when advanced dental caries is present.

It was found that dental tartar, sharp enamel points, dental caries, periodontal disease, diestemata, bit seat and caudal hook caused equine colic and these results were similar to that reported by (Pence, 2002). Contrarily, Timothy and Joseph(2014) reported that dental caries and sharp enamel points only, are predisposing factors for colic in horses.

In the present work, usually used in a thorough oral examination lead rope, source of light, bucket of dilute antiseptic (Betadine), dose syringe, hand towel, tooth elevator, tooth extractor, power float and smart cam and this is agreed with that of (pence, 2002). In the same time Dacre (2004) added that the use of a long dental mirror can reveal subtle lesions.

Treatment of dental tartar involved removal of tartar, curetting the tooth by tooth elevator and disinfection by tincture iodine 2%.On the other hand, Dixon and Dacre (2005) preferred using strong forceps only, and the above-noted periodontal disease will then usually regress, due to the ability of equine periodontal membranes to reform.

In the present work, treatment of sharp enamel points, rostral hook and caudal hook by rasping the overlong portion of the tooth by power float, these results were met with (Pence, 2002).

As regard, treatment of dental decay involved cleaning the tooth well by tooth elevator, rinsing it by water then by tincture iodine 2%, degenerated tooth material should be debrided, repeating hexitol mouthwashes is the best treatment of dental caries and decreasing the proportion of dietary simple carbohydrates (grains such as barley and oats) slow down progression of the disease. pence (2002) added that cleaning and filling these decayed areas with a- composite may arrest the decomposition of the tooth each carious lesion must be approached as a unique situation and evaluated for severity of decomposition of the infundibular enamel, but our treatment was successful.

Concerning the treatment of periodontal disease involved (Treat primary cause in case of secondary periodontal disease, cleaning out periodontal pockets, and packing pockets with an antibiotic gel(Doxirobe gel).widening the periodontal pocket helps in treating this disease, recheck and retreat the pocket at intervals of 14 days until the pocket has healed, injection of the horse by anti inflammatory drug(finadyne) and antibiotic(Pen&Strep) for 5 days and these results were coincided with obtained by (pence, 2002).

In treatment of diestemata, make widening at the position of distemata by tooth elevator and reduction the overlong portion of the opposite tooth by power float and this is in agreeable with that of (Barakzai and Dixon 2003) ,furthermore, Dixon and Dacre (2005) added that specialized burrs have recently been developed to widen diastemata at the occlusal surface to help limit food trapping and are best used after radiographic evaluation (open-mouth projections) of diastemata to help reduce the risk of iatrogenic pulpar exposure during such procedures.

Management of incisor tooth fracture and canine tooth fracture can be successfully done by extraction the fractured tooth, and these results were similar to (pence, 2002).

Belong of the treatment of bit seat, making the bit seat rounded by power float, and this result was agreed with the result mentioned by (pence, 2002).

In this work, over bite management can be done by reducing the overlong portion of the opposite tooth by power float and this is met with that of (Dixon et al.,1999a and Easley, 1999b) added that over jet in

foals can be treated by orthodontic therapy, i.e., wiring the upper incisors to the upper CT to restrict growth of the pre maxilla and maxilla.

5. CONCLUSION

All dental affections were recorded in male horses more than female except in caudal hook affection. There is no doubt that regular dental care every 3 months, will benefit the health and subsequent performance of the horse. It was found that dental tartar is the most prevalent dental affection in this study. Making stab wound in the hematomed soft palate that resulted from sharp points of teeth helps horse to eat well. All cases that suffering from periodontal disease was accompanied with dental tartar. About 90% of the horses that suffering from sharp enamel points accompanied with ulcer in oral cavity. All cases that suffering from dental caries was accompanied with dental tartar. All horses that suffering from rostral hook accompanied with ulcer in oral cavity or ulcer in tongue. All horses that suffering from diestemata accompanied with periodontal disease. Neglecting of treatment of dental tartar, sharp enamel points, dental caries, periodontal disease, diestemata, bit seat and caudal hook resulted in equine colic.

6. REFERENCES

Alexander K , McMillen RG., Easley J. 2001. Incisor extraction in a horse by a longitudinal forage technique, Equine Vet. Education,. 179–182.

Barakzai SZ, Dixon PM. 2003. A study of open-mouthed oblique radiographic projections for evaluating lesions of the erupted (clinical) crown, Equine Veterinary Education.. 143–148.

Becker E. 1962. turn, J. Dobberstein, G. Pallaske, H. Stunzi, V. Band (Eds.), Handbook of special pathological anatomy of pets (third ed.), Verlag Paul Parey, Berlin, pp. 121-133, 249-260, 263-265.

Bettiol N., Dixon PM 2011. An anatomical study to evaluate the risk of pulpar exposure during mechanical widening of equine cheek teeth diastemata and ‘bit seating’, . Equine Vet. J. 43(2): 163–169.

BEVA 1965. British Equine Veterinary Association survey of equine disease, Vet. Record 77: 528–538.

Brigham EJ., Duncanson G. 2000b. Case study of 100 horses presented to an equine dental technician in the UK, Equine Vet. Education, pp. 63–67.

Carmalt JL.,2003. Understanding the equine diastema, Equine Veterinary Education.pp.34–35.

Dacre IT. 2004. Equine dental pathology. In: Baker, G.J., Easley, J. (Eds.), Equine Dentistry, second ed. W.B. Saunders, London.

Dixon PM., Collins NM.2005. diagnosis and management of equine diastemata, Clinical Techniques in Equine Practice, Volume 4, Issue 2, June 2005, Pages 148–154.

Dixon PM and Dacre I. 2005. A review of equine dental disorders, The Veterinary Journal, Volume 169, Issue 2, Pages 165–187.

Dixon PM, Tremaine WH, Pickles K, Kuhns L, Hawe C, McCann J, McGorum B, Railton DI., Brammer S. 1999. Equine dental disease part 1: a long-term study of 400 cases: disorders of incisor, canine and first premolar teeth, Equine Vet J. pp. 369-377.

Dixon PM , Tremaine WH , Pickles K, Kuhns L , Hawe C, McCann J , McGorum BC , Railton DI.,Brammer S. 2000a. Equine dental disease. Part 3: a long-term study of 400 cases: disorders of wear, traumatic damage and idiopathic fractures, tumours and miscellaneous disorders of the cheek teeth, Equine Veterinary Journal, pp. 9–18.

Dixon PM, Tremaine WH , Pickles K , Kuhns L , Hawe C , McCann J , McGorum BC , Railton DI and Brammer S. 2000b. Equine dental disease part 4: a long-term study of 400 cases: apical infections of cheek teeth ,Equine Veterinary Journal, pp. 182–194.

Easley J. 1999. Dental and oral examination, G.J. Baker, J. Easley (Eds.), Equine Dentistry (first ed.), W.B. Saunders, London, pp. 107–126.

Kempson SA , Davidson M , Dacre IT. 2003. The effect of three types of rasps on the occlusal surface of equine CT: a scanning electron microscopic study, J. Vet. Dentistry, 19–27.

Koontz RH 2016. Chief Executive Officer, Conley and Koontz Equine Hospital, 877-499-9909, www.ckequinehospital.com , p.183.

Lowder MQ , Mueller POE 1998. Dental disease in geriatric horses,Veterinary Clinics of North America: Equine Practice, pp. 365–380.

Lowder MQ. 2001. Journal of Equine Veterinary Science, Floating teeth Volume 21, Issue 7, Pages 327–328, Veterinary Record 77, 528–538.

Menzies RA, Lewis JR, Reiter AM and Lundström TS 2011. Essential considerations for equine oral examination, diagnosis, and treatment. J. Vet. Dentistry; 28:204–9.

O'Connor JJ 1930.: Dollars Veterinary Surgery (second ed.) Balliere Tindall and Cox, London, pp. 481–491.

Pence P. 2002. Equine Dentistry: A Practical Guide that published in 2002 by Lippincott Williams & Wilkins, 2nd edition, p13.

Pence P. 2002. Equine Dentistry: A Practical Guide that published in 2002 by Lippincott Williams & Wilkins, 2nd edition, p55-57

Pence P 2002. Equine Dentistry: A Practical Guide that published in 2002 by Lippincott Williams & Wilkins, 2nd edition, p63-69.

Pence P 2002. Equine Dentistry: A Practical Guide that published in 2002 by Lippincott Williams & Wilkins, 2nd edition, p104.

Pence P. 2002. Equine Dentistry: A Practical Guide that published in 2002 by Lippincott Williams & Wilkins, 2nd edition, p118-119.

Pence P. 2002. Equine Dentistry: A Practical Guide that published in 2002 by Lippincott Williams & Wilkins, 2nd edition, p141-142.

Pence P 2002. Equine Dentistry: A Practical Guide that published in 2002 by Lippincott Williams & Wilkins, 2nd edition, 209-230.

peter D , Gordon JB , Josiph AD , Walter I , Jone EM , James NM , Michael JM ,Stanley IR ,Susan DS ,Josie LT 2011. Merck Manual for Pet Health, Pet Owners, Horse Disorders and Diseases, Digestive Disorders of Horses.

Preston JD, Ward LC, Bobrick M 1978. Light and lighting in the dental office, Dental Clinics of North America, 22(3):431-451.

Ramzan PH 2002. The need for chemical restraint while performing routine dental procedures using a full mouth speculum: a retrospective study of 581 examinations, Equine Veterinary Education, pp. 30–32.

Saulez MN , Burton A , Steyl JCA , Williams JH , and Clif SJ 2009. Perforation of the gastrointestinal tracts of four horses by metallic wires. Vet Rec. 164: 86-88.

Scrutchfield WL 1999. Dental prophylaxis, G.J. Baker, J. Easley (Eds.), Equine Dentistry (first ed.), W.B. Saunders, London, pp. 185–205.

Scrutchfield WL , Schumacher J 1993. Examination of the oral cavity and routine dental care ,Veterinary Clinics of North America – Equine Practice, pp. 123–131.

Timothy AOO., Joseph FA 2014. Do dental abnormalities predispose horses to colic? . J. Vet. Med. Anim. Health .6 (7), 192-197.

Young JM, Satrom KD, Berrong JM. 1987. Intraoral dental lights: test and evaluation, J. Prosthet Dentistry, 57(1) 99–107.