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CHANGES IN SELECTED HEMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS ASSOCIATED WITH SURGICALLY MANAGED TOOTH AVULSION IN A DOG: CASE REPORT

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ABSTRACT

A two year old Nigerian indigenous dog was presented to the University of Nigeria Veterinary Teaching Hospital with a swelling on the mandibular aspect of the face following an automobile accident. The dog was in great painwith bleeding in the mouth due to partial avulsion of the 3rd and 4th left mandibular premolars. On physical examination, pain and swelling of the mandibular aspect of the face was observed with part of the 3rd and 4th left mandibular premolars broken and exposing the pulp. Laboratory examination revealed increased levels of glucose, blood urea, creatinine and serum cortisol. Exodontia was carried out on the dog. Following successful management of the surgical condition, the animal was monitored for six days before discharge.

Keywords: Tooth, Exodontia, Pain, Surgical management

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INTRODUCTION

In veterinary practice, pain management has been identified to be critical in optimum recovery from illness, injury or surgery and enhanced quality of life [1]. Pain associated with trauma of the teeth is of great interest in animals as this may adversely affect the appetite of the animal and in turn result in several metabolic alterations and other complications [1].

Most times, tooth damage in domestic animals necessitates surgery. Tooth damage can affect both the tooth and paradontal structures. It could result from concussive trauma, localized traumatic injuries, such as those associated with chewing or biting or more widespread traumatic injuries such as road traffic collisions [1,2]. The present case report describes some haematological and serum biochemical changes associated with surgically managed tooth avulsion in a dog presented at the University of Nigeria Veterinary Teaching Hospital.

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CASE HISTORY

A two year old Nigerian indigenous dog named Cherry was presented at the University of Nigeria Veterinary Teaching Hospital with the complaint of having a swelling on the mandibular aspect of the face following an automobile accident that left the dog with two broken teeth. The dog had been duly vaccinated against rabies, canine distemper, leptospirosis, hepatitis, parvovirus, and para-influenza virus. The dog feeds on commercial dog and household foods. On physical examination, pain and swelling of the mandibular aspect of the face were observed. It was also observed that part of the 3rd and 4th left mandibular premolars were broken and had fallen off exposing the pulp.

CLINICAL PRESENTATION

The 7.5 kg dog had a rectal temperature of 42°C, pulse rate of 160 beats/min, heart rate of 144 beats/min. and a respiratory rate of 66 cycles/min. On physical examination, no ectoparasites were seen but the dog had a slight bruise on the lower left hind limb due to the accident.

Blood samples were collected by venipuncture using vacoutainer tubes with EDTA for haematological analyses and without anticoagulant (no EDTA) for serum biochemistry..

RESULTS OF LABORATORY ANALYSIS

The results of the haematological and biochemical analyses are presented in Table 1. All the haematological parameters (PCV, Hb concentration, RBC and WBC counts) fluctuated without any significant changes immediately after the accident and 4 days post exodontia. On the other hand, serum cortisol and glucose levels were elevated immediately after the accident but gradually returned to lower levels post exodontia. However, blood urea and creatinine values progressively increased following the accident while total protein value did not significantly change pre- and post exodontia.

Table 1. Hematological and serum biochemical parameters of the dog pre and post exodontia.

Parameters	Days post exodentia				
	0	1	2	3	4
PCV (%)	43.00	42.00	40.5	40.00	42.00
Hb (g/dl)	14.70	14.20	14.50	13.60	14.10
RBC ($\times 10^6/\mu l$)	6.60	6.42	6.28	6.38	7.10
WBC ($\times 10^3/\mu l$)	4.80	5.00	5.20	4.60	4.00
Serum cortisol (µg/dl)	25.63	13.58	9.48	4.42	9.48
Glucose (mg/dl)	240.69	100.48	70.69	30.48	41.27
Blood Urea (mg/dl)	35.70	62.70	54.10	62.70	77.90
Creatinine (mg/dl)	2.50	6.98	7.21	6.00	6.08
Total plasma protein (g/dl)	7.10	6.88	6.88	6.88	6.68

SURGICAL REMOVAL OF THE FRACTURED TOOH

Balance anesthesia was achieved with intramuscular injections of atropine (Amopin, China), xylazine (V.M.D, Belgium) and ketamine (S.P.L Ketamine, Nigeria) combination. The animal was operated under general anesthesia using Atropine as premedicant at 0.02 mg/kg body weight (bwt.), followed by Xylazine hydrochloride at 2 mg/kg bwt. while general anaesthesia was induced with Ketamine at 20 mg/kg bwt. The left mandibular premolar was approached from the lateral aspect. Exodontia was performed through the gingival flap and alveoloplasty to expose the root. With the use of canine tooth elevator, the remaining roots of the teeth were gently elevated to prevent damage and fracture of the surrounding structures. Infiltration of adrenaline (Serenaline, China) was done to minimize discomfort

and hemorrhage. The wound was closed with subcuticular stitches using size 2-0 chromic catgut. Intramuscular injections of gentamycin (PE-GENT 80, China) at 0.5 mg/kg bwt for 5 days and tramadol (Pauco Tramadol, India) at 1.5 mg/kg bwt. 12 hourly for 3 days were administered to the dog post-operatively. The skin bruises were cleaned daily with chlorhexidine hydrochloride solution and covered with oxytetracyclin antibiotic spray (OXYPHARMA, China) to avoid surface bacterial infections. After successful removal of the tooth, assisted feeding was employed for the dog for 6 days until it was able to feed on its own.

DISCUSSION

Tooth damage is a common injury in domestic animals and can affect both the teeth and the paradontal structures which include the periodontal tissues, the gingival, mucosa and the supporting bone [1]. It can be seen in concussive trauma; localized traumatic injuries, such as those associated with chewing or biting; or can be seen with more widespread traumatic injuries, such as those associated with road traffic collisions [3]. Damage to teeth may be externally obvious with visible damage to the tooth and paradontal structures as evidenced in this case report. Alternatively, it may only be evident radiographically, or may not be possible to detect in animal patients [3,4]. Therefore, all cases of suspected tooth trauma should be thoroughly assessed clinically under anesthesia as was done in this case, and always with dental radiography [2]. Cases of untreated tooth trauma may be associated with pain, pulpitis, pulp necrosis, root resorption and periodontitis [1]. Therefore, pain is a critically important factor in the quality of life of man and animals. Tooth trauma is one of the common conditions that elicit high levels of pain in dogs. In such situations, the primary aim is usually to assist the dogs in pain alleviation to enable them return to their normal feeding status and thus assist the total well-being of the animals.

In the present case, there was a transient increase in serum cortisol level which could have been due to the stress of the injury, anesthesia, analgesia and/or surgery. However, serum cortisol levels returned to normal value after 24 hours of management. Hyperglycaemia was observed in this particular dog pre-exodontia. Hyperglycaemia has been recorded in patients administered with xylazine which is known to induce increase in serum glucose levels by suppressing insulin and stimulating glucagon release or both by the beta and alpha cells of the pancreas [5]. In as much as xylazine and ketamine administration, as used in this case, could cause hyperglycaemia, we presume that the long duration of the hyperglycaemia was as a result of pain from the injury. However, hypoglycemia was recorded by days 4 and 5 post surgery probably due to the continued use of tramadol to manage the pain suffered by the dog. Tramadol is prescribed for use in both acute and chronic pain management. It is an opioid pain killer drug that works by inhibiting reuptake of nor-epinephrine and serotonin in the brain causing a feeling of euphoria as it reduces pain similar to the way morphine works [6]. It has been postulated that inhibition of neuronal serotonin re-uptake by tramadol may be at least partially responsible for tramadol-related decreases in glucose concentrations [6]. Thus, plausible pharmacological mechanisms exist for clinically relevant hypoglycemic effects that may result from tramadol administration [6].

Increased serum creatinine and urea levels recorded in this case could be due to drug induced nephrotoxicosis [7]. Gentamycin was administered to the dog. Gentamycin, an aminoglycoside antibiotic has been shown to be nephrotoxic at high concentrations [8]. Aminoglycoside antibiotics are among the commonest causes of drug induced nephrotoxicity [7].

In conclusion, based on the results of this case, tooth trauma of this nature should be carefully and properly assessed to ascertain the need for antibiotic therapy. If the need for antibiotic therapy arises, it is recommended that safer broad spectrum antibiotics or antibiotics with extended activity and minimal or no side effects could be employed. We recommend careful use of tramadol as a pain killer in emergency cases of this nature as its use may be associated with hypoglycemia. Consequently, there would be need to carefully monitor the patient's blood glucose levels. On the other hand, drugs other than tramadol should be employed in surgical management of critical patients with blood glucose derangements.

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