VETERINARSKI ARHIV 71 (1), 31-36, 2001

Reconstruction of fractured canine teeth with cast metal crowns and pulpar pins

Ivan Borissov*

Faculty of Veterinary Medicine, Thracian University, Bulgaria

BORISSOV, I.: Reconstruction of fractured canine teeth with cast metal crowns and pulpar pins. Vet. arhiv 71, 31-36, 2001.

ABSTRACT

During the last few years a significant increase in the number of dogs with traumatic dental problems has been observed, particularly those with fractured canine teeth. In the period 1994-1998, 12 dogs of different breeds (German Shepherd, Dobermann, Pit Bull and Bull Terrier) were referred with complete fractures of a total of 34 canine teeth. After endodontic treatment, preparation of teeth and taking of dental imprints according to routine methods, the fractured teeth were reconstructed using moulded metal crowns and parapulpar pins. The length of the latter was 16-22 mm according to the depth of the pulpa channel. The metal crowns were fixed to the remaining tooth with chemopolymers. All reconstructed teeth were observed for 36 months. Complications occurred only in 2 teeth (new fractures and removal of crown). The method of reconstruction of fractured teeth with moulded metal crowns and pulpar pins is relatively easy to perform and can be done in two stages. Efficacy was about 96% and is found to be practical for application in veterinary dental practice in Bulgaria.

Key words: veterinary dentistry, fractured teeth, metal crowns, dog

Introduction

Traumatic factors of various kinds often result in traumatic dental disorders in dogs. Their highest incidence appears in canine teeth fractures. According to a number of reports (BEARD, 1991; ZETNER, 1976) the percentage of dogs with fractured canine teeth varied from 3.4 to 10.7% of all dental diseases prior to 1980. Subsequently, a tendency towards a significant

* Contact address:
Prof. Dr. Ivan Borissov, DVM, PhD, Department of Surgery, Faculty of Veterinary Medicine, Thracian University, 6000 Stara Zagora, Bulgaria, Phone: +359 042 53 078; Fax: +359 042 40 159; E-mail: daniela@uni-sz.bg

ISSN 0372-5480
Printed in Croatia

increase in the frequency was observed – comprising up to 27% of all dental problems (SMEETS and REM, 1993).

Teeth fractures are to some extent related to the destination of dogs, being common in police and fighting dogs (BRECH and HAMEL, 1997; FOREEST, 1998). Most often, canine teeth, including incisors, are affected (HAMEL et al., 1997). In the past, veterinary dentists performed extraction of fractured teeth – an inexpensive cheap and simple intervention. Over recent years, new techniques for reconstruction of fractured teeth have been developed. One of the most important factors in performing such reconstruction is the use of a very hard material, which is why methods for reconstruction of fractured teeth with cast metal crowns were introduced (LINDER and MANFRA, 1995). A problem for veterinary dentistry is the permanent fixation of the metal crown to the remaining part of the tooth. This problem involves two distinct aspects: on the one hand, choice of the most appropriate adhesive material (cement or chemopolymer) and on the other, achievement of the best mechanical retention. Recently, veterinary dentists have successfully used zinc-phosphate and carboxylate cements that are designed for human use. However, the problem of retention of the metal crown to the remaining part of the tooth remains.

Hence, why the aim of our study was to observe the efficacy of the method which involves reconstruction of fractured teeth via cast metal crowns and pulpar pins.

Materials and methods

Studies were performed for a 5-year period (1994-1998) in 12 German Shepherds, Dobermanns, Pit Bulls and Bull Terriers, used for police work and fighting. A total of 34 teeth possessing indications for reconstruction with metal crowns, were found to be fractured. Table 1 presents the breed, age, sex, destination and number of fractured teeth in each patient.

Reconstruction of all teeth was performed in two stages following i.v. anaesthesia with medetomidine-ketamine. The first stage included endodontic treatment (pulpectomy, nervectomy and canal filling), preparation of the remaining part of the tooth, and taking of a dental imprint. In the laboratory a cast metal crown with a pulpar pin was elaborated. The

Table 1. Results from the reconstruction of fractured teeth using metal crowns and pulpar pins in 12 dogs

N°	Breed	Sex	Age (y)	Indication	Total number of crowns	Complications
1	GS	F	6	FR, PE, ET	4	-
2	GS	M	3	FR, PE, ET	4	1 E
3	GS	M	4	PA, PE, ET	3	-
4	GS	M	3	FR, PE, ET	2	-
5	GS	M	2	FR, PE, ET	4	-
6	GS	F	2	PA, PE, ET	4	-
7	GS	M	3	FR, PE, ET	4	-
8	PB	M	4	FR, PE, ET	4	-
9	D	F	5	FR, PE, ET	2	-
10	BT	M	1	FR, PE, ET	1	1 FrR
11	MB	M	6	PA, PE, ET	1	-
12	MB	F	3	FR, PE, ET	1	-

GS - German Shepherd; D - Dobermann; BT – Bull Terrier; MB - Mixed breed
FR - fractured canine tooth; PA - pathological abrasion; PE - pulpectomy; ET - endodontic therapy
R - removal of crown; FrR - fractured root

length of the pin was 16-22 mm, according to the length of the pulpar canal. The material of the crown (San-Dental) contained nickel, chromium, molybdene, cobalt and iron. The second, final stage of the treatment consisted of further root therapy, adaptation of the metal crown and the pulpar pin to the remaining part of the tooth, and adhering with zinc-phosphate cement.

The fractured teeth were radiographed twice: prior to and after reconstruction using an intra-oral view.

All reconstructed teeth were periodically observed for 36 months at regular examinations.

All patients were fed and housed and used as they had been prior to the interventions.

Results

Thirty-four cast metal crowns with pulpar pins were fixed to 12 dogs with fractured canine teeth. Two to three days after fixation all dogs were fed with soft food and were then returned to their normal food. One month after the intervention the function of teeth was completely restored and the dogs were re-employed for police work or for fighting. The dental status was monitored at regular intervals.

Adaptation was very rapid. During the period of survey we observed complications only in two dogs (5.9%). In patient No. 2 (a male German Shepherd) the metal crown was removed at day 76 following reconstruction. In patient No. 10 (a male Bull Terrier) a fracture of the dental root occurred and the metal crown was removed, together with the pulpar pin.

Discussion

Our results were similar to those of FAHRENKRUG (1989), who reported that fractured teeth could be reconstructed, thereby enabling the dogs to be used again according to their destination. Breed was not found to be important with regard to the reconstruction, although the intervention was easier to perform in larger breeds.

The adherence quality of crowns with zinc-phosphate cement was durable. Achieved stability was due to the pulpar pins.

This method was easier to perform when compared to the methods of SHIPP and FAHRENKRUG (1992) and BORISSOV et al. (1997). The first part is difficult when the remaining part of the tooth is very small, as well as with small breeds with small teeth. A risk exists for a further fracture of the remaining part of the tooth, or for instability. The latter method for fixation via a retention-type "inverted cone" was suitable and stable in those cases where at least half of the tooth was preserved; otherwise, this method was also difficult to perform.

Our method is characterized by greater stability because of the long pulpar pin that fills the pulpar canal and prevents rotation of the metal crown and which also increases the retention surface.

Complications in patients N^{o} 2 and 10 were due to pre-existing longitudinal fissures in the remaining parts of the teeth, which resulted in

removal of metal crowns. In patient 10, the complication was further due to the fact that as the dog grew, the root canal was somewhat large and the pulpar pin became loose.

In the other 32 reconstructed teeth (94.1%) teeth stability was excellent. We therefore propose this method as being simple, safe and suited to the needs of veterinary dentistry.

Conclusions

The method of reconstruction of fractured teeth using moulded metal crowns and pulpar pins is relatively simple to perform and can be carried out in two stages. Efficacy was 94.1%. It was found to be eminently suitable for application in veterinary dental practice in Bulgaria.

References

BORISSOV, I., R. SLAVCHEV, D. SIVREV, V. BAKLOVA (1997): A prosthodontic method in veterinary dentistry. Fifth World Veterinary Dental Congress, Birmingham, England, 116-119.

BEARD, G. (1991): Fixed prothesis: a cast metal crown restorative procedure for the maxillary carnassial teeth of the canine. Proceedings of the Brithish Small Animal Veterinary Association, pp. 382-384.

BRECH, C., L. HAMEL (1997): Epidemiological study of canine teeth fractures in military dogs. J. Vet. Dent. 14, 51-55.

FAHRENKRUG, P. (1989): Crowns in veterinary dentistry - indication, preparation. Proceedings of the Brithish Small Animal Veterinary Association, pp. 38-42.

FOREEST, A. (1998): Evalution of the clinical performance and effectivenees of adhesively-bonded metal crowns on damaged canine teeth of working dogs over a 2 to 52-months period. J. Vet. Dent. 15, 13-20.

HAMEL, L., C. BRECH, J. BESNIER (1997): Measurement of biting pulling strength developed on canine teeth of military dogs. J. Vet. Dent. 14, 57-60.

LINDER, D., C. MANFRA (1995): Measurement of bite force in dogs. J. Vet. Dent. 12, 49-52.

SHIPP, A., P. FAHRENKRUG (1992): Practitioner's Guide to Veterinary Dentistry, Beverly Hills Publishing House, California, pp. 109-114.

SMEETS, S., F. REM (1993): Een inventarisatie van tandeheelkundige afijikingen bij 99 hinden. Utrecht University, Clinic for Companion Animals, Report pp. 48-53.

ZETNER, K. (1976): Die prothetische Versorgung von Zahnfrakturen mit Adhäsivkunststoffen. Kleintierpraxis 21, 271-277.

Received: 29 November 1999
Accepted: 20 February 2001

BORISSOV, I.: Rekonstrukcija slomljenih zubi u pasa pomoću metalnih kruna i parapulparnih klinova. Vet. arhiv 71, 31-36, 2001.

SAŽETAK

U posljednje je vrijeme zabilježena veća učestalost traumi zubala u pasa, a posebice ozljede očnjaka. U razdoblju od 1994. do 1998. obrađeno je 12 pasa (pasmine njemački ovčar, doberman, pit bul i bul terijer) s ozljedama 34 očnjaka. Nakon endodontske obradbe, preparacije zuba, ozlijeđeni su zubi rekonstruirani metalnim krunama i parapulparnim klinovima. Za to su upotrijebljeni klinovi dugi 16 do 22 mm te prilagođeni dubini pulparnog kanala. Metalne su krune fiksirane na ostatak zuba kemopolimerom. Nakon obradbe psi su praćeni sljedećih 36 mjeseci. Komplikacije su zabilježene samo u dva zuba (nove frakture ili odvajanje krune). Na temelju svega navedenoga može se smatrati da je navedena rekonstrukcija relativno lagan zahvat kojega ne prate značajnije komplikacije s obzirom na to da uspješnost doseže čak 96%.

Ključne riječi: veterinarska stomatologija, lom zuba, metalne krune, pas