

RADIOLOGICAL EVALUATION OF REPARATIVE CHANGES IN ALVEOLAE AFTER THE EXTRACTION OF MANDIBULAR TEETH IN DOGS

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A radiological diagnostic method was used to evaluate the regenerative growth of alveolar tissue following extraction of the mandibular premolars in the German shepherd dog. All animals in the experiment were around 10 months old and 20 to 27 kg heavy. The dogs were divided into two groups with 5 dogs in each. The extraction of P₁ and P₃ premolars was performed in the first and P₂ and P₄ were extracted in the 2nd group of animals. The process of alveolar filling was monitored during an eight months long post extraction period. The gradual disappearance of the residual parameters of the tooth presence was also monitored. The earliest refill of the alveola occurred 7 months following the extraction of P₁. The regenerative process in the alveolar tissue of the other extracted premolars was completed eight months after the operation.

Key words: dog, acquired oligodontia, dental alveola, radiological examination

INTRODUCTION

The process of bone defect sanitation is characterised by production of the same, functional bone tissue. The speed of the sanitation process differs depending on the bone structure and the localisation of the process. Injuries to the lower jaw caused by the extraction of a tooth follow the same sanitation pattern. Specific spongy structure and vascularisation of the alveolar bone together with trouble caused by repeated injuries of the alveolar edge may give rise to a prolongation of the sanitation process (Jojić, 1975).

The process of intraalveolar bone tissue development following the extraction of a tooth has been researched by numerous authors (Huesbach and Hansen, 1969). The development of the sanitation through several phases was confirmed by many authors, while the speed of the reparation from stage to stage is not defined (Branovački and Marić, 1973). The evolution of alveolar sanitation can be determined radiographically and histologically. Since the need for radiographical determination of acquired oligodontia in purebreed dogs is

frequent in clinical practice (Zontine, 1975), a radiological evaluation of the alveolar sanation process is presented in this paper. The aim of the investigation was to establish a methodological model that would help the determination of the age of the injury upon the finding revealing the presence of the alveola. The established differences among the X-ray pictures of the alveolar bones were systematized and criteria ensuring diagnostic value in different breeds of dogs were established.

The finding of a reduced number of permanent teeth was more frequent in German Shepherds, Giant Schnauzer and Doberman Pincher than in other dog breeds (Zagorčić and Krstić, 1992)

MATERIAL AND METHODS

The experiment was performed on 10 German Shepherd dogs divided into two groups of, 5 dogs each. The animals were ten months old, had permanent teeth and weighed between 20 and 27 kg.

The extraction of the 1st and the 3rd and of the 2nd and 4th premolars from the right mandible was performed in the first and the second group of animals, respectively.

The operation was performed after the induction of general anaesthesia (phenothiazine and ketamine, IV). Possible side effects of the drugs were avoided by premedication of the animals with atropine sulphate.

The radiographs were obtained with a portable TUR DE 3 X-ray camera, while 3x4, 13x18 and 18x24 cm extraoral and intraoral dental films were used.

The radiographs of the lower jaw, placed in the oblique mediolateral projection were obtained during the experiment. The radiography was performed on animals in ventral recumbency and the head with the open mouth was aligned so that the central beam struck the alveolar border at an angle of 45° and fell perpendicularly to the film (Schebitz and Wilkens, 1977).

Radiography was performed immediately after the extraction, and at one month intervals during the following 8 months. Radiographs of each dog were separately analysed for the parameters that indicate the reparatory process inside the alveola. The most prominent findings like the degree and the intensity of the shadow filling of the radicular space, the appearance of the lamina dura and the diameter of the interdental spaces of the alveolar limb were evaluated.

RESULTS AND DISCUSSION

All radiographs taken one month after the extraction of the teeth showed the presence of clearly transparent zones inside the alveolar spaces. Lamina dura and the alveolar limb remained unchanged, compared to the pictures obtained immediately after the extraction. The diameter of the intraalveolar zones matched those of the dental root (figure 1).



Figure 1. -X-ray picture of the lower jaw, 1 month after the extraction of P2 and p4
1. Alveola
2. Lamina dura
3. Interdental space

The transparency of the alveolar spaces was decreased on the X-ray pictures taken two months after the operation. The shadow of the intraalveolar spongy net was more visible in the empty radicular space of the first mandibular premolar, while the changes developing in alveolar spaces of the other extracted teeth were less clear due to the sharp bone shadow covering the lower third of the radicular spaces. The shadow of the lamina dura was obvious in the empty places of the 3rd and the 4th premolars in the lower jaw. Since, in dogs under two years of age, lamina dura is generally diagnosed as a cortical covering of the alveolar bone (Morgan and Pool, 1989) and disappears following the extraction of the tooth, laminar disappearance was used as a parameter of the changes involving the alveolar bone in the experiment performed on 10 months old animals (Dillon, 1988).

According to the findings of Petrović and Matejić (1980), a narrowing of the interdental space is prominent among the initial changes occurring in the postextraction period, while the migration of the neighbouring teeth is slow (1 mm in eight months). Narrowing of the interdental spaces by 1 mm was established on the roentgenograms taken two months after the extraction, compared to the preoperative state. The established narrowing of the interdental space did not progress until the end of the experiment.

During the 4th month postextraction, the degree of the filling of the radicular spaces by spongy tissue was more expressed in the uniradicular space of the first mandibular premolar, than in the other extracted teeth. The same degree of spongy development was radiologically established in the radicular space of the second premolar during the 5th month, while the soft shadows in the radicular spaces of P3 and P4 were underdeveloped compared to the findings on the places of P1 and P2. Fragmentation of the laminar shadow was established for all extracted teeth.

The highest degree of spongy tissue development inside the alveola of the first premolar was radiologically established during the 6th month postextraction. The process of sanation involving the other teeth was slower.

The final reduction of the P1 lamina dura was visual 6 months after the operation. The thin filamentous fragments of the laminar remaining were sometimes seen around the alveolar spaces of the other extracted teeth.

The remains of the first premolar alveola visually disappeared on the radiograms obtained during the 7th month after the operation. The small and shallow alveolar spaces at the place of P1 enabled a fast process of sanation following the extraction of this tooth.

Evidence of complete calcification in the alveolar spaces of the 2nd, 3rd and the 4th premolar were present on the X-ray pictures obtained 8 months after the extraction of the teeth. The prolongation of the sanation pattern com-

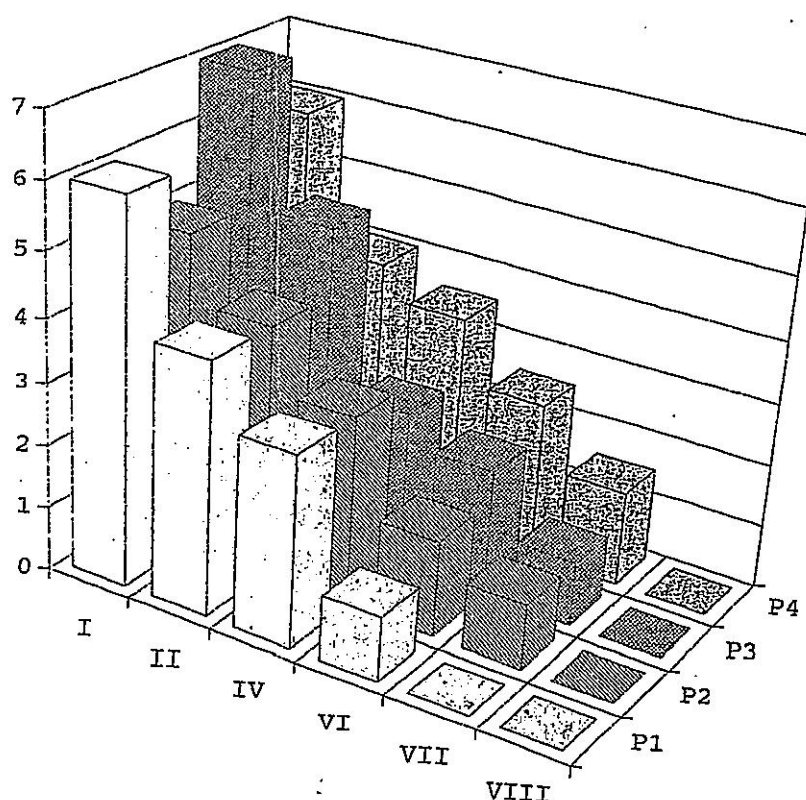


Figure 2. - Gradual disappearing of the parameters showing the presence of the reparative process in postextraction mandibular alveolas

pared to P1 can be explained by the morphological characteristics of the alveolar spaces of the teeth with a paired root (Evans and Christensen, 1979).

The only remaining evidence of the acquired loss of the teeth on the X-ray pictures obtained at the end of the experiment was the zigzag shaped edge of the alveolar limbus in the region of the first premolar (figure 2)

CONCLUSIONS

1. Periodical rendgenography of the mandibles revealed that the fastest process of sanation occurred in the alveola of the one-rooted first premolar and lasted for 7 months after the extraction.

2. Intraalveolar shadows of the mandibular P2, P3 and P4 became as intense as the shadow of the alveolar bone on the X-ray pictures taken in the 8th month postextraction.

3. The sharp laminar shadow surrounding the alveolas, was not apparent on the rendgenograms of P1 obtained 6 months after the extraction. The same change involving the places of P2, P3 and P4 was established one month later.

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RENDGENO OŠKI NA AZ REGENERATIVNIH PROMENA NA A VEO AMA POS E VAĐENJA ZUBA DONJE VI ICE KOD PASA

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SADRŽAJ

Rendgenološkom dijagnostičkom metodom ispitivali smo regenerativne promene na alveolama izvađenih premolara donje vilice. Eksperiment je izveden kod nemačkih ovčara starih oko 10 meseci, telesne mase 20-27 kg. Psi su bili

podeljeni u dve grupe, u kojima se nalazilo po pet jedinki. U prvoj grupi izvršena je ekstrakcija P1 i P3 premolara, a u drugoj P2 i P4 premolara. U periodu od osam meseci posle vađenja zuba na rendgenskim snimcima smo mogli pratiti proces ispunjavanja alveola, kao i gubitak drugih parametara na osnovu kojih je zaključeno da li je nekada bio zub ili ne. Alveole su se najranije (za 7 meseci) ispunile kod jednokorenih P1 zuba, dok je regeneracija alveolarnih prostora kod ostalih premolara bila oko 30 dana duža (tj. trajala je 8 meseci).