Observations Regarding Dental Composite Restorations for Tooth Repair in Dogs.

Florin BETEG, Aurel MUSTE, Laura SCURTU, Loredana HODIȘ

Abstract. The most common form of tooth repair in human dentistry is filling cavities. Carious decay is uncommon in dogs and almost nonexistent in cats. When found in dogs, cavities are treated by dental restorations (fillings) just as for people. Carious lesions are most frequently identified on the occlusal surfaces of molar teeth in dogs. Dental cavities are often present on both sides and in some dogs they are on the upper and lower dental arches. Early lesions are diagnosed by observation and investigation of discolored areas of teeth. Soft enamel may be detected using an explorer probe. These lesions progress into the dentin. The dentin is "demineralized" by the decay process. Dental radiographs confirm the presence and the extent of these lesions (Duncan , 2010). The earlier these lesions are diagnosed the greater is possibility of saving rather than extracting these teeth. Early cavities involve damage to tooth enamel and dentin. Longer term tooth decay results in pulp inflammation, infection. These teeth must be treated by root canal therapy or by dental extraction. Carious lesions may be restored by performing "cavity preparation" and the placement of composite restorations (fillings). Restorations are performed using a composite resin, which is supplied in a soft, moldable form. After rebuilding a tooth the composite bonds to the tooth and becomes nearly as hard as a normal tooth by exposure to an ultrabright light, called a curing light.

Keywords: dogs, tooth, repair, dental, restorations.

INTRODUCTION

Caries is one of the most common of dental diseases in humans. Caries has been defined as "a disease of the calcified tissues of the teeth resulting from the action of microorganisms on carbohydrates, characterized by decalcification of the inorganic portions of the tooth and accompanied or followed by disintegration of the organic portion" (Hale, 2009).

Signs of dental carie progression include red and swollen gums, difficulty chewing and, in advanced cases, bad breath resulting from periodontitis. In rare cases, your dog may even begin to uncontrollably vomit and drool. Caries results from bacterial decay of the tooth structure brought about by the release of acids from oral bacteria fermenting carbohydrates on the tooth surface. Therefore, a diet high in highly refined and easily fermentable carbohydrates will favor the development of caries. Factors which must be in place for caries to develop include: natural tooth structure with susceptible surface exposed to the oral environment, complex indigenous microflora, and food ingested by mouth. Caries can be classified by location as pit and fissure caries, smooth surface caries, or root surface caries (Duncan , 2010).

Early tooth decay is detected with the explorer probe as soft enamel and dentin. Tooth decay and cavities are diagnosing with an increasing frequency in dogs. The earlier these lesions are diagnosed the greater is possibility of saving rather than extracting these teeth. Theses teeth must be treated by root canal therapy or by dental extraction. It is essential to take and evaluate dental radiographs before deciding to treat or to extract these teeth. Carious lesions may be restored by performing "cavity preparation" and the placement of amalgam or composite restorations (fillings) (Stansbury, 2000).
MATERIALS AND METHODS

Observations and investigations were conducted on a total of seven dogs in the Surgery Clinic of the Faculty of Veterinary Medicine Cluj-Napoca listed in the table below (Tab.1).

Clinical cases in the study.

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Breed</th>
<th>Sex</th>
<th>Age</th>
<th>Diagnosis</th>
<th>Triadan Numbering System</th>
<th>Decay Localisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Common Breed</td>
<td>M</td>
<td>11</td>
<td>Decay</td>
<td>309</td>
<td>Labial</td>
</tr>
<tr>
<td>2</td>
<td>Common Breed</td>
<td>M</td>
<td>11</td>
<td>Decay</td>
<td>409</td>
<td>Oclusal</td>
</tr>
<tr>
<td>3</td>
<td>Cocker Spaniel</td>
<td>F</td>
<td>8</td>
<td>decay</td>
<td>108</td>
<td>Oclusal</td>
</tr>
<tr>
<td>4</td>
<td>Common Breed</td>
<td>M</td>
<td>10</td>
<td>Atrition</td>
<td>304,404</td>
<td>Distal</td>
</tr>
<tr>
<td>5</td>
<td>German Shepherd</td>
<td>F</td>
<td>14</td>
<td>Atrition, Tartar</td>
<td>102</td>
<td>Distal</td>
</tr>
<tr>
<td>6</td>
<td>G. Shorthaired Pointer</td>
<td>F</td>
<td>12</td>
<td>Decay</td>
<td>310</td>
<td>Mesial</td>
</tr>
<tr>
<td>7</td>
<td>Fox Terrier</td>
<td>M</td>
<td>7</td>
<td>Decay</td>
<td>209</td>
<td>Oclusal</td>
</tr>
</tbody>
</table>

Oral examination was performed in most cases after sedation of patients with Domitor. In this direction, was examined the appearance of bucal mucosa, presence of tartar and plaque deposits and performing the proper occlusion. For inspection of incisors, canines and premolars at the level of labial face, mobilizing by an exploratory probe was sufficient; to investigate more thoroughly the application of a mouth speculum and a mirror was used to observe the palate, lingual face of the molars and premolars, but also to protect and to reflect mouth soft tissue. We also observed in one patient fracture of portions of the cusps and oclusal dental caries on the vestibular side of a mandibular left molar(309)(Fig.1).

![Dental decay on 309(left mandibular molar)](image)

To performe the light-curing composite restorations have made general anesthesia with NLA (neuroleptanalgesia) with Domitor and Ketamine. Because in patients with dental disease general status is only rarely changed, we consider the use this anesthesia is the best because after completion of maneuvers to performe the restorations, anesthesia was antagonized with...
Antisedan, the animal will recovery in minutes, moving on their feet and no longer needed supplementary supervision efforts and manipulations for transport of canine patients. We did not used the endotracheal intubation in patients because limit the maneuvers that are performed for dental restorations. Loco-regional anesthesia, depending on the location of the caries process can be: the infraorbital nerve block, and alveolo-mandibular nerve block.

Oral cavity and decay lavage. After preoperative clinical examination and general anesthesia, we performed a lavage of the oral cavity and the carious cavity with saline, or use a chlorhexidine solution to reduce the concentration of germs in the mouth, followed by desiccation of decay and mouth. Carious cavity preparation. Cavity must be prepared in accordance with rules of restoration procedure by adhesion. The occlusal edges will be beveled to improve mechanical retention. Thus, using adequate bur was performing a 30-40 degree angle at the margin of carious cavity (Fig. 2).

![Fig. 2. Carious cavity preparation with dimond bur turbine](image)

For cavity caries preparation and enamel perforation we used a diamond bur turbine. Rotation speed up to 350,000 rpm with water spray cooling. In the time it reaches the dentin to clean was used an angle handpiece with globular bur and I avoided opening the pulp chamber. Carious cavity lavage and desiccation. After cavity preparation it requires a lavage with water pressure jet to remove particles of enamel and dentine resulting in preparation time (Fig. 3). After cavity lavage desiccation it was realized with a jet of air. We performed very well drying of cavity because etching gel can be applied only on desiccated tissue.

![Fig. 3. Carious cavity after lavage and desiccation](image)

Etching gel application. Etching operation is that in the tooth is created microporosity and composite material that is fixed, generating micoretention between the tooth and it.
Phosphoric acid is the most used etching agent. We applied Kerr-Etch Gel (37.5% concentration of phosphoric acid) on the cavity surface and let it stand for 20-30 sec (Fig.4).

**Lavage and desiccation of cavity after etching application.** After etching application is washing up to 10 seconds, but no longer than 20 seconds and drying to be done well, because humidity may limit the ability of coaptation of the composite material in the cavity.

**Bonding applying.** Bonding is a substance, a binder, an adhesive that improves restoration retention and is helping to better marginal adjustments while providing protection against toxic action of the tooth-composite resin. Brushing, slightly rubbing of the bonding on the cavity surface is more appropriate than using the air to spread in thin uniform layer (Fig.5).

**Curing light of the bonding.** After application and uniform spreading of the bonding for 20 sec, its curing is for strengthening (Fig.6).
Application and photopolymerization of composites resins. Application of the composite resins can be performed both with plastic or stainless steel spatula and then shaping into desired shape (Fig. 7.). The material is then pressed into the cavity for better coverage areas and ensuring complete filling. When using light-curing composites resins applied layers thickness should not exceed 2 mm for correct and complete photopolymerization of the material.

Fig. 7. Composites resins application.

Polymerization of each layer of filling is needed is for 40-50 sec (Fig. 8).

Fig. 8. Photopolymerization of the composites resins

Finish (polish) of the filling. After hardening of the composite resins is grinding, finishing and polishing. Filling was adjusted either with diamond burs, polishers parts, rubber polishing, to remove excess material and obtain fine edges. Subsequent polishing of the finished filling was made with rotative brush and polishing paste (Fig. 9).
RESULTS AND DISCUSSIONS

Because the clinical status of animals presented to the clinic on suspicion of dental disease or a generally periodical exam is little or very little modified we proceeded to sedation and their anesthesia with moderate doses of anesthetic in order to ensure comfort for the medical procedures and recovery from anesthesia to be as easy.

Considering written above, reversible anesthesia in the interventions what we have performed for dental fillings and tooth structure restoring, was made by using anesthetic combination (NLA): Domitor with Ketamine - Antisedan, they solve the problem elegantly offering both stability and comfort during the surgical procedure and the recovery from anesthesia being done without any problem. Following research conducted on the 7 dogs we observed that most carious disorders were located on molars and premolars.

None of the patients examined showed no cavities in the incisors and canines, without excluding the occurrence of caries and processes as a result of untreated dental fractures, or irrational food. Moreover, we observed no decay to the mandibular premolars, but frequently found carious lesions in the maxillary premolar 4 (carnasier).

At the time carious cavity preparation will avoid sharp edges and forming angles too sharp. Adhesion technique should be used to achieve optimum marginal seal and strong adhesion. In terms of light-curing of composite materials, they adhere well to the cavity, but cleaning cavity must be well executed (Tutt, 2006; Hale, 2009). Cleaning will be performed with great care and will eliminating all modified structures until healthy tissue and avoid opening the pulp chamber. Etching is usually carried out in 30-40 sec for enamel and 10-15 sec are sufficient for dentin. Research has shown that shorter periods of demineralization of enamel are as effective as 60 seconds demineralization in humans.

An etching of 120 sec creates at the cavity surface an insoluble precipitate of calcium which prevent joining of correct and firm bonding. The entire surface where was applied the etching gel will be covered with bonding solution. To obtain optimal polymerization the light source will be maintain closer to the filling surface. Fillings composed of several layers will be polymerize around for 40-60 sec. If the fillings thickness is greater than the power of penetration of the light source, layer by layer is recomended to be polymerize (Puckett, 2007). There are also a number of factors that can negatively influence curing: time of exposure, wear light bulb lamp (Gorrel Cecilia, 2004). As the characteristic of race was not observed cavities in dogs of a certain race, or different size. However in terms of age, the majority of dental caries we have seen in dogs over the age of 9-10 years.
All patients were regularly checked to detect any changes regarding resins applied so
and on the tooth integrity after restoration procedure(Fig.10)

![Image](image_url)

Fig.10. Composites resins restoration 3 months after procedure on 309

The owners have been trained in the hygienic-dietary regime of dogs after restoration
procedure, on at least manage their first day post-restoration of a liquid allowance consists of
soups, and in the coming days to move to a regular diet(Muste, 2008). Emphasize that it is very
important to avoid frequent or not at all the bones in place of food and especially those cattles
(beef), is preferable bones "artificial" that help and contribute to massage and protect gums.
Bone feeding could lead to cracks, crevices, partial or total fracture of the
photopolymerizable fillings.

CONCLUSION

1. Tooth decay or caries process is well represented morbid entity for dental diseases
in dogs, which at the time of their advancement in depth cause pain and discomfort to the
patient owner.

2. Dental (restoration)fillings is a conservative solution for the treatment of dental
caries, preferable to radical variant represented by tooth extraction.

3. Dental fillings made at the appropriate time convey the occlusal and masticatory
function, patient could continue his normal life without too much food and behavioral restrictions.

4. Photopolymerizable fillings are superior to other types by physiognomic point of
view, the strength, durability and appearance of the prosthetic.

5. Composites resins fillings with light-curing requires equipment and materials
perfectly adaptable from human dentistry, maneuvers of achievement it's completely
overlapped with those in humans.

6. General anesthesia the type NLA (neuroleptanalgesia) for the dental fillings, made
with Domitor and Ketamine provides the required comfort and presenting additional
advantage by possible antagonism with Antisedan, immediately after completion of the
intervention, the patient moving on own feet.

7. Regardless of the location(occlusal, mesial, labial or lingual) of the
photopolymerizable filling for their sustainability, will devote particular attention to food and
hygiene management.
REFERENCES