

## Root Canal Therapy for Multiple Broken Teeth in a 5-year-old German Shepherd Dog



Figure 1 – “Yasko”

“Yasko” (figure 1), a 5-year-old male German Shepherd Dog trained for personal protection, was presented for assessment of broken teeth that were noticed in recent months. This would have gone unnoticed, except there was some slight enlargement of a lymph node on his face that was visible to his owner. Upon further investigation, it was determined there were at least 3 broken teeth with exposed pulp chambers. The next steps were pre-anesthetic blood testing followed by anesthesia to allow a more complete tooth-by-tooth exam and dental radiographs. In Figures 2 and 3, you can see broken upper right canine, lower left 3<sup>rd</sup> incisor and lower left canine teeth, all with open pulp chambers. When pulp exposure is present, there are 2 main options, endodontic therapy or surgical extraction. Endodontic therapy is treatment of the inside of the tooth and can be root canal therapy in older fractures or vital pulp therapy in fresh fractures of less than 2 weeks duration in patients less than 18 months of age, or less than 2 days for patients older than 18 months of age. In most cases, we do not know the precise timing of the tooth trauma which makes root canal therapy the more common endodontic procedure performed, if the tooth is mature enough. Tooth maturity is an important factor because the apex at the root tip must be closed to allow cleaning, disinfection, sealer placement and

filling of the root canal and final restoration. In this case, the canine teeth appear to have been broken at a young age based on the wide diameter of the root canals on dental radiographs. Figure 4 is a dental radiograph that shows the most apical portion of the lower canine teeth with an obvious discrepancy in root canal diameters. The wider canal is the non-vital tooth that stopped maturing when the pulp died. This tooth will not be as sturdy as the opposite tooth that has thicker walls, but with successful root canal therapy, it can remain in the mouth and continue to function.

In this case, “Yasko” has a job to do that would require he have his canine teeth intact. We performed root canal therapy which was very challenging due to the long duration the canal was open allowing hair, sand, pieces of chew toys and other debris to fester inside the wide canal (Figure 5). Once a fracture occurs that exposes the pulp chamber, the pulp tissue swells which can keep the canal free of infection for a short time. If it is not treated with vital pulp therapy in a timely fashion, it will become contaminated and eventually shrink and die. In this case, the pulp underwent liquefactive necrosis which is a process where the blood rich pulp tissue rots. Successful root canal therapy is essential for the teeth to be salvaged.

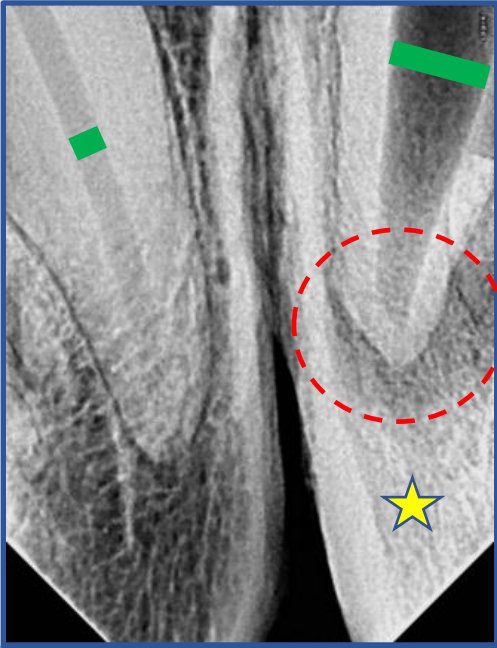
The process of root canal therapy requires access to the root canal including the apex of the tooth which is the very end of the root. On dental radiographs lesions of endodontic origin can be identified where bone density is decreased by inflammation (Figure 4). The goal of therapy is to remove the necrotic pulp tissue and diseased dentin, disinfect, rinse and dry the canal system, seal the canal (Figure 7), obturate (fill) the canal (Figure 8), place intermediate and final restorations (Figures 9 & 10). Dental radiographs are taken during the procedure and upon completion to assess each step. Most of the time, oral antibiotics are given to resolve infection that could remain around the tooth root in the bone. “Yasko” was prescribed clindamycin twice daily for 4 weeks. Carprofen and tramadol were prescribed for 3-5 days for pain control.



Figure 2 -broken upper right canine tooth with pulp chamber exposure



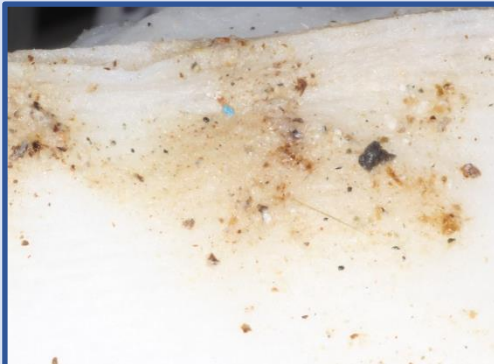
Figure 3 – Broken lower left 3<sup>rd</sup> incisor and canine teeth with pulp chamber exposure



**Figure 4** – Dental radiograph showing canal diameter disparity (green lines). The tooth on the right is the lower left canine tooth. There is an obvious periapical lucency (dashed lines) surrounded by more dense bone (star)

He was doing well 2 days post op at the time of this publication. The owners were instructed to assess any changes in habits and activity levels now, and once antibiotic therapy has been completed. The measures of success are radiograph appearance at subsequent visits (6 months then annually), patient’s energy levels, use of mouth (previously reluctant) and resolution of draining tracts and swelling. If there is worsening of periapical inflammation, the root canal procedure must be repeated, or another procedure called an apicoectomy or surgical root canal performed. A surgical root canal procedure removes the root tip which is usually responsible for ongoing contamination.

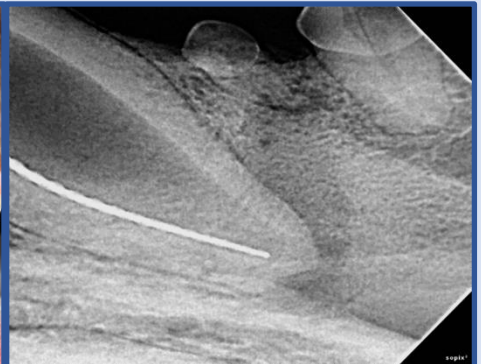
In cases like this, where there are huge canals, it is not possible to physically file debris. The endodontic files cannot hit all walls of the canal (Figure 7). We rely on chemical disinfection with full strength bleach for extended time periods in combination with use of an EndoVac endodontic vacuum system (Figure 6). This vacuum stirs the contents of the canal and allows more dilution of contaminants with reduced risk of extrusion of bleach into the surrounding tissues, which would be disastrous. Less severe cases will have 15-30 minutes of contact time with dilute bleach, however in this case there was at least 60 minutes of contact time with full-strength bleach with frequent replacement and flushing with sterile saline. Areas of concern in this case are some voids which are created by calcification in the apex of the canal or reduced ability to file. It is my hope that chemical disinfection and sealing will be sufficient for clinical success.



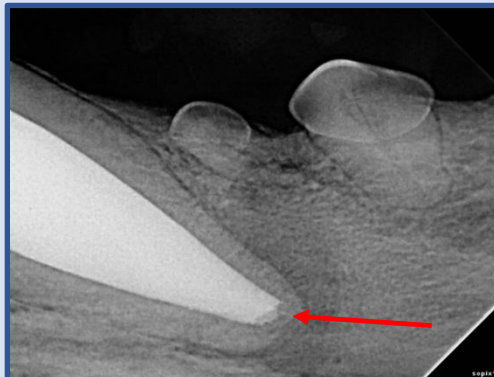
**Figure 5** – Debris from root canal (hair, sand, pieces of chew toy and more)



**Figure 6** – EndoVac (Kerr Endo) being used on a different patient to disinfect and rinse canal



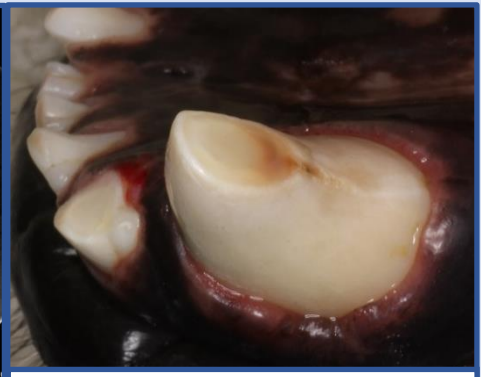
**Figure 7** – Endodontic file in canal illustrating size difference



**Figure 8** – Canal filled with sealer and gutta percha to isolate the tooth from the body. Minor canal defect of uncertain significance (red arrow)



**Figure 9** – Intermediate (red arrow) and final restorations (green arrows)



**Figure 10** – After photo of finished root canal procedures on lower left 3<sup>rd</sup> incisor and canine teeth. Compare to figure 3