Root canal therapy setting your teeth on edge?

Feature: Case report from Bristol Zoo

Every endodontic treatment is different. However, if you as a dentist have only half an hour before risking your life, if your patient weighs about 22 stone (139.71 kg) and if his canines are 14 cm long, you are literally in the lion’s den.

Root canals come in all shapes and sizes. There are multiple canals, hidden accessory canals or even horizontal branches. And sometimes root canals are just unusually long. In the case of my most prominent patient so far, the root canal was 9 cm long to be precise. It was a fine male specimen of Panthera leo persica, an Asiatic lion. When I received a call from Bristol Zoo to say that they had an adult lion with an apparent tooth problem, I was rather intrigued to say the least.

It turned out that the patient was a 17-year-old Asiatic lion named Kamal. The zoo’s veterinary surgeon informed me that the animal was suffering from a fractured canine tooth and was unable to chew on bones. After our first conversation, we needed to come up with a special treatment plan. Leaving the infected tooth untreated would have meant a painful deterioration in his condition, which would ultimately lead to an infection in his mandible, making life even more difficult for the poor animal.

As a veterinary dentist, I have worked on thousands of cats and dogs during my 28 years in practice. In terms of anatomy, the canine was very similar to that of my regular patients; it was just scaled up in proportion. Radiographic examination (Figs. 1a & b) showed evidence of an infection around the root apex. Root canal therapy was indicated. Before our patient was ready to undergo surgery, we had to order extra-long endodontic files from the US that would fit into a 9 cm-long root canal. The only files fit for the purpose are so-called “Tiger Files”. These Hedstrom files are 12 cm long.

Operating in less than 2 hours

One of the challenges we faced was the time constraints we would be working under; the whole procedure had to be done as efficiently as possible.
Owing to his age and the fact that the lion was anaesthetised in field conditions (not in a hospital), we did not want the lion to be anaesthetised for too long. We thus had to come prepared. In advance, my team and I had to obtain the correct equipment for such a special treatment. The Swiss dental specialist Coltène/Whaledent provided us with a fast-flowing filling system (GuttaFlow 2), which helped us tremendously in keeping down the treatment time. In this case, we definitely had to reduce “chair time”, if you know what I mean.

The operation was performed on-site at Bristol Zoo. After the lion was anaesthetised and placed on the operating table, we had to perform the treatment quickly. Dispensing with a dental dam owing to the special circumstances, I started to clean and shape the canal with the Hedstrom files. Their effectiveness in terms of swift dentine removal was a great benefit to us. Irrigating the canal did not prove to be easy either. The main cleaning agent was a sodium hypochlorite solution with a concentration of 5%. A feline urinary catheter was used for flushing.

After all necrotic pulp tissue and dentine shavings had been successfully removed, the canal had to be obturated with a reliable permanent filling. It goes without saying that the average masticatory force in lions is considerably larger than it is in human beings. We placed a single master gutta-percha point with the help of a plugger. The master point was 60mm long and covered with GuttaFlow 2. This new filling system combines cold free-flow gutta-percha and a sealer to create a fast-flowing filling material that is easy to handle and provides a reliable barrier against bacteria and liquids re-entering the root canal. Its working time is approximately 10–15 minutes. After placing the gutta-percha in the canal from the syringe, it was carried into the canal using the Hedstroem files. Even in these unusual working conditions, handling was easy and the application of the material really straightforward. The short working and curing times helped us to establish a safe seal for the canal within minutes. After the successful obturation of the canal, the final restoration was created with a layer of glass ionomer and a normal nano-hybrid composite. It took us less than 2 hours to complete the whole procedure.

Conclusion

The needs of a very large feline patient are not that different to those of a human patient. The key to a successful endodontic treatment is the effective and complete removal of any infected tissue, as well as quick and safe obturation of the canal. New, innovative filling systems have excellent flow properties.

They are easy to handle and help to speed up treatment sessions. Two-in-one products, moreover, combine sealer and gutta-percha in powder form to guarantee a tight seal of the root canal for optimum protection against reinfection. And reduced chair time is a big bonus to the dentist, whether treating children, patients with dental fear, or lions.

Fig. 3. Filling the root canal with GuttaFlow 2.
Fig. 4. Radiographic control.

Dr Peter Southerden is a recognised European Veterinary Dental Specialist. He is the founder of the Eastcott Veterinary Clinic and Hospital in Swindon in South West England, where he sees referred dentistry, and oral and maxillofacial surgery cases. He is a regular presenter at both UK and international veterinary conferences.