

# **TOOTH REMOVAL IN AN ELEPHANT**

## **MAXILLARY MOLAR EXTRACTION...A PICTORIAL**

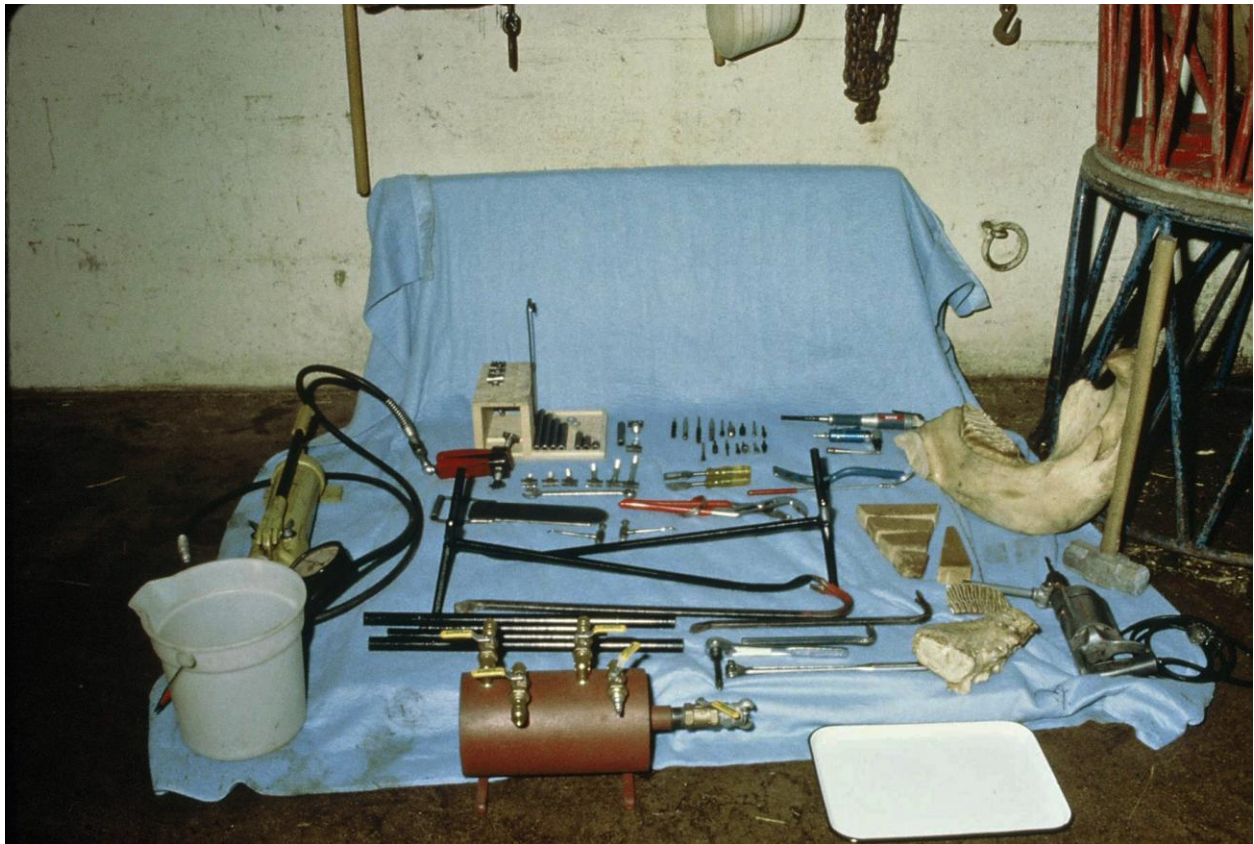
Elephants have 6 sets of molars during their lifespan. They go through the first three sets in 15 years; the remaining three sets last 15 years each, so elephants have molars until they are about 60 years old. After that, no teeth are left, and if an elephant were to live this long, she would die of starvation.

Elephants have “teeth buds” in the back part of their mandible (lower jaw) and maxilla (upper jaw). As each set of molars erupt and enlarge, they slowly migrate forward. When they reach the front of the mandible and maxilla, the roots are reabsorbed, and the crown falls out, usually in pieces. While this is happening, the next molar is coming in behind the older one.

In 1983, Babe was a 37 year old, Asian Elephant living at the Brookfield Zoo in Chicago, IL. Over a 6 month period she lost 1200 pounds of body weight. The zoo had the local police department bring out portable truck scales to weigh all the elephants. She was on her 5<sup>th</sup> set of molars. As the molars on the right side of her mouth moved forward, they somehow turned about 20 degrees and angled upward (or downward for the maxillary molar). The teeth on the left side were normal, but their grinding surfaces couldn't make contact due to the malpositioned teeth on the right side. As a result, she couldn't grind and chew her food and thus lost all this weight.

The decision was made to remove the molars on Babe's right side. This was accomplished during two separate surgeries about 6 months apart. The first surgery, shown here, involved the extraction of the right maxillary (upper) molar.

A team of human dentists (lead by Dr David Fagan, dental consultant to the San Diego Zoo) and zoo veterinarians worked together to perform this unusual surgical procedure...successfully.



**Fig 1 and 2: Babe is chained to the floor to keep her restrained and held in place. A belly band will be positioned around her body so she can be hoisted up after surgery if she won't get up on her own. Note band in doorway and chain hoist above her head. A photo of the dental equipment we either custom made or borrowed from the zoo's machine shop. Elephant mandible shows molar in normal position.**



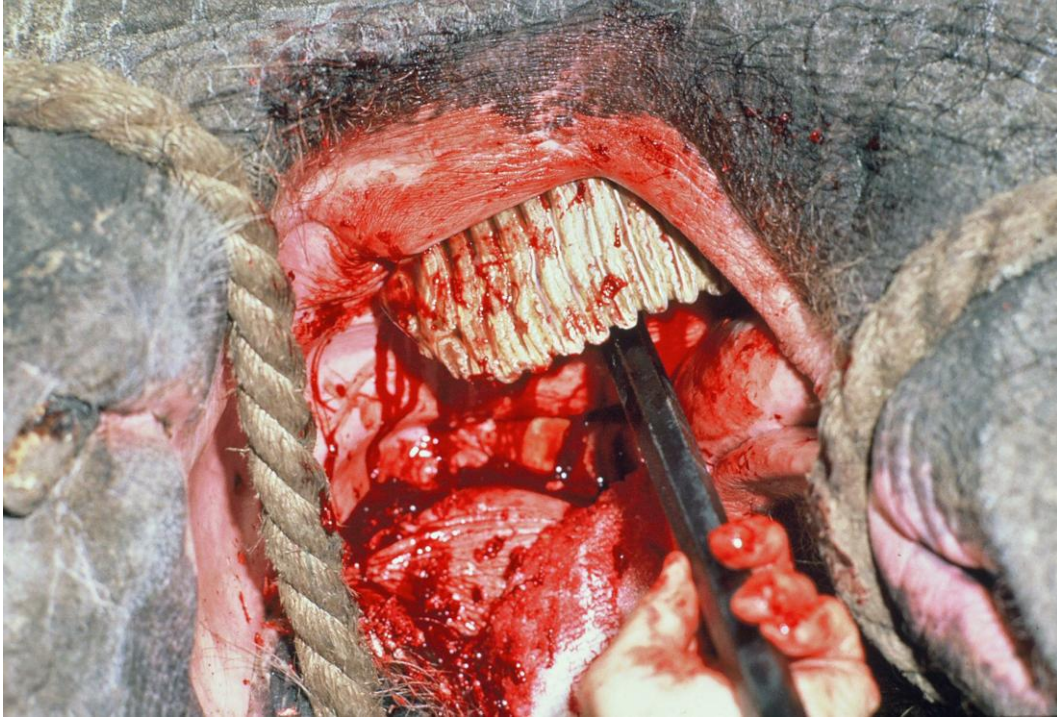
**Fig 3 and 4: Babe is injected with a dose of M-99 (Etorphine), which is a synthetic opium derivative like morphine, only much more potent. Keepers are in place with ropes to pull her down on her left side. That's me giving the IM injection. As the drug takes effect 10 minutes later and she starts to go down, everyone starts pulling as hard as they can. She needs to go down on her left side because we can't turn her over.**



**Fig 5 and 6: She is down and bedded on straw. IV's will be started in two ear veins. Heart monitors will be connected. We didn't intubate her trachea because the mouth is so small that there wouldn't be any room to work. Ropes are positioned around the base of her lips (left side) and truck (right side). These were anchored and pulled tight to open her mouth as much as possible. The upper molars are visualized. The upper right will be removed.**



**Fig 7 and 8: A chisel was used to separate the gingiva (gums) from around the tooth. We could only do this on the lingual (tongue) and the rostral (front) surface of the tooth. The skin over the maxilla was so thick and taunt that the buccal (cheek) surface of the tooth was unapproachable. We then used a drill with a  $\frac{3}{4}$  inch bit to drill 5 evenly spaced holes in the maxillary bone along the edge of the tooth. The holes were about 3 inches deep.**



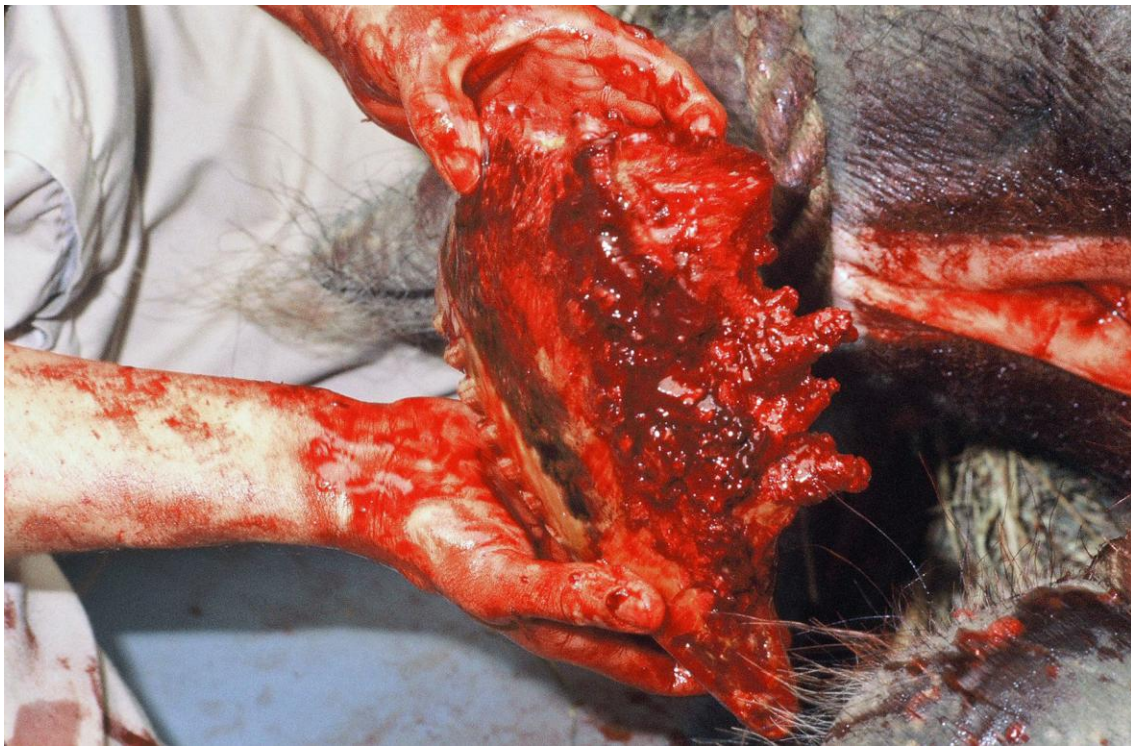
**Fig 9 and 10: A modified crowbar was inserted into one of these holes. We took turns pounding it in with a sledge hammer.**



**Fig 11 and 12: The modified crowbar had handles welded onto the top which could be turned to provide better leverage and torque to help loosen the tooth.**

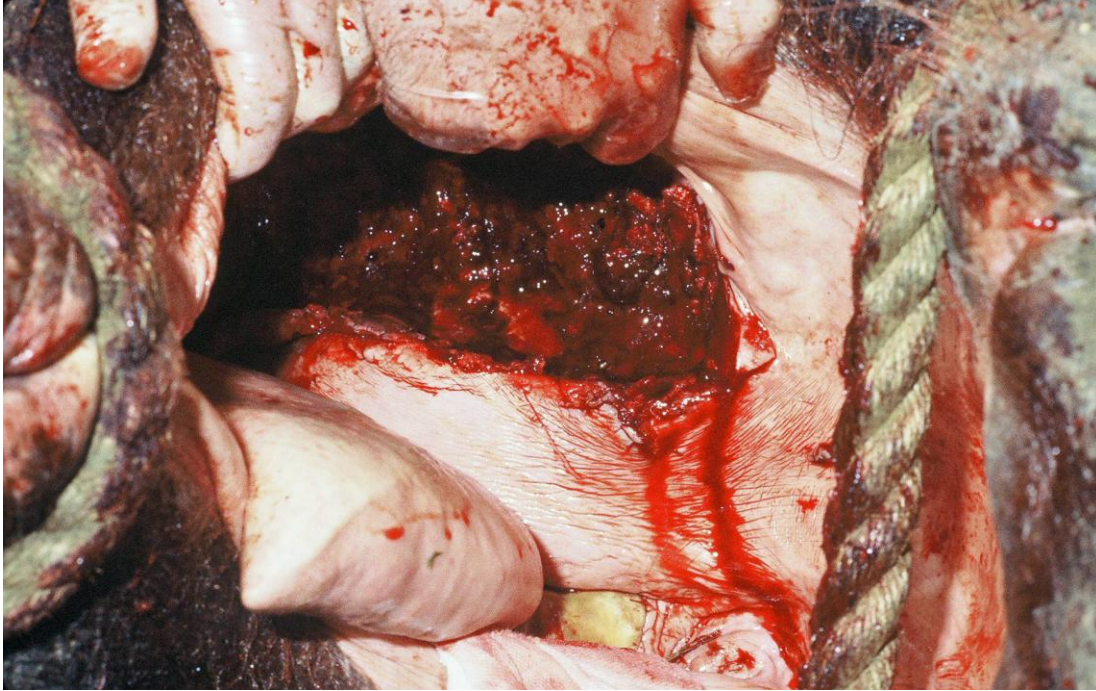
**Panoramic view of the surgery. Notice all the press taking pictures for the local newspaper and getting ready for a story on the nightly news.**





**Fig 13 and 14: Will this tooth ever come out? We would pound in the crowbar and torque it. We would remove it, pound it in the next hole and torque it again. Then on to the next hole. We did this continuously for two hours. It was a bloody ordeal. Then suddenly, the tooth just loosened and fell out. Notice the unusual root pattern.**





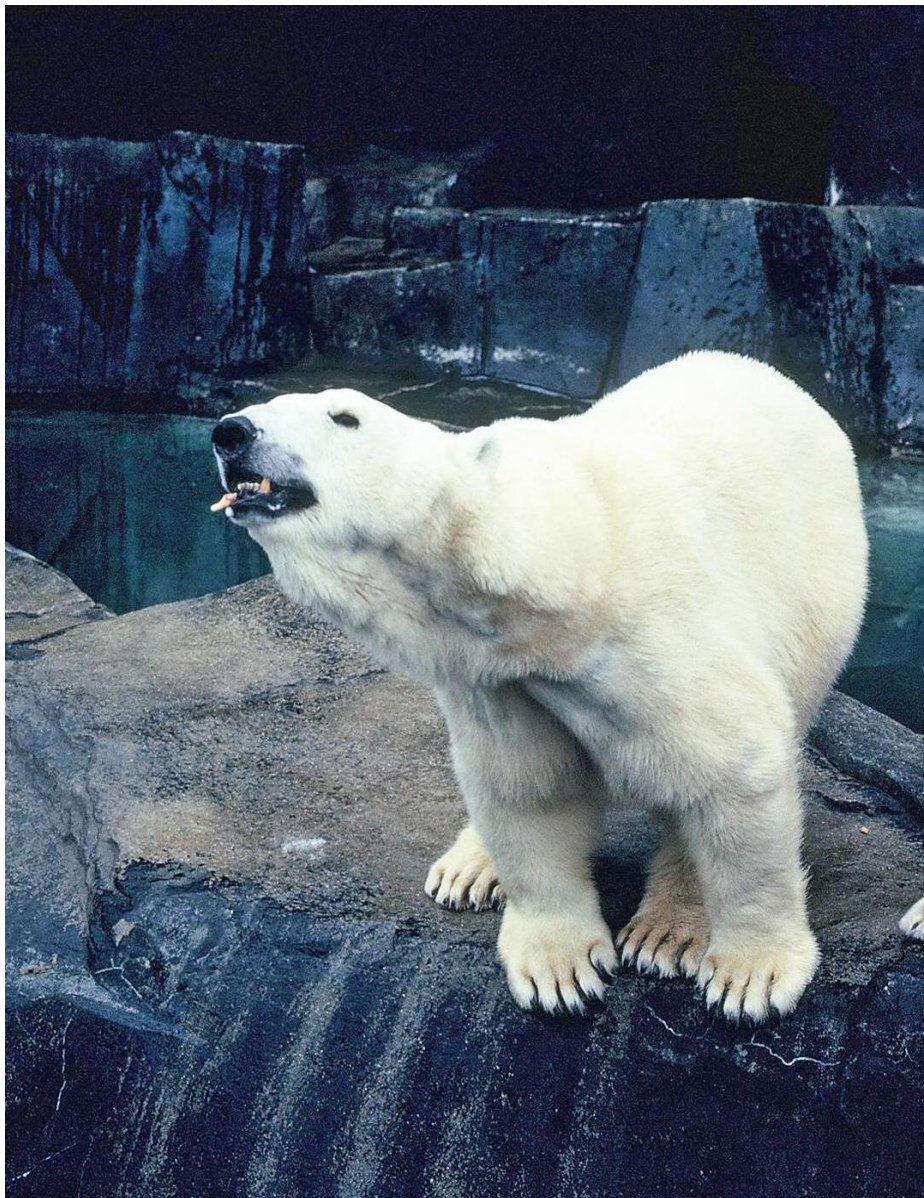
**Fig 15 and 16: The empty socket. This was flushed out several times each day with a garden hose by one of the keepers. Penicillin was administered by injection for several weeks. The anesthetic was reversed with an antagonist drug and within 20 minutes she was up...mostly on her own, but with a little help from the chain hoist.**



**Fig 17: The tooth weighed 6 pounds. The second surgery six months later to remove the mandibular molar was also successful. Babe regained most of her lost weight, now that she could grind her left molars properly. Over the following year, the next (and last) set of molars on her right side began to erupt and ultimately migrated forward in a normal manner. Babe lived for 12 more years before dying of other causes.**

## ROOT CANAL IN A POLAR BEAR

Trisha was an adult, female Polar Bear. One morning keepers noticed that her lower right canine tooth was dangling from her mouth. The decision was made to sedate her, with the intention to either extract or save the root. For this procedure, a local human dentist, Dr Ray Kotz, was brought in to assist with the surgery.





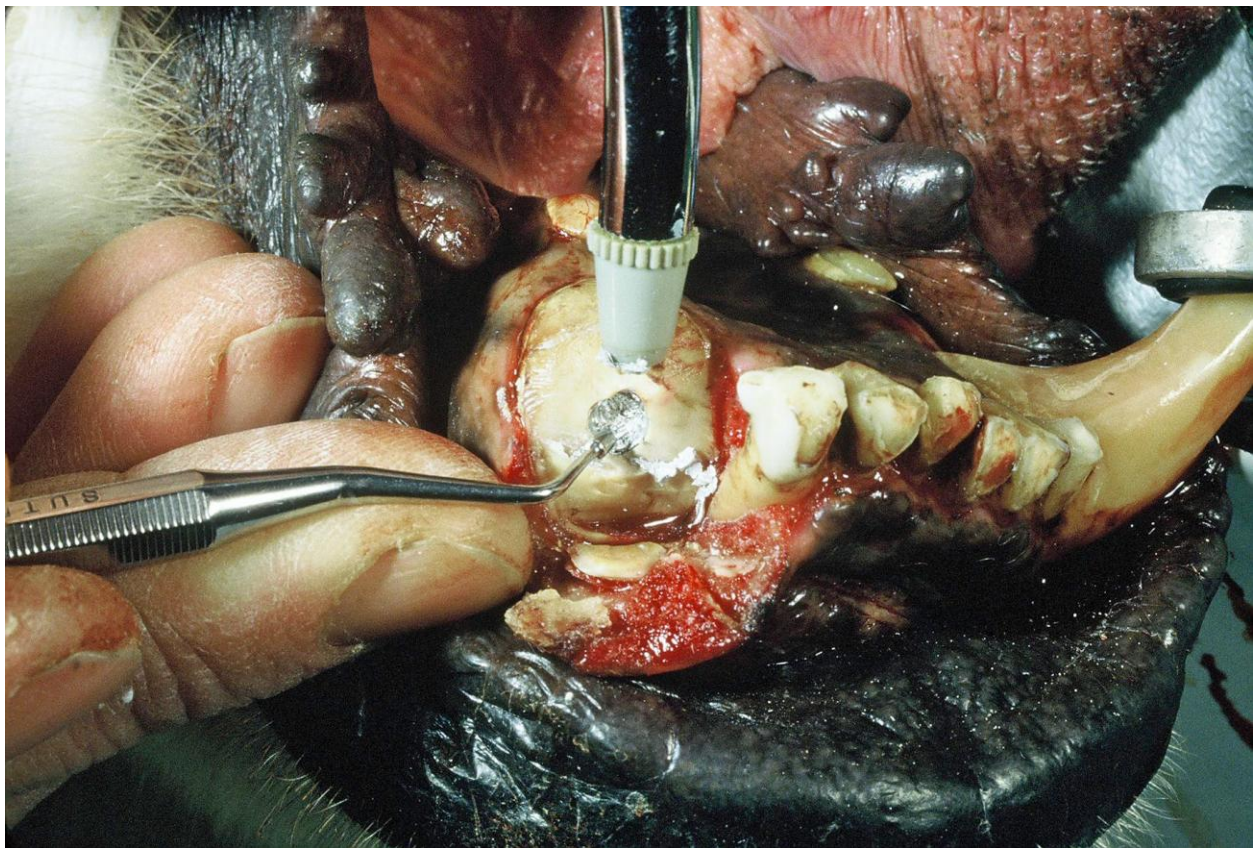
**Fig 2 The bear was lured into a holding cage behind the grotto. She was then immobilized with M-99 (a very strong opioid anesthetic) using a dart fired from a CO2 powered pistol at short range. Once immobilized, she was lifted onto a gurney by zoo personnel and transported to the animal hospital in a pickup truck. We all posed for a picture. Dr Kotz is at far right.**



**Fig 3 The bear weighed 625 pounds according to our truck scales. It took at least 10 people to lift her off of the truck onto the hospital loading dock. The bear was positioned onto the examination table.**



**Fig 4 and 5: The crown of the canine tooth was lost. We don't know if she swallowed it or if it fell out during the immobilization process. We never found it. The injury not only sheared off the crown, but also damaged gingival tissue and mandibular bone in front of the tooth. The exposed pulp canal is very evident. Extraction of the remaining root was ruled out due to its immense size. The girth was more than double that of the crown and it coursed back into the mandible at least 4 inches. Instead, an endodontic procedure (root canal) was performed. The pulp tissue was removed, the canal cleaned, dried, and filled, then metal amalgam placed over the opening. The damaged gingiva and bony fragments were debrided.**



**Fig 6: The bear recovered uneventfully. She showed no obvious signs of discomfort and maintained a healthy appetite. She was kept on injectable penicillin for one week (administered with CO2 pistol).**

