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## **MAGGOT, A REMARKABLE RHINOCEROS**

## RHINOCEROTIDAE CERATHOTHERIUM SIMUM, SIMUM WHITE RHINOCEROS

The species belongs to the group "Perissodactyla" odd toed ungulates along with Tapiridae, and Equinae, and the toenails of each appear to be homologous.

The patient's name is "Maggot", female and approximately twenty eight (28) years old, her estimated weight is two tons. The initial assessment revealed, a severe division of the toenail on the lateral aspect of the left front foot, (see Fig. 1 & 2).

The conformation of the Rhinoceros would suggest that load and weight bearing on the fore limb is mainly central to the limb when static. However this changes to lateral loading of the limb when turning to the left, and has a slight bias to the lateral aspect when moving in a straight line, this is a somewhat confirmed by the skeletal structure of the limb.

Discussion with Steward Elliot the veterinary surgeon revealed a major problem, because of the age and size of Maggot there was a time limit of approximately thirty minutes to complete whatever treatment was decided. Welfare of the animal took precedence over anything else. From the outset it was made very clear that if it became necessary, Maggot would be revived from the anaesthetic no matter what. After much thought an idea was put forward, would it be possible to apply a type of a shoe to prevent the crack opening any further, we both decided to ruminate on the possibility and then made a definite date to perform the operation two weeks later, even though we had not yet decided on how we were going to achieve the immobilization of the cracked toenail.

The fact that we had no data on the growth rates of rhino toenails, it was agreed that a stainless steel plate be fastened as far up the toenail as was possible and would be fixed with stainless steel self tapping screws and be assisted with an acrylic compound (**Bond-N-Flex**<sup>®</sup>). The main reason for this decision was that if the growth rate was comparable to that of a horse, or elephant (approximately 8mm to 10mm per month) we could be placed in a serious situation in terms of loading by applying a shoe to the bottom.

Shunting of the toenail upwards and jamming of



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Fig. 1



Fig. 2



the matrix could impair the blood flow and could cause irreversible damage to that part of the foot. The major concern with this in mind was to minimize the loading on the lateral toenail and cut away all the nail that was deformed and unable to function correctly, obviously leaving enough to attach the plate, fortunately this was possible due to the fact that the horn structure on both sides of the crack was bending from the mid-portion of



the nail (see Fig 1) leaving a good area for attachment of the plate.

Drawings were taken of the affected toenail and a comparative drawing of the opposite side toenail. This then gave us the area and size that we had to work with so the shape of the plate was designed to cover as much of the nail as possible.

The profuse amount of holes drilled in the plate gave us a lot of options for the placement of screws and the added advantage of adhesion with the acrylic.

Stainless Steel was chosen for both the screw and the plate because of their tensile strength and also their ability to withstand corrosion. The thickness of the plate was 2.5mm and the screw size selected was 6mm long and 3.5mm diameter. The screw length selection was to be a problem later on.

A small piece of toenail which had been acquired from



another foot was used to experiment with to ascertain the thickness of the stratum externum (nail wall), and also to test the texture. Due to the fact that it had been removed some considerable time earlier it was only possible to identify two things, one, the nail wall was measured at approximately 6mm thick, and two, there was a definite laminal structure bonded to the nail that appeared to be somewhat similar to that of some laminitic horses. Could we be looking at a rhinoceros with "Laminitis"?

A lot of thought was given to the tools and ancillary equipment required to perform the operation successfully and a list started to form in the minds of the three operators. From a farriery point of view the list included, Dremel with various burrs and sanding drums, half round and straight G.E. Hoofcutters, toeing knife, loop knife, searching knife, 14" rasp, **Bond-N-Flex**<sup>®</sup> gun and cartridge, acetone with clean muslin cloth, and an assortment of wooden blocks for supporting the foot.

A generator to run the Dremel tool was arranged, and a very large mobile crane with slings to move the rhino in the event of a problem arising during the operation was on standby close to the operation site.

Stewart Elliot and Martin Hosegood (veterinary surgeons) arranged their side and closely monitored "Maggot" throughout keeping us well aware of her condition and the amount of time we had to complete our tasks.



Stewart and Martin decided that the operation should take place at approximately six o'clock in the morning due to the weather conditions which were forecast as being extremely hot and we did not wish to add any extra problems to those that we already had.

Maggot was subsequently anaesthetized and after about seventeen minutes was in a very favorable position to start. The first priority was to shape and fit the plate to the nail, (I had previously altered the shape of the plate and roughly fitted it earlier to save time) when this was completed the area of attachment was thoroughly cleaned using the Dremel with an attached sanding drum. The plate was then placed on the nail and the holes were drilled in the nail wall for the reception of the screws, a small hand drill was used and a marker placed on the drill bit 6mm from the tip to prevent overdrilling. Plate and toenail were then degreased with acetone and made ready for the attachment. One screw each side of the crack located the plate in position then **Bond-N-Flex**® was applied under the plate and in the screw holes. This was then given a little while to activate and when it was starting to harden the other screws were placed in the pre-selected holes and screwed up to secure the whole area around the crack. The whole area of the nail wall distal to the attached plate (including the deformed laminae underneath) was then trimmed back as far as was possible to allow the nail to grow down without any loading or pressure.

We then proceeded to trim the other three feet where they showed excessive growth, and when this was completed Stewart and Martin administered the revival drug and Maggot was allowed to quietly awaken. From start to finish the operation took just thirty four minutes. Once she regained her feet it was possible to check the loading on the nail and the effect it had, if any, on the platel. At this moment in time everyone seemed to



think the operation to be successful however we did not know what factor the considerable weight of the animal would play. At this juncture I was dependant on the Rhino being closely monitored by the keepers, who would make sure that if any problems occurred I could be informed immediately.

I would like at this point to thank the following persons for their unselfish support and assistance in this very unusual and difficult operation. Stewart Elliot, MRCVS.

Martin Hosegood, MRCVS.

Michael Cox, FWCF.

Christopher Freeman, Head Warden, Woburn Safari Park.

Anne Stewart and Nick Whiting, who are responsible for the daily management of the Rhinoceros. I propose to update this report as and when I collect all the information available.





