

Case report of surgical treatment of a *Carcharhinus plumbeus* rectal prolapse

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Summary

In December 2009 an adult male sandbar shark (*Carcharhinus plumbeus*) housed in a 3000 m³ tank at the aquarium of Paris presented an intestinal prolapse. After a couple of days, natural replacement of the shark organ was not observed and the shark stopped feeding. Some marks of rectal laceration by tank mate bites were seen and an emergency action took place. The shark was caught in its exhibit aquarium with a net after injectable sedation. Then it was moved in a stretcher and restrained in a tank with anaesthesia in the water. After a complete clinical exam and intestinal exploration, the bitten and necrotic intestinal parts were removed and the intestine was put back in its physiological place. The clinical exploration and surgery was taken under complete anaesthesia during 45 minutes. The shark was then transported in a 20 m³ quarantine tank after specific medication. Fifteen minutes later it showed a normal swimming behaviour. Under corticoide and antibiotherapy the shark started feeding two days later with specific diet. At this time, it eats normally and should go in a month in another large tropical aquarium, with less sharks. Intestinal exploration and clinical exam revealed no intestinal perforation neither any cause of the prolapse stage. This is the first report of rectal prolapse treatment on a *C. Plumbeus*, it shows the difficulties of intervention and what should be improved.

Introduction

Intestinal prolapse in shark and other elasmobranchs is a common behaviour and was described and studied on blacktip reef sharks (Crow et al., 1990,1991), largetooth sawfish (Henningsen et al., 2005), manta ray (Clark et al., 2008) and other fishes (*Caranx ignobilis*). The flushing action may function to remove partially-assimilated, undigested matter or intestinal parasites (Crow et al., 1990). Normally, it's a quick phenomenon, 4 to 60 seconds (Crow et al., 1990) and is often inconspicuous. Some time in a closed exhibit, tank mates can quickly be interested in biting it. Many cases of mortality in aquarium, due to bitten intestine, have been published in the past (Crow et al., 1991; Henningsen et al., 2005), but none on *Carcharhinus plumbeus*. Some of them are necropsies finding. Even if shark's wounds healing abilities are well known, in this case veterinarian intervention is imperative. Experiences show that without quick intervention, the animal die after a couple of weeks by peritonitis or intestinal necrosis. Prognosis depends closely on time reaction and significance of wounds. If shark intestine is perforated, than prognosis is very poor due to peritonitis and long and fastidious surgical intervention. This article will relate this case story, what has been done and the difficulties encountered.

Case report

A male sand bar shark of 21 kg and 118 cm long, is held in a 3000 m³ tropical aquarium at the aquarium of Paris since 2004. This shark is the last of the brood, born in captivity at the Antibes aquarium. It is held in a tank with other bigger sandbar sharks, from the same brood, blacktip reef sharks (*C. Melanoptuerus*), guitar rays, nurse shark (*Ginglymostoma cirratum*) and lots of other fishes. The Curator staff saw some faeces like in the cloacae area. After a couple of days, "faeces" remained and the curator decided to consult us. No other shark showed the same pattern. We ask for underwater pictures that show that the remaining thing out of the cloacae was not faeces but the rectal part of the shark intestine. A clinical and surgical intervention was planned, and during this time the shark stopped feeding.

This aquarium has no connected pool to isolate the shark without taking it out of the water, but there is a round 20 m³ quarantine tank linked to the main pool by filtration. In order to capture the shark, divers had to sedate it by intra-muscular injection of Etomidate (Etomidate lipuro®, B-Braun Melsungen) at 2 mg/ kg of body weight with a pole. When tranquilized, the animal was caught in a net and placed in a stretcher for transport.

Beside the pool, a 600 litres tank of tropical sea water was prepared to keep it in well oxygenated water at 130% of saturation. Anaesthetic (benzocaine at 20 ppm) was introduced in the water.

The shark was premedicated with butorphanol (Dolorex®, Intervet), at 0,03 mg/ kg of body weight and held in the stretcher inside the tank with anaesthetic maintained on its back for catalepsy. After complete anaesthesia the shark was closely examined, no sign of peritonitis was seen so the intestine was explored. The first exam showed a bleeding rectum prolapse through the cloacae with an intestinal bitten part. The intestine was gently externalized as much as possible to look for deep wounds, necrosis or intestinal perforation. The intestine was not perforated and only the last mucosa fold showed some bitten marks with surrounding necrosis. The mucosa of the anal sphincter presented a patch of necrosis and congestion. It was decided to cut as much as mucosa fold as possible, in order to let no necrosis or bitten wounds. The section of the mucosa fold was then disinfected with iodine povidone diluted at 10% (Vetedine®, Vetoquinol). The intestine was then replaced and introverted with fingers and a 30 cm silicone flexible pipe to make sure everything was back in place.

Prophylactic treatments were injected: dexamethasone (Dexadreson®, Intervet) at 1mg/kg of body weight, gentamicin (Forticine®, Vetoquinol) for bacterial prevention at 12 mg/kg of body weight and 20 mg of Nandrolone laurate (Laurabolin®, Intervet) for haematology stimulation.

Antibiotic treatment was continued by five injections of gentamicin at 6 mg/kg of body weight every fifth day recommended by Stoskopf (Stoskopf, 1993) on *Carcharinus plumbeus*.

Specific diet was stipulated: small parts of food like filets and squids (without any bones) presented several times a day during one month.

Discussion

This shark was lucky because the intestinal prolapse alerted the curator and at the end no intestinal perforation was seen. Despite having returned to its former ration, it is impossible at this time to give a prognostic. It took 168 days to a largetooth sawfish to die after such intervention (Henningsen et al., 2005).

No specific cause, like parasitism or foreign body could explain the prolapse. Thus the hypothesis was that this shark, the smallest in the aquarium and often chased by its tank mates, has simply been bitten during a physiological prolapse.

One of the difficulties of the intervention was that very few anatomical charts for this species and even sharks are available. Few similar interventions have been described on other shark species (Henningesen et al., 2005) but the intestinal structure is very different between species.

Anaesthesia, and especially injectable anaesthesia, is still an issue on sharks, due to lack of knowledge and poor work in this field. In this case etomidate wasn't so efficient to immobilise the shark, it induced a very quick and too light effect on the *C. plumbeus*. Obviously the best would be to have a holding pool on the side of the main tank and to train the shark to get in naturally, in order to manipulate them more securely and less stressfully.

Benzocain seems to be good water anaesthetic, like MS222 for quick and long intervention, and it is also possible to use it in an adapted system like volatile anaesthesia used for terrestrial mammal. Compared to eugenol, with a narrow safe security margin and a long wake up time (a point that is very crucial for such fish that need to swim to breath), benzocain seems more appropriate and safe.

This case shows that clinical exam and intervention on elasmobranches and other fishes in a big aquarium without any specific facilities is possible and taking them out when they are dead is not a fatality.

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References

- CLARK, T. B.; PAPASTAMATIOU, Y. P.; MEYER, C. G. (2008): *Intestinal eversion in a free-ranging manta ray (Manta birostris)*. *Coral Reefs*, Volume 27, Issue 1, 61-61.
- CROW G.L, HOWE JC, UCHIDA S, KAMOLNICK S, WISNER MG, CAIRA JN (1990): *Protusion of the valvular intestine through the cloaca in sharks of the family Carcharhidae*. *Copeia* **1**, 226-229
- CROW, G. L., J. A. BROCK, J. C. H., AND B. E. L. (1991): *Shark bite wounds of the valvular intestine: the cause of an acute mortality syndrome of captive blacktip reef sharks, Carcharhinus melanopterus*. *Zoo Biology* **10**, 457-463.
- CROW, G. L., AND J. A. BROCK. (1993): *The use of gentamicin sulfate therapy in a captive blacktip reef shark (Carcharhinus melanopterus) with intestinal biting syndrome*. *Zoo Biology* **12**, 479-42.
- HENNINGSEN A.D., WHITAKER B.R., WALKER I.D. (2005): *Protrusion of the Valvular Intestine in Captive Smalltooth Sawfish and Comments on Pristid Gastrointestinal Anatomy and Intestinal Valve Types*. *Journal of Aquatic Animal Health* **17**, 289-295.
- STOSKOPF, M. K. (1993): *Shark pharmacology and toxicology*. In: *Fish medicine*, Philadelphia: WB Saunders Compagny, 812.