

IMPACTION IN A GREAT INDIAN RHINOCEROS

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6506

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It was reported that "Tiny", a 14 year old male Great Indian Rhinoceros estimated to weigh approximately 5,000 lbs., had not defecated on January 30, 1975. He appeared normal otherwise.

During the next two days, he continued to eat and drink but no feces were found in the pen.

On Sunday, he stopped eating and drank very little, an attempt was made to induce him to eat a mixture of mineral oil, ground apples, honey, and grain. He refused this and such delicacies as bananas.

Wednesday, February 5, 1975, - he was immobilized with 2 mg. of M-99 and 15 mg. acepromazine. Induction was very smooth and he settled into sternal recumbancy with a slight tilt to one side. Blood was drawn from an ear vein. A wooden plank with a large hole was used as a speculum for an examination of the mouth. A stomach tube was inserted and 2½ gallons of heavy mineral oil was pumped in. Rectal palpation revealed nothing of significance beyond an empty terminal colon.

An enema was administered using ½ gallon of mineral oil and 8 gallons of warm water. An unsuccessful attempt was made to administer intervenus fluids. Venapuncture in a rhino is difficult due to the thickness of their skin. B Complex, Vitamin C and 3500 mg of ampicillin trihydrate were injected as supportive therapy. After being down for 56 minutes, he was injected with 4 mg. M50-50 IV. He regained his feet in five minutes.

Over the next two days, there was no change. He appeared alert, in no pain and active. He would go to his usual corner and attempt to defecate, unsuccessfully.

On Saturday, February 8, 1977, he was immobilized again. Blood samples were taken. A second unsuccessful attempt was made to administer intervenus fluids.

An intermuscular injection of 5,000 mg d-Panthenol was administered. Rectal palpation revealed a hard mass in what was believed to be the

pelvic flexure of the large colon which extended beyond arms reach both proximal and discal to the flexure. The mass could not be broken down by manual massage.

An enema consisting of 14 gallons warm water and one gallon on concentrated electrol te mixture was given. A stomach tube was inserted and 2 gallons of heavy mineral oil and 1 lb. of rumen stimulant pumped into the stomach. Four mg. M50-50 was administered intramuscularly and he regained his feet in 14 minutes. He was unsteady and somewhat depressed due to incomplete reversal of M-99. Another 2½ gallons of warm water were given by enema. Two and a half hours later he was given 3 mg. carbamylcholine chloride IM in the neck using a pole syringe. Within three minutes he began to salivate and lacrimate profusely, voided urine, and 1 to 2 gallons of water from the rectum. He was restless, appeared uncomfortable, and wandered around his pen, occasionally positioning himself in his defecating corner, often laying down briefly and rolled over on his side once.

Flatulence was very pronounced. He continued this behavior for approximately 30 minutes. He then lay down in sternal recumbancy and spent the rest of the night resting quietly.

During the next 13 days, the animal was immobilized 10 more times, each time using 2 mg. M-99 and from 0-30 mg. acepromazine, depending upon the degree of post immobilization tranquilization desired. (Table 1) Seven injections, 6250 mg. each of d-Panthenol were given, and 26 injections of 1-3 mg. each carbamylcholine chloride were given to stimulate peristalsis and defecation.

In an attempt to loosen the blockage, maintain hydration, and electro-lite balance and provide energy, he was stomach-tubed 9 times and a total of 6½ gallons of mineral oil, 46½ gallons of water, 2 gallons amino-acid solution, 37 ounces dry electrolyte concentrate, 1 lb. of rumen stimulent, 121 grams of danthron, 204 grams of tetracycline 28 lbs. of sustagen, 16½ lbs. of honey, 18 dozen eggs, 315 ml. dioctyl sodium succinate 5% pumped into his stomach.

During this period of time, he also drank 27 gallons of water on his own. During this same 13 day period, he was also given 6 enemas containing a total of 50 gallons of water, 1 gallon amino-acids, 100 grams of tetracycline 1 gram neo-mycin, 30 ounces dry eletrol te concentrate, 2 lbs $MgSO_4$, and 300 ml. dioctyl sodium succinate.

At each immobilization, an attempt was made to manually break down that part of the impaction that could be reached.

In addition, on 6 occasions, a 15 gage trocar was inserted through the wall of the rectum into the colon and 2 gallons of 10% $MgSO_4$, and 25-100 grams tetracycline injected directly into the mass. This required that somebody remain on his side with his arm inserted to the armpit for as much as 1½ hours at a time. During the last such injections dioctyl sodium succinate was added.

All of this seemed for a time, to be producing the desired effect in that between 2-11-75 and 2-19-75, "Tiny" passed approximately 19 gallons of hard, dry feces. When the voiding of feces tapered off and finally stopped, it was decided that surgery was the only alternative. After consultation with Dr. R. L. Lundvall of the Iowa State School of Veterinary Medicine, Tiny was immobilized, placed on a palet, hoisted into a large heated truck box and transported 180 miles to Ames, Iowa.

On 2-21-75, he was immobilized, off loaded and laid on his right side on a heavy rubber mat. After further examination, it revealed no change in the mass, he was prepped for surgery. He was placed on a large animal gas machine by Dr. Larry Jackson, surgery was performed by Dr. Lundvall and Dr. Simmons with assistance by Dr. Dean Patterson and Dr. Bruce Jenke. Halothane was used to maintain a light plane of surgical anesthesia. Lactated ringer solution and sodium bicarbonate were administered intravenously through superficial veins on the medial aspect of the front legs. An 8' incision was made in the left lower paralumbar area, 5' posterior to the last rib.

The skin, facia and peritoneum is remarkably thick and tough in a rhino. Palpatation (again at armpit level) revealed a hard impaction of the proximal small colon, approximately 2' in length, the transverse colon was greatly extended and full of doughy feces.

The impaction in the small colon was broken down in small pieces by a gentle massage without exteriorizing or incising the colon. After this peristalsis could be felt in the small colon.

A solution of saline and tetracycline was injected into the distended transverse colon by trocar. Twelve tetracycline bolettes were inserted into the peritoneal cavity and the incision closed. Due to the build-up of pCO₂ in the blood, the last 45 minutes of the surgical procedure was done under 1 mg. of M-99 IV.

The surgical procedure lasted 3 hours. Total time down was 4 hours, 50 minutes. Four mg. M50-50 IV brought him to his feet in two minutes. Tiny exhibited some paralysis of the right front leg as a result of prolonged pressure on the radial nerve.

During the next three days, his condition seemed much improved. He drank 14 gallons of water and ate lettuce and bananas. Additional attempts to stimulate defecation were only minimally successful.

Unfortunately, he collapsed and died on the evening of 2-24-75. Post Mortem examination by Dr. D. L. Graham of Iowa State University revealed an additional impaction of the anterior half of the small colon, which was impossible to reach surgically. Throughout the 24 day course of the illness, his vital signs and the numerous blood and urine samples that were taken remained in remarkably normal order.

IN SUMMARY, the problem appears to have been percipitated by a change of feed which resulted when the zoo's regular feed mill went out of business. This apparently caused Tiny to eat primarily

only prairie hay and lettuce for a period of approximately three weeks prior to the first clinical symptoms.

The Indian Rhino appears to have a much greater ability to withstand repeated stress, immobilization and surgical intervention than had previously been suspected. He was able to maintain adequate hydration and electrolyte balance by absorption of fluids given by stomach tubes and enemas.

In retrospect, with knowledge of rhinos ability to resist infection and tolerate surgery, an earlier surgical intervention was probably in order.

A summary of hemograms, blood chemistries and urinalysis is found in Tables 2 - 3 - and 4.

TABLE I
SUMMARY OF REPEATED CHEMICAL IMMOBILIZATION
OF
AN INDIAN RHINOCEROS

D A T E	DRUG(S)	DOSAGE (mg)	ROUTE	FIRST SIGNS OF INDUCTION	TOTAL INDUCTION	DURATION OF IMMOBILIZATION	RESPIRATION RATE (per Minute)	HEART RATE (per minute)	ANTIDOTE	DOSAGE (mg)	RATE	FIRST SIGNS OF RECOVERY	TOTAL RECOVERY (up on feet)
	M99												
	2-5 Acepromazine	2 15	IM IM	:05	:20	:56	6 - 8		M 50 - 50	4	IV	:04	:05
	2-8 M99 Acepromazine	2 15	IM IM	:06	:12	1:39	4 - 10		M 50 - 50	4	IM	:12	:13
	2-9 M99 Acepromazine (after down)	2 30	IM IM	:03	:10	2:01	8	60	M 50 - 50	4	IM	:00	:30
	2-10 M99 Acepromazine (10 min.)	2 20	IM IM	:05	:15	2:48			M 50 - 50 M 50 - 50	4 1	IM IV	:10 :00	:24 :02
	2-13 M99 Acepromazine	2 30	IM IM	:03	:06	2:17	3 - 8	72	M 50 - 50	4	IV	:03	:03
	2-14 M99 (1-2 min) Acepromazine	2 30	IM IM	:09	:18	1:10	5 - 8		M 50 - 50	4	IV	:03	:03
	2-17 M99 Acepromazine	2 20	IM IM	:09	:11	2:39	5		M 50 - 50	4	IV	:03	:03
	2-18 M99 Acepromazine	2 30	IM IM	:03	:06	1:57	7 - 10		M 50 - 50	4	IV	:04	:07
	2-19 M99 Acepromazine	2 10	IM IM	:03	:05	2:14	9	60	M 50 - 50	4	IV	:06	:06
	2-20 M99	2	IM	:15	:21	:59			M 50 - 50	4	IM	:13	:19
	2-20 M99 Acepromazine	2 30	IM IM	:13	:15	1:05			M 50 - 50	4	IM	:05	---
	2-11 M 99 Acepromazine	2 30	IM IM	:11	:21	4:50		60	M 50 - 50	4	IV	---	---

TABLE 2
HEMOGRAMS OF AN IMPACTED GREAT INDIAN RHINOCEROS* (RHINOCEROS UNICORNIS)

Date	Hb gm%	PCV %	RBC $\times 10^6/\mu^3$	Retic %	RBC MORPH	MCV μ^3	MCH ug	MCHC %	WBC $/\text{mm}^3$	Baco %	Eos %	Band %	Seg %	Lymph %	Mono %	WBC Morph	Plate /	
1975																		
2-5	15.4	39	7.76	<0.1	marked aniso- micro	51	20	39	7700	-	-	10 (770)	70 (5390)	20 (1540)	-	normal	normal	no blood para- sites
2-8	14.0	40	6.78	-	marked aniso- micro sl. polk	-	21	-	10,700	-	-	1 (107)	81 (8667)	15 (1605)	3 (321)	"	"	on 20 points sitar
2-9	12.9	-	6.49	-	marked micro mod. hypo	-	20	-	9800	-	-	17 (1666)	74 (7252)	7 (686)	2 (196)	"	"	
2-10	11.3	31	5.89	-	marked aniso- micro sl. hypo	52	20	37	9700	-	-	46 (4462)	48 (4656)	3 (291)	3 (291)	"	"	
2-13	13.6	38	7.02	-	marked aniso- micro few schisto- cytes	54	20	36	13700	-	-	21 (2877)	67 (9179)	10 (1370)	2 (274)	"	"	
2-14	10.2	29	5.39	-	marked aniso- micro	53	19	35	9900	1 (99)	-	34 (3366)	56 (5544)	4 (396)	5 (495)	"	"	
2-17	13.4	36	6.94	<0.1	marked aniso- micro	52	20	37	6200	-	-	4 (248)	89 (5518)	7 (434)	-	"	"	
2-18	12.6	35	6.64	-	marked aniso- micro	52	19	36	14300	-	-	2 (286)	93 (13,259)	2 (286)	3 (429)	"	"	
2-19	12.6	34	6.64	-	marked aniso- micro	51	19	37	10800	-	-	10 (1080)	76 (8208)	14 (1512)	-	"	"	
2-20	13.5	33	6.40	-	marked aniso- micro	-	21	-	14400	-	-	7 (1008)	81 (11,664)	10 (1440)	2 (288)	"	"	

* MALE ISIS #249

"Tiny" Birthdate: June 1962

TABLE 3

BLOOD CHEMISTRIES ON AN IMPACTED GREAT INDIAN RHINOCEROS *

(RHINOCEROS UNICORNIS)

Date	Cl mg/l	CO ₂ mg/l	H ⁺ mg/l	Na ⁺ mg/l	BUN mg%	Glucose mg%	T.P. gm%	Alb gm%	Ca ⁺⁺ mg%	Inorg Phos. mg%	Chol. mg%	Uric Acid mg%	Creat mg%	T. Bili. mg%	HL Phos. mV/ml	LDH mV/ml	SGOT mV/ml	pH (A)	pCO ₂ (A) mmHg	pO ₂ (A) mmHg	CO ₂ (A) mg/l
1975 2-5	87	28.5	3.5	132	18	70	7.8	0.8	10.1	3.9	125	0.5	2.3	0.4	104	200	125	7.31	60	54	31
2-8	90.5	24	3.5	129	17	97	7.6	0.7	12.0	4.2	100	0.5	1.7	0.4	100	230	150	-	-	-	-
2-9	91	28.5	3.2	137	16	116	7.3	0.9	10.4	4.0	100	0.5	1.8	0.3	90	225	135	-	-	-	-
2-10	86	31.8	3.2	132	17	120	6.6	0.8	9.4	3.6	69	0.7	2.3	0.3	85	235	145	-	-	-	-
2-13	92	26.0	2.9	132	18	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-14	96	22.8	2.9	132	14	90	7.8	1.0	8.4	3.9	85	0.7	1.5	0.5	102	300	210	-	-	-	-
2-17	97	20.5	2.7	134	15	63	8.4	1.1	9.5	3.4	85	0.7	1.5	1.4	120	390	230	-	-	-	-
2-18	102	20.8	2.5	135	17	116	7.9	0.7	10.2	2.7	114	0.5	1.7	0.5	93	363	218	-	-	-	-
2-19	101	18.0	2.4	138	18	165	7.9	0.8	10.2	3.3	87	0.6	2.1	0.4	81	345	226	-	-	-	-
2-20	-	-	-	-	-	-	7.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Male ISIS #249

"Tiny" Birthdate - June 1962

TABLE 4

URINE ANALYSIS OF AN INDIAN RHINOCEROS

DATE:	2-11-75	Negatives: protein, glucose, acetone, occult
SPECIFIC GRAVITY:	1.023	blood, urobilinogen, RBC's, WBC's, casts, epithelial cells
pH:	6.0	crystals, bacteria
COLOR	amber	COMMENTS; Large amount of urinary bilirubin present
APPEARANCE	cloudy	ictotest.
BILIRUBIN	large amount	

PRODUCTS MENTIONED IN THE TEXT

M99^R - etorphine 0.1% 1 mg/cc etorphine HCl
D-M Pharmaceuticals, Inc., Rockville, MD 20850

M50 - 50 - diprenorphine 0.2% 2 mg/cc diprenorphine HCl
(as above)

Acepromazine Maleate Injectable^R (10-(dimethyl-amino) propyl)
phenothiazin - 2 - yl - methyl ketone)
10 mg/cc Ayerst Labs Inc., Vet Medical Dept. NY 10017

Istizin^R Granules - danthron 14.2 g/packet
Vet. Dept., Winthrop Labs, Division of Sterling Drug Inc, New York NY 10016

B-Complex 100^R
Concord Inc., Omaha, NE 68127
per cc: Thiamine HCl 100 mg
Riboflavin 5' 2 mg
Niacinamide 100 mg
d-Panthenol 2 mg
Pyridoxine HCl 10 mg
Cyanocobalamin 50 mg

Sodium Ascorbate^R 250 mgm/cc
Med. Tech Labs, Inc. St. Joseph, MO 64506

Vitamins ADE Oil Solution (Nitrogenized)^R
Haver-Lockhart Labs, Kansas City MO
per cc: vit A (Palmitate) 100,000 USP units
vit D (activated er-
gosterol) 100,000 USP units
vit E (di-cx-tocopheryl
acetate) 10 I. U.

PolyflexTM ampicillin trihydrate 100 mg/cc
Vets Products, Division of Bristol-Myers, Syracuse, NY 13201

Paralene^R - carbamyl choline chloride 1 mg/cc
Affiliated Labs Corp., East St. Louis, Ill

5% Dextrose in Lactated Ringers
McGaw Labs, Division of American Hospital Supply Corp. Glendale, CA 91201
per 100 ml: hydrous dextrose USP - 5 g
Na lactate - .31 g Na 130 mEq/l
Na Cl USP - .60 g K 4 "
K Cl USP - .03 g Ca 3 "
Ca Cl USP - .02 g Cl 109 "
Lactate 28 "

Lactated Ringers
McGaw Labs, Division of American Hospital Supply Corp., Glendale, CA 91201

PRODUCTS MENTIONED IN THE TEXT
CONTINUED

5% Hyprotigen^R (5% = 5g/100ml) - modified protein hydrolysates \bar{c} 5% dextrose
McGaw (adress as above)

Polyotic^R - tetracycline HCl 25.6 g/packet
Professional Veterinary Pharmaceuticals, American Cyanamid, Co.
Princeton, NJ 08540

Electrolytes - 1 lb. packet
mix in drinking water 1 oz/10 gal H₂O
Co SO₄, Zn SO₄, Cu SO₄, Mn SO₄, FE⁺⁺ Co₄, MgCO₃, KCL, Ca Lactate, NaCl
vit A Palmitate, Vit D₃,
Medical - Tech Labs, Inc. St. Joseph, MO 64506
Rumen Compound Powder 1#
Intermountain Veterinary Supply Inc. Denver Colo 80207

Carbachol^R Carbamylcholine Cl 1 mg/cc
Curts Labs Inc., Kansas City MO 64105

D-Panthenol^R - dexpanthenol 250 mg/cc
Med-Tech. Inc. St. Joseph, MO 64506

Ace-10X Solution
Curts Labs Inc, Kansas City, MO 64105
per 100 cc:

Glutamic acid	1408 mg
tyrosine	221mg
proline	785
histidine	200
lecine	614
methionine	164
lysine	528
glycine	114
voline	428
tryptophane	100
serine	407
cystine	30 mg
aspartic acid	392
NaAc	52 gm
phenylalanine	364.
KAc	10 g
NaCl	51 g
isoleucine	293
arginine	271
CaCl	5.5 g
threonine	264
MgCl	3.0 g
alanine	221 mg
Dextrose	500 g
Formalin	2.5 %

PRODUCTS MENTIONED IN THE TEXT
CONTINUED

Permeatrate 5% dioctyl Na succinate
Haver Lockhart Labs, Shawnee, Kansas 66201

Nonemic^R (Iron Dextran Injection) - iron dextran - 100mg/cc
Armour-Baldwin Labs Division of Armour Pharmaceutical Co.
Omaha, NE 68103

Riosol^R - neomycin sulfate 200 mg/ml (16 oz.bottle)
Upjohn Co., Kalamazoo, Mich 49001

Liquamycin^R - oxytetracycline 50 mg/cc
Department of Vet Medicine, Pfizer Inc., NY NY 10017

Amino Acid Solution
Concord Pharmaceuticals Inc. Omaha NE 68127

Sustagen
Mead Johnson Labs, Division of Mead Johnson and Co. Evansville, Ind. 47721

Potassium Chloride Injection, U. S. P.
Ely Lilly and Co., Indianapolis, IND 46206