Aloha
ANIMAL HOSPITAL

The office of Drs. Jason and Jamie Sullivan

Sloth necropsy

Date of death: 7/30/2020

Gross observations: Overall, thin BCS 3-4/9. No other visible abnormalities

Ventral midline approach

- No free fluid in abdomen
- Large gas distended forestomach with small petechiations on distal end observed (biopsied)
- Stomach small and normal in appearance and feel. Small amount digesta within (biopsied)
- Liver normal shape, color and consistency (biopsied)
- Spleen very small/contracted (biopsied)
- Small intestines- slightly pale in color (post-mortem?) with some lymph nodes present in mesentery (biopsied small intestines and mesentery with lymph node)
- Kidneys normal (biopsied)
- Adrenals apparent (biopsied both)
- Testis normal (biopsied)
- Bladder normal
- No free fluid in thorax
- Normal lungs- pink and light fluffy tissue throughout
- Heart- fluid and blood in pericardium (2 heart sticks at CPR); heart tissue biopsied
- Top of skull removed
- Brain appears normal- no color change, consistency change or fluid (collect entire brain for biopsy)

There is no gross pathologic finding that will be able to explain this sloth's death. Samples submitted to NW Zoopath for histopathology.

✿ *Dr. Jamie Sullivan* ✿ *Dr. Jason Sullivan* ✿ *Dr. Anne Beckes* ✿
✿ *Dr. Llora Raphael* ✿ *Dr. Erin Knickerbocker* ✿

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Case No.: G20-2829

Obtained: NA, rec'd 08/12/20
Reported: 08/14/20

Dr. Sullivan
[redacted]
Las Vegas, NV 89139

Patient ID: Two-toed Sloth ("Flash")
Account #:
Telephone: [redacted]
FAX #:
E-mail: [redacted]

HISTORY: This 1-year-old male two-toed sloth had a one-month history of intermittent twitching, weakness, and inappetence and had received various forms of supportive care with varying response. The sloth subsequently died.

CLINICAL DIAGNOSIS: Open.

GROSS: Received in formalin are 13 tissues to 5 cm. in greatest dimension that are processed in six blocks.

MICROSCOPIC: **Heart:** Acute moderate myocardial necrosis is noted. **Kidney:** Acute marked renal tubular necrosis is noted, and tubules occasionally contain proteinaceous material, hemoglobin, or tubular epithelial intracytoplasmic eosinophilic globules (hemoglobin nephrosis). **Liver:** Moderate to marked, centrilobular, hepatocellular vacuolar degeneration is noted, and some erythrophagocytosis is also present in the sinusoids in the centrilobular regions. **Adrenal glands:** Both adrenal glands have multiple small foci of hemorrhage and fibrin deposition or fibrin thrombosis in the cortex and medulla. **Colon:** The lumen of the colon is filled with frank blood. **Stomach:** Numerous erosions are in the fundus of the stomach. **Brain:** The meninges of the cerebellum have a focus of hemorrhage and thrombosis. The following tissues are histologically within normal limits: lymph node, adipose, one section of large intestine, small intestine, testicle (inactive), cerebellum, brainstem, midbrain, hippocampus, and cerebrum.

HISTOPATHOLOGIC DIAGNOSIS:

1. Moderate acute myocardial necrosis.
2. Marked hemoglobin nephrosis.
3. Marked centrilobular hepatocellular vacuolar degeneration and necrosis.
4. Acute thrombosis with hemorrhage, adrenals.
5. Melena, colon.
6. Multiple erosions, fundus.
7. Acute thrombosis with hemorrhage, meninges in region of cerebellum.

COMMENT: Histologic findings are consistent with intravascular hemolysis, DIC, and subsequent necrosis associated with hypoxia in the kidney, liver, and heart. The inciting cause is not apparent in the submitted tissues, and no infectious agents or viral inclusions were seen. Skeletal muscle and lung were not in the submitted tissue set, but there may have been lesions in these tissues as well based on the

history. The cause for the twitching behavior is not apparent histologically in the submitted tissue set. This animal may have had some form of innate metabolic derangement.

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MMG/hc
E-mail: [redacted]
NZP Code: M, 1, 2; intravascular hemolysis, hemoglobin nephrosis, cardiac, renal, and hepatic necrosis, DIC.

Sloth case summary for NW Zoopath:

I have a bit of a conundrum of a sloth case. Hold on to your hat. "Flash" is a 1 year old 2 toed sloth that presented 7/7/2020 with generalized weakness and whole body twitching. Per owner, he was thriving but then his appetite began decreasing and 2 days later developed generalized weakness. There was no history of known toxin exposure, changes in diet or trauma. Diet was copied from recommendations of a zoo diet but favorites are Calabacita squash and sweet potato.

On exam- patient was 3.6kg, weak but responsive. The entire body does a twitch almost like a big hiccup. The arms have some strength but seem uncoordinated. Patient would not eat but would lick some water via syringe. The previous ER vet treated with buprenex and sent home methocarbamol for muscle spasms. While here, an IV was placed and norm R started at double daily requirements. No murmurs or arrhythmias noted. In house BW (all are attached) revealed what appears to be elevated WBC (25.37 low Calcium (8) with a phosphorous of 6.2 and elevated ALP (1980). Discussed case with Idexx Specialist and concern for very low calcium and added on CBC at lab to confirm WBC types present. Started treatment for hypocalcemia with low end dog dose as described in Plumb (0.55ml/kg) as CRI over 6 hours. Also started Baytril IV @ 10mg/kg. ***Difficulty in finding any normals for reference on this bloodwork. *** Overnight, patient pulled catheter but started eating from syringe. Twitching is pretty constant. Seems to have less twitching when sleeping but still visible. Twitching was as frequent as 1 twitch every 2-3 seconds. Started critical care with calcium supplementation and discharged to owner for continued supportive care and to hopefully correct calcium. Pet was taking feeding well at home and seemed stronger but still twitching. Rule outs: hypocalcemia, Infectious/parasite, viral, toxic.

3 days later (7/10/2020), came back for recheck- still twitching but taking syringe feeding very well. (3.77kg body weight) Rechecked bloodwork- Calcium still low (7.8) but WBC (22.01) improving and ALP decreasing slowly(1410). Placed catheter again and started fluids with calcium again. Spoke to specialist at lab. Started low dose gabapentin for possible seizure threshold adjustment. Reached out to several vets for advise and direction- spoke to one in CA and FL but no one has seen anything like this. Discussed possible viral vs parasitic conditions vs toxin with slow metabolism and prolonged effects. I was able to cut and paste a lot of sections of the Spanish Sloth text for some info and found some slides from a sloth health lecture with some biochemical "normal" values. Apparently, their calcium runs low so our lab values were normal. Discontinued calcium at that time. After 3 days in hospital with IV fluids and baytril, overall condition was unchanged. Weakness (will hold on a branch, inverted, if we carry majority of his body weight) and generalized twitching still present. Started Dexamethasone IV (1mg). The next morning, pet seemed most mentally alert since starting treatment. Unclear if it is due to supportive care and time or steroids (got 2 doses). Also eating a little solid food if we hold it for him. Pulled IV cath and sent home for continued care. Went home on probiotics, Metacam, baytril 2.5mg/kg SID and gabapentin 25mg SID.

On 7/21/2020, approx 1 week after releaese, started getting gassy (distended abd) and not eating well. Concern for dysbiosis so baytril was stopped. Back today for a recheck. Body weight is 4 kg. Twitching is about 75% better but still not strong enough to hold self on a branch. Palpable gas distension in foregut. There is distension but not tight like a drum. Increased assisted syringe feeding frequency and dropped volume to 5-10 ml per feeding as well as added probiotics to each feeding. Within 1 day, appetite returned and released back to owner. Animal continued to eat well at home and all twitching had stopped. Flash had decent hind end strength but very weak front end. O state that they feel there is daily improvements.

Presented on 7/27 in afternoon- drooling and very weak. No grip, no strength and minimal response. Unable to get IV cath so gave small amount of SQ fluids, baytril SQ and 2mg dexamethasone SQ. Discussed QOL. By late evening- animal lifting head and gaining strength in hind end again. By Tuesday AM (7/28) , the animal looked better than I had seen it in weeks, trying to use front feet and grabbing our arms at feedings. Eating like a champ. Still cannot get blood sample. Discussed responses to steroids and how dramatic they were. We reviewed gray area of steroid use in sloth and that, along with just about everything else, there is minimal data on treatment. Owner understands and since we have seen pretty good responses- gave Triamcinolone at 0.1mg/kg IM for some continued steroid support. Went home that afternoon and owner sent me a picture in late night of the animal climbing on it's perch all 4 feet without any assistance. Miracle. Wednesday presented down and out again. Addison's right? Able to get a small blood sample- resting cortisol is 0.3ugm/dl. Repeated dexamethasone and no response. Animal died on Thursday (7/30/2020), and necropsy performed that afternoon.

So many questions... I have submitted a little of most organs. My rule outs are viral, parasitic with migrans/inflammation, viral, Addison's, other. Hopefully you can clear things up a bit for us. Call me with any questions.

Thank you,

Jason Sullivan DVM

(cell)

[redacted] (work)