



Respiratory Disease in a Red Eared Slider (*Trachemys scripta elegans*)

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Abstract

This case demonstrates the diagnosis and treatment of respiratory disease in a 15-year-old, male red-eared slider (R.E.S.) (*Trachemys scripta elegans*).

The presenting complaint was anorexia since three days and bubbles from the nose. There was a history of improper husbandry and diet. The initial diagnostic work up was radiographs which demonstrated mild opacity in the lungs, the owner initially denied further diagnostics and so a decision was made to treat the R.E.S. with enrofloxacin @5 mg/kg, q 48h, diluted with Ringer's lactate, S/C, for five treatments.

After the treatments the radiographs were repeated and demonstrated an increase in the opacity of the lungs which lead to the suspicion of microbial resistance to enrofloxacin, after which the owners agreed to conduct a culture of the swab of the nasal discharge and the collection of a blood sample which demonstrated heterophilia and elevated WBCs with hypocalcaemia. The swab was sent for a culture and demonstrated that it was susceptible to gentamicin, ceftriaxone and amikacin, and resistant to enrofloxacin and amoxicillin + clavulanic acid after which it was treated with ceftriaxone @ 50 mg/Kg, q 24, seven days, after which the radiographs and blood tests were repeated, the radiographs revealed no abnormalities and the blood test revealed mild hypocalcaemia and the heterophil and WBC values were within normal range.

Keywords: Respiratory Disease; Ceftriaxone; Diet

Introduction

Respiratory disease is common in reptiles, especially in snakes and chelonians. A large part of this is due to inappropriate husbandry practices and certain anatomical features of reptile respiratory system, which include:

- Lack of a muscular diaphragm means that discharges cannot be coughed up
- A poorly developed mucociliary escalator in the airways also reduces the ability to clear discharges
- The ability to withstand long periods of hypoxia means that respiratory diseases are often well advanced before clinical signs are seen [1].

Respiratory disease is one of the most commonly encountered disease processes in collections of captive reptiles. In many cases, improper husbandry techniques, including too high or too low temperatures, inadequate humidity, and poor nutrition will compromise the reptile's immune system and its response to potential pathogens [3].

History

The red-eared slider (*Trachemys scripta elegans*) was 15 years old, male, and captive-bred.

The present complaints were anorexia since 3 days and occasional bubbles from his nares. The RES was housed alone, and was housed in a plastic box of dimensions 8ft x 4ft x 5ft. There were no other animals present in the house. The turtle was provided occasionally with shallow lukewarm water in the enclosure.

There was no UVB source or heat source provided, there was sunlight provided occasionally due to the placement of the enclosure. The enclosure was cleaned once in two days, he was fed and kept in the same tank. The tank did not have any water heater or water filter. There were no furnishings in the tank.

There was no device to measure the temperature or humidity of the enclosure.

The RES was provided with boiled chicken, vegetables and turtle pellets but consumed only turtle pellets and was in the middle of a diet conversion.

The RES had a history of anorexia during the winters every year, since the last three years with no abnormalities detected in previous radiographs other than low bone density, no blood samples had been collected for evaluation [1,2,7,14].

Clinical examination

The body weight and body condition score of the RES presented were 1.5 Kg and 7/10 respectively [8]. The presenting complaints were anorexia since three days and occasional bubbles from his nares.

The RES had a history of periods of anorexia occurring during winters over the last 3 years, thought to have occurred due to improper husbandry practices. Low bone density was observed in previous radiographs, there was no blood collected for sampling previously.

His mucous membranes were pink, the carapace was malformed. The RES was also dehydrated, thought to be due to the anorexia and the possible respiratory disease.

The RES was lethargic on presentation and anorexic since 3 days.

No other abnormalities were observed on clinical examination [1,2,12,14].

Problem list and differential diagnosis

- Anorexia
- Dehydration
- Nasal discharge
- Hypocalcaemia

Diagnostic techniques

Three views (Dorsoventral view, a left lateral view and a right lateral) were taken for radiography at a nearby diagnostic centre (and not at the clinic) due to economic constraints, the radiographs were not digital. There was no sedation or anaesthesia used for the radiographs due to economic constraints and the lack of consent from the owner. They demonstrated a slightly low bone density and increased radio opacity in the lung space. There was no other abnormality observed in the radiographs [6,10].

After which the owners were offered with the option of sending a swab of the nasal discharge for culture and blood collection to evaluate a manual CBC, SGPT, Creatinine, Calcium and uric acid, but denied it. The RES was put on a course of with enrofloxacin @5mg/kg, q 48h, diluted with Ringer's lactate, S/C, for five treatments [4], after which the nasal discharge increased and started to have a small amount of blood in it.

The owners then agreed to sending the swab of the nasal discharge for culture [3,9], and for the collection of blood.

Blood was collected to evaluate a manual complete blood count and to evaluate the serum glutamic pyruvic transaminase, creatinine, Uric acid, and calcium levels, in a preheparinised 1ml syringe with a 26G needle. The results of the blood test demonstrated elevated white blood cells ($35 \times 10^3/\text{cu mm}$, ($1-19.4 \times 10^3/\text{cu mm}$)), heterophils (45% (18%-30.2%)), mild hypocalcaemia 6 mg/dL (6.5-22.6mg/dL) and elevated uric acid 6.9 (0.1-1.9 mg/dL), the rest of the values were normal [4,5].

The culture demonstrated the growth of *Pseudomonas aeruginosa*, susceptible to susceptible to ceftriaxone, gentamicin, amikacin, Levofloxacin, Ofloxacin, Ciprofloxacin, Netilmicin, Cefepime, and resistant to enrofloxacin, amoxicillin + clavulanic acid, ceftriaxone, cefuroxime, cefoperazone, and trimethoprim/sulphamethoxazole.

Diagnosis

The results of the blood and biochemistry tests demonstrated elevated heterophils and WBCs which confirmed the author's suspicion of a respiratory disease caused due to infectious causes

which had arisen due to the history taken and the bubbles from the nares hence the swab of the nasal discharge was collected and sent for culture which demonstrated growth of *Pseudomonas aeruginosa* which was susceptible to susceptible to ceftriaxone, gentamicin, amikacin, Levofloxacin, Ofloxacin, Ciprofloxacin, Netilmicin, Cefepime, and resistant to enrofloxacin, amoxicillin + clavulanic acid, ceftriaxone, cefuroxime, cefoperazone, and trimethoprim/sulphamethoxazole [3-5,9].

This may have been caused by either the unclean environment, the improper husbandry, the improper diet, or a combination of the three [1,3].

The elevated uric acid was thought to be due to dehydration, given the history, the anorexia of the RES [5,6,13].

An additional suspicion of hypocalcemia which occurred due to the lack of provision of any UVB was confirmed by the results of the blood and biochemistry tests as the calcium levels were 6 mg/dL which fell mildly below the normal range of 6.5-22.6mg/dL [4,5,13].

Treatment/Case management

The list of problems to treat include:

- Improper environment
- Respiratory infection
- Hypocalcaemia
- Dehydration and elevated uric acid levels
- Anorexia

Post treatment with enrofloxacin, the owner was informed of the severity of the respiratory infection, considering the required some time to provide for the changes in husbandry discussed the decision was made to admit the RES at the clinic.

Improper environment

The RES was provided with a heat source, a hide, and a UVB source (BURAQ turtle UVB), the temperature was maintained at 25 degrees Celsius and 32 degrees Celsius in the water and the basking area respectively, and the distance between the UVB source and the patient was 1 foot, the water in the tank was retained at a shallow level considering the RES was lethargic and the temperature

of the water was maintained at 25 degrees Celsius using a water heater (Buraq aquarium heater) [1,11,12,14].

Respiratory infection

The RES was treated with ceftriaxone @ 50 mg/Kg, q 24 (Intacef pet injection, Intas pharmaceuticals limited), seven days for the respiratory infection [2,4], ringer's lactate solution (Ringer-Lactate solution for injection, Abarias Healthcare Pvt. Ltd.), dextrose normal saline (DNS, Abaris) for the dehydration [8]. Ceftriaxone was chosen because the swab of the nasal discharge collected aseptically and sent for a culture demonstrated *Pseudomonas aeruginosa* that was susceptible to susceptible to ceftriaxone, gentamicin, amikacin, Levofloxacin, Ofloxacin, Ciprofloxacin, Netilmicin, Cefepime, and resistant to enrofloxacin, amoxicillin + clavulanic acid, ceftriaxone, cefuroxime, cefoperazone, and trimethoprim/sulphamethoxazole.

The RES was nebulised with salbutamol and distilled water (asthalin respirator solution (5 mg), Cipla Ltd.), for 15 minutes, twice a day for 15 days [1,15,16] and amikacin(mikacin 100mg, Aristo pharmaceuticals) 50mg/10ml saline, twice a day, for 30 minutes, twice a day, for 7 days [1,4,16].

- The hypocalcaemia was treated with oral calcium supplementation
- Dehydration and elevated uric acid levels

The elevated uric acid levels were most likely due to the dehydration. The dehydration was treated by using R.L. and D.N.S at 15ml/Kg ICe, once a day.

Anorexia

After the RES was hydrated, he was also given Emeraid intensive care omnivore formula (Emeraid IC omnivore, Emeraid), one three parts formula mixed with two part luke warm water till it achieved pancake batter like consistency, at 1% body weight gradually increasing to 2% of body weight on second feed, 3% body weight on third feed and so on, once a day,10 days, via tube feeding (once the animal was properly hydrated), to prevent hepatic lipidosis since the RES had a higher BCS [4].

Progress and outcome

The treatment with ceftriaxone @ 50 mg/Kg, q 24, seven days for the respiratory infection, along with which the Ringer's- Lactate

and dextrose normal saline administered every 24 hours as well for the same duration after which the manual CBC and uric acid levels were retested and the WBC and heterophil counts were 12.0×10^3 / cu mm and $(1-19.4 \times 10^3$ / cu mm) which are normal as the range is 28% and (18%-30.2%) respectively and the calcium levels were 6.1mg/ dL(6.5-22.6mg/dL) uric acid levels were 1.5 mg/dL (0.1-1.9 mg/dL) [4].

The tube feeding was started on the 3rd day after rehydration and was continued for 10 days, because the RES started consuming food on his own on the 10th day.

The nebulisations with salbutamol and distilled water were continued for 15 minutes, twice a day for 15 days [1,15,16] and the nebulisation with Amikacin was continued, twice a day, for 7 days.

After which the radiographs were repeated, which showed normal lungs.

After 7 days of treatment, the RES was sent home, the owners were asked to house the RES in a glass tank of dimension 4ft x 2ft x 2.5ft, the owner was asked to supply a UVB bulb and a heat source, the owner was asked to keep the UVB at 1 feet distance from the basking area which was to be kept on for 10 hours/day, the owner was asked to let the RES feed on his own and to correct the diet, the owner was instructed to add a water heater which maintained the temperature at 25 degrees Celsius and to feed and house the RES in two different areas in order to maintain hygiene.

Discussion

Respiratory infection

Respiratory disease is common in reptiles, especially in snakes and chelonians. A large part of this is due to inappropriate husbandry practices and certain anatomical features of reptile respiratory system, which include:

- Lack of a muscular diaphragm means that discharges cannot be coughed up
- A poorly developed mucociliary escalator in the airways also reduces the ability to clear discharges
- The ability to withstand long periods of hypoxia means that respiratory diseases are often well advanced before clinical signs are seen [1].

The suspicion of respiratory infection that had arisen because of the symptoms observed was confirmed with elevated WBCs and heterophilia. After which the nasal swab was collected for culture the results of which demonstrated growth of pseudomonas aerugi-

nosa which was susceptible to ceftriaxone, gentamicin, amikacin, Levofloxacin, Ofloxacin, Ciprofloxacin, Netilmicin, Cefepime, and resistant to enrofloxacin, amoxicillin + clavulanic acid, ceftriaxone, cefuroxime, cefoperazone, and trimethoprim/sulphamethoxazole. After which the decision was made to use ceftriaxone ceftriaxone @ 50 mg/Kg, q 24 seven days for the respiratory infection [2,4], to treat the respiratory infection.

Respiratory disease is one of the most commonly encountered disease processes in collections of captive reptiles. In many cases, improper husbandry techniques, including too high or too low temperatures, inadequate humidity, and poor nutrition will compromise the reptile's immune system and its response to potential pathogens [3].

Because of which the husbandry was corrected immediately at the time of treatment and the diet was improved gradually.

Aerosol therapy is indicated in reptiles with severe, chronic respiratory disease to facilitate delivery of antimicrobials and/or saline and water directly to respiratory surfaces. Administration of antimicrobial agents by aerosol in conjunction with systemic antibiotic therapy will improve delivery of the agent to the source of infection [16].

Because of which the R.E.S. was nebulised with salbutamol and distilled water, for 15 minutes, twice a day for 15 days [1,15,16] and amikacin diluted to 2 mg/ml, twice a day, till the medication was completely vapourised, for 7 days [1,4,16].

Hypocalcaemia

The initial suspicion of hypocalcaemia (that had arisen due to the malformed shell observed during clinical examination and the lack of a UVB source) was confirmed once the blood was evaluated and the calcium values were found to be 6mg/dL which fell below the normal range [4].

Which was then treated with Oral calcium supplementation with the Emerald IC formula that was given P/O and was continued in the form of oral calcium supplementation in the enclosure in the form of a mineral block.

Dehydration

The dehydration was suspected due to anorexia and the respiratory infection, which was then corrected with fluid therapy initially, followed by a combination of fluid and nutritional therapy [1,16].

Elevated uric acid levels

Uric acid is not a sensitive indicator of renal disease, an increase of above 15mg/dL is considered abnormal in a healthy individual.

A plasma calcium to phosphorus ratio of less than 1.0 would confirm renal disease [6].

Hence the uric acid levels were considered to be elevated due to dehydration, which was corrected once the RES was treated, the values were within the normal range once the blood tests were repeated post treatment.

Anorexia

Regardless of disease aetiology, supportive care is paramount. Patients will often be anorexic and nutritional support is essential, especially in cases of hepatic lipidosis, to avoid further mobilization of stored body fat [17].

The anorexia was taken care of by Tube feeding of Emeraid IC formula (two parts formula mixed with three parts of luke warm water) initially at 1% body weight gradually increasing to 2% of body weight on second feed, 3% body weight on third feed and so on, once a day, 10 days, via tube feeding (once the animal was properly hydrated), to prevent hepatic lipidosis since the RES had a higher BCS.

Table 1: Blood reports on 15/02/23.

Test	Unit	Results	Reference Range
Haemoglobin	g/dL	14.8	10-12,2
R.B.C Count	10 ⁶ x cu mm	0.86	0.33-2.21
W.B.C Count	10 ³ / cu mm	35	1.0-19.4
Heterophils	%	45	18-30.2
Lymphocytes	%	32	3-35.5
Eosinophils	%	03	1-15
Monocytes	%	05	4-18.3
Basophils	%	01	1-18
Creatinine	mg/dL	0.34	0.2-0.5
Calcium	mg/dL	6.0	6.5-22.6
Uric Acid	mg/dL	6.9	0.1-1.9
ALT(SGPT)	U/L	22.5	1-66

Table 2: Manual CBC reports on 22/02/23.

Test	Units	Results	Reference range
Haemoglobin	g/dL	12.1	10-12.2
R.B.C Count	10 ⁶ x cu mm	1.23	0.33-2.21
W.B.C count	10 ³ / cu mm	12.0	1.0-19.4
Heterophils	%	28	18-30.2
Lymphocytes	%	34	3-35.5
Eosinophils	%	03	1-15
Monocytes	%	05	4-18.3
Basophils	%	01	1-18
Uric Acid	mg/dL	1.5	0.1-1.9
Calcium	Mg/dL	6.1	6.5-22.6

Table 3: Results of the culture of the nasal swabs were as follows:
Organism: *Pseudomonas aeruginosa*.

Susceptible to	Resistant to
Ceftriaxone	Amoxicillin+ clavulanic acid
Gentamicin	Ceftriaxone
Amikacin	Cefuroxime
Levofloxacin	Cefoperazone
Ofloxacin	Trimithoprim/sulphamethoxazole
Ciprofloxacin	Enrofloxacin
Netilmicin	
Cefepime	

Conclusion

The author would like to bring attention to

- The role husbandry, diet and the environmental conditions can play on a reptiles health, and the importance of correcting all of these factors while a reptile is being treated in order to restore the reptiles health.
- The importance of diagnostic tests during treatment.
- The need for culture and sensitivity tests regularly both to prevent antimicrobial resistance and for effective treatment.
- The growing number of micro organisms resistant to the most commonly used antibiotic for exotic species- enrofloxacin.

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