Case Report 2

History

A 7 year-old, female spayed, feline, Domestic Shorthair presented to the applicant's facility on November 3rd, 2022 for further evaluation of chronic sneezing and nasal discharge persisting over a 7 month duration. The patient was treated empirically by rDVM with a tapering course of prednisolone (receiving 0.184 mg/kg [1.25 mg] PO q 48 hr at the time of consultation) and a since completed course of amoxicillin trihydrate/clavulanate potassium, however clinical signs did not improve. The patient was not experiencing any other reported clinical signs and maintained a normal appetite and energy level with no noted coughing, vomiting, or diarrhea. Diagnostics performed with rDVM included a cryptococcus serology, which was negative.

Patient Status on Presentation

Upon presentation, the patient was bright, alert, and responsive with a weight of 6.8 kg. Vital parameters obtained revealed normotension (130 millimeters of mercury [mmHg] on indirect arterial Doppler blood pressure), normothermia (102.1 degrees ℉), a heart rate of 192 bpm with a matching pulse rate of 192, mild tachypnea with a respiratory rate of 42 and no noted respiratory effort, a capillary refill time (CRT) of 1-2 seconds, and light pink mucous membranes. Physical examination (PE) revealed no murmurs or arrhythmias on auscultation, clear bronchovesicular sounds bilaterally, a soft and non-painful abdomen on palpation with no noted organomegaly, a body condition score of 6/9 (based on The World Small Animal Veterinary Association Global Nutrition Committee), and euhydration with normal skin turgor. No ocular discharge was noted, fundic examination showed no significant findings, and no overt circling, nystagmus, ataxia, or head tilt was appreciated. However, mild mucopurulent and

hemorrhagic left-sided nasal discharge was noted with no appreciated decrease of nasal airflow. Based on PE and clinical abnormalities, the patient's primary problem list included left-sided mild mucopurulent and hemorrhagic nasal discharge and sneezing.

Veterinarian's Differential Diagnosis

The veterinarian's differential diagnosis list included idiopathic rhinitis vs. viral rhinitis vs. fungal rhinitis vs. neoplasia vs. other.

Veterinarian's Initial Assessment of Prognosis

The veterinarian's initial assessment of prognosis was guarded. With a primary differential diagnosis of rhinitis, the prognosis can vary depending on the underlying etiology (such as viral, fungal, bacterial, and inflammatory) and chronicity of disease. The chronic nature of the patient's clinical signs and lack of response to empiric glucocorticoids (GCs) and antibiotic therapy was suggestive of disease that was not self-limiting and it was probable that the patient would exhibit recurrence of clinical signs with treatment, requiring life-long medical therapy. Therefore, an etiology with a high morbidity and low mortality was suspected. Nasal or nasopharyngeal (NP) neoplasia would be more likely in a patient with advanced age and prognoses of such neoplasms vary greatly. Typically nasal or NP tumors are locally invasive and respond well to radiation and/or chemotherapy, however advanced imaging (such as CT) and staging with cytology of regional lymph nodes are required for a more accurate prognosis.

Interventions

Given the chronicity of clinical signs and lack of response to empiric GCs and antibiotic therapy, a skull CT, rhinoscopy, nasal biopsies for histopathology, aerobic culture, and fungal culture, and an upper respiratory disease (URD) panel (see **Appendix A**) were recommended.

Preanesthetic diagnostics included CBC, chemistry, venous blood gas (VBG), prothrombin time (PT), partial thromboplastin time (PTT) (see **Appendix B**), and thoracic radiographs (see **Appendix C**). A 22 gauge left cephalic IV catheter (IVC) was placed and CBC, chemistry, and VBG were performed. CBC and VBG showed no significant findings and chemistry revealed hyperglycemia (220 mg/dL [N=75-120 mg/dL]), which was suspected to be stress-induced. The applicant then independently collected a citrated whole blood sample (in an effort to avoid potential prolonged PT/PTT artifact) for PT and PTT testing to evaluate coagulation parameters, which were both within normal limits. Thoracic radiographs were then performed, which showed no significant findings. Additional diagnostic tools to have considered at that time would include FIV and FeLV testing to evaluate for immunosuppression and susceptibility to URD. An aspergillus serology could also be considered to evaluate for an alternate form of fungal rhinitis. Abdominal ultrasound (AUS) would be helpful in identifying comorbidities that may not be distinguished on blood work to better evaluate anesthetic risk. Even in the absence of azotemia, investigation for signs of renal degeneration (such as loss of corticomedullary distinction) on AUS would also be vital to better evaluate anesthetic risk and the potential for the patient to develop an acute kidney injury secondary to IV contrast administration necessary to perform CT.

The applicant proposed an analgesia plan to include premedication with a pure mu-opioid agonist and N-methyl-D-aspartate (NMDA) antagonist, methadone 0.2 mg/kg (1.4 mg) IV, a bilateral infraorbital block with a local anesthetic, bupivacaine 0.29 mg/kg (2 mg) divided into two aliquots, and an intra-procedural additional mu-selective opioid agonist via a CRI, fentanyl CRI at 3-10 mcg/kg/hr (20.4 mcg/hr-68 mcg/hr) IV preceded by a fentanyl bolus of 3 mcg/kg (20.4 mcg) IV, to facilitate multimodal analgesia during rhinoscopy and nasopharyngoscopy. A

6.2 mm x 61 cm flexible endoscope for nasopharyngoscopy and 1.9 mm rigid endoscope, fiber optic lightsource, endoscopic camera, 0.9% sodium chloride, and laparotomy sponge for anterograde rhinoscopy were then prepared by the applicant.

The patient was administered maropitant 1 mg/kg (6.8 mg) IV, premedicated with methadone 0.2 mg/kg (1.4 mg) IV, induced with midazolam 0.2 mg/kg (1.4 mg) IV and propofol 5.88 mg/kg (40 mg) IV titrated to effect, intubated with a sterile 4.0 mm endotracheal tube, and maintained on sevoflurane and oxygen as well as a balanced crystalloid solution IV at 2.94 mL/kg/hr (20 mL/hr) by a registered veterinary technician (RVT) colleague. Vitals including ECG, pulse-oximetry, capnography, temperature, and non-invasive blood pressure were closely monitored. The applicant then administered bilateral infraorbital nerve blocks of bupivacaine prior to CT for regional analgesia, in order for the local anesthetic to reach onset of action (20-30 min) for subsequent rhinoscopy. Each infraorbital foramen was palpated independently, a 25 gauge 0.625 in needle with 1 mL syringe attached was inserted into each foramen, the syringe was aspirated with no blood return visualized, and bupivacaine 0.15 mg/kg (1 mg) was administered into each site. The patient was then positioned sternally within the CT gantry. After review of patient positioning on scout images, the patient was administered iohexol 350 mg iodine/mL (2.05 mL/kg [14 mL]) IV for contrast enhancement. CT revealed bilateral severe rhinitis with extension into the left nasopharynx and bilateral frontal sinusitis (see **Appendix C**). In preparation of rhinoscopy, the patient was then positioned in sternal recumbency and a 1.5 in non-spring-loaded mouth gag was placed. A fentanyl bolus of 3 mcg/kg (20.4 mcg) IV was administered, followed by initiation of the CRI at 3 mcg/kg/hr (20.4 mcg/hr) IV. DACVIM commenced nasopharyngoscopy and the 6.2 mm x 61 cm flexible endoscope was inserted into

the pharynx and retroflexed (180 degrees) to view the nasopharynx. The caudal nasopharynx was visualized and contained a large amount of blood. Following suction via the endoscope, mild left-sided NP stenosis was observed. To evaluate left-sided NP patency, a 5 french red rubber catheter was passed into the left nasal cavity and left nasopharynx without complication. Applicant then occluded the caudal pharynx with an absorbent laparotomy sponge. Anterograde rhinoscopy was then commenced and 40 ℉ sodium chloride was administered through the 1.9 rigid endoscope to improve visualization and facilitate vasoconstriction. Inflamed, ulcerated mucosa with hemorrhagic mucus was noted bilaterally. The rigid endoscope was removed and bilateral nasal biopsies were performed with 3 mm cup forceps for aerobic culture, fungal culture, and histopathology. A combined conjunctival and pharyngeal swab was then submitted for a feline URD panel. One actuation of oxymetazoline nasal spray (to relieve nasal congestion) was administered into each nare, the laparotomy sponge was removed, and the patient was recovered uneventfully from anesthesia while respiratory rate, respiratory character, pulse-oximetry, and severity of epistaxis was closely monitored. The patient was discharged same-day with no changes to medical therapy to await diagnostic results. The applicant prepared and provided the owner with postanesthetic care instructions upon discharge (see **Appendix D**).

Case Management

The feline URD panel did not show any positive findings and the fungal culture revealed no growth. Histopathology of the nasal biopsies revealed bilateral lymphoplasmacytic, neutrophilic, and eosinophilic rhinitis (see **appendix E**) and aerobic culture revealed *Pseudomonas oryzihabitans* with resistance to a number of antibiotics, including amoxicillin trihydrate/clavulanate potassium (see **Appendix F**). The owner was advised that histopathology

was suggestive of rhinitis (suspect idiopathic) with a bacterial component evident on culture. The presence of antibiotic resistant pseudomonas was likely the cause of the patient's lack of response to anti-inflammatory GCs and antibiotic therapy. The visualized left stenotic nasopharynx was suspected to be secondary to chronic inflammation and/or chronic infection, however congenital NP stenosis could not be ruled out. Intervention with NP balloon dilation was not recommended at that time as the stenosis was not severe. The owner understood that the underlying disease process would require long-term if not life-long management. Continuation of GCs (prednisolone 0.184 mg/kg [1.25 mg] PO q 48 hr until otherwise advised) was recommended in addition to marbofloxacin 3.67 mg/kg (25 mg) PO SID for 28 days (as the pseudomonas was sensitive to marbofloxacin based on minimum inhibitory concentration [MIC]). Use of phenylephrine hydrochloride drops (1-2 drops per nostril) PRN was also recommended if nasal congestion of both nares was noted. The owner was advised of the possibility of rebound congestion if phenylephrine is used in excess.

The patient's sneezing and nasal discharge resolved two weeks after the addition of marbofloxacin and the patient remained subclinical for one month after completing antibiotic therapy. At that time, the patient was solely maintained on prednisolone 0.184 mg/kg (1.25 mg) PO q 48 hr and experienced a recurrence of sneezing and left-sided mucopurulent and hemorrhagic nasal discharge. A second course of marbofloxacin 3.67 mg/kg (25 mg) PO SID for 28 days was recommended. Nasal signs resolved with antibiotic therapy and the patient remained subclinical for an extended period of time.

5 months post diagnosis of idiopathic rhinitis (April 12th, 2023), the patient returned for a recheck examination. No sneezing, nasal discharge, or other clinical abnormalities were reported

at that time. PE and vital parameters were within normal limits and CBC and chemistry showed no significant findings (see **Appendix G**). As the patient was experiencing no clinical abnormalities, prednisolone was further tapered to 0.184 mg/kg (1.25 mg) PO three times weekly for two weeks, then 0.184 mg/kg (1.25 mg) PO twice weekly for two weeks, then 0.184 mg/kg (1.25 mg) PO once weekly for two weeks, at which point the prednisolone was discontinued.

Final Outcome

In the absence of a glucocorticoid, the owner appreciated an increase in sneezing and mild left-sided nasal congestion and epistaxis. Prednisolone was restarted at 0.18 mg/kg (1.25 mg) PO q 48 until directed and continuation of phenylephrine hydrochloride drops (1-2 drops per nostril) PRN was recommended in addition to sodium chloride nasal drops (1-2 drops per nostril) PRN to mitigate nasal congestion and discharge. The patient was clinically well-managed with only occasional sneezing episodes noted by the owner upon reintroduction of prednisolone.

Discussion

Upper respiratory tract (URT) conditions are widespread in the feline population regardless of age or lifestyle, including those in colonies, shelters, and households (Gao et al., 2017). Of these conditions, chronic nasal disease is incredibly common and can be difficult to treat due to the anatomy and physiology of the nasal cavity. The internal nasal cavity consists of nasal conchae, or turbinates, that provide a large mucosal surface area. The nasal mucous membranes and mucus they secrete are responsible for humidification, filtration, and warming of inspired air (Xi et al., 2023). While a healthy nasal cavity contains a normal flora of microbial diversity, patients exhibiting signs of nasal disease (such as sneezing, nasal discharge, and respiratory stertor) can contain problematic nasal pathogens (Dorn et al., 2017). Pathogens to

consider in these patients include bacterial causes such as *Mycoplasma felis,* viral causes such as herpesvirus type-1, and fungal causes such as cryptococcosis (Gao et al., 2017). Destruction of the nasal mucosa and turbinates is possible with aggressive disease, but more so with neoplastic or fungal involvement.

Diagnostically in this patient, a CBC, chemistry, and VBG were helpful in screening for systemic disease prior to general anesthesia (GA). Coagulation times (PT and PTT) were evaluated due to the hemorrhagic nasal discharge noted on PE. Thoracic radiographs were imperative to exclude lower airway disease and further evaluate cardiac status prior to GA. As this patient was initially unresponsive to empiric therapy, testing for respiratory viruses, such as feline herpesvirus 1 or calicivirus, was beneficial in evaluating for feline URT disease. The possibility of secondary bacterial infections should be taken into consideration in patients with mucopurulent nasal discharge (Lappin et al., 2017), and an aerobic culture of nasal tissue was performed as a result. While cryptococcal and aspergillus serology are recommended to evaluate for fungal rhinitis, it should be noted that aspergillus serology is highly specific, but not sensitive (Lopez, 2017). As the patient previously tested negative for cryptococcosis, a fungal culture of nasal tissue was used as an alternative diagnostic tool to evaluate for fungal disease. Advanced imaging such as CT or MRI is the next diagnostic method in assessing soft tissue or fluid accumulation, turbinate destruction, or destruction of the paranasal bones. However, CT is currently the preferred imaging modality over MRI due to prolonged anesthetic time with the latter (Lopez, 2017). Following advanced imaging, retrograde nasopharyngoscopy and anterior rhinoscopy were essential for visualization of the affected area and biopsy procurement.

Despite diagnostics, a viral, bacterial, or fungal pathogenic cause may not be isolated. These cases will often show non-specific lymphoplasmacytic or mixed inflammatory rhinitis on histopathology. This non-specific inflammation, or idiopathic rhinitis, is speculated to be correlated with dysregulation of the nasal mucosal immune system (Roccabianca et al., 2021). In this specific patient, a mixed lymphoplasmacytic, neutrophilic, and eosinophilic rhinitis was evident on histopathology, which was not unexpected given that lymphoplasmacytic rhinitis is of the most common non-infectious forms of rhinitis (Oechtering, 2017). While *Pseudomonas oryzihabitans* was evident on aerobic culture, primary bacterial rhinitis is rare (Meepoo et al., 2022), and it was suspected to be a secondary bacterial infection. Nasopharyngoscopy also revealed left-sided nasopharyngeal stenosis in this patient. While anatomical abnormalities are an important consideration in the treatment of patients exhibiting signs of nasal disease, it was determined that the stenosis observed was not severe enough to require intervention.

In treatment of idiopathic rhinitis, management focuses on symptomatic rather than curative therapies. Alleviation of inflammation is a cornerstone of treatment and typically involves a tapering course of a glucocorticoid. The anti-inflammatory mechanistic actions of GCs are multifactorial and some examples include reduction of inflammatory enzyme activity, suppression of inflammatory cytokines, and incitement of anti-inflammatory cytokines (Blois & Mathews, 2017). The glucocorticoid of choice in this patient was prednisolone and although anti-inflammatory dosing of prednisolone in cats ranges from 1-2 mg/kg/day (Blois & Mathews, 2017), this patient showed clinical improvement with a reduced physiologic dose (0.184 mg/kg [1.25 mg] PO q 48). While GCs are an imperative treatment modality to mitigate inflammation, adverse effects can include insulin resistance, muscle wasting, secondary infections, and obesity

(Blois & Mathews, 2017). In consideration of these possible iatrogenic glucocorticoid-induced complications, routine clinical, biochemical, and hematologic monitoring should be performed with their prolonged use. In this patient, emerging diabetes mellitus vs. stress-induced hyperglycemia was a concern upon initial presentation, however normoglycemia was noted upon the aforementioned recheck evaluation. Additionally, the presence of a resistant pseudomonas organism required treatment with two courses of targeted antibiotic therapy (marbofloxacin 3.67 mg/kg [25 mg] PO SID for 28 days). Other recommended long-term therapy in this patient included PRN treatment of nasal congestion and discharge with a nasal decongestant (phenylephrine) and sodium chloride, but was purely symptomatic therapy.

Advanced knowledge of small animal internal medicine by the applicant allowed for the proposal and administration of a multimodal analgesic plan. Given the sensitivity of the nasal cavity, appropriate analgesia with an opioid and/or nerve blockade are essential in reducing the sneeze reflex and relieving pain (Page, 2017). A pure mu-opioid agonist and NMDA antagonist (methadone) and an intra-procedural pure mu-opioid agonist CRI (fentanyl) were imperative in providing appropriate analgesia as well as reduction of induction and maintenance anesthetic agents. The applicant's advanced small animal internal medicine skills also allowed for administration of an infraorbital block with a local anesthetic (bupivacaine) for rostral maxillary regional pain management. This multimodal analgesic plan allowed for an appropriate plane of anesthesia for identification of unilateral NP stenosis, evaluation of patency and severity of the stenotic nasopharynx, anterior rhinoscopy, and nasal biopsies while avoiding adverse anesthetic events such as inadequate plane of anesthesia or the need for high concentrations of an inhalant anesthetic (leading to potential hypoventilation, hypotension, and bradycardia).

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Appendix A

Upper Respiratory Disease Panel

The feline upper respiratory disease (URD) panel included evaluation of *Chlamydophila felis*, feline calicivirus, herpesvirus type-1, *Bordetella*, *Mycoplasma felis*, influenza A, and influenza A subtype H7N2 on polymerase chain reaction (PCR).

Appendix B

Laboratory Results

Venous Blood Gas (VBG)			
Test	**Results**	**Unit**	**Reference Range**
pH	7.334		7.230-7.423
partial pressure of carbon dioxide (PCO2)	36.2	millimeters of mercury (mmHg)	42.1 ± 4.4
partial pressure of oxygen (PO2)	47	millimeters of mercury (mmHg)	55 ± 9.6
bicarbonate (HCO3)	18.8	mmol/L	18.1-26.3
base excess (BE)	-3.3	mmol/L	-5.7 ± 5
Hct	35	%	31-48
sodium (Na)	150.4	mmol/L	149.8-155.7
potassium (K)	3.61	mmol/L	3.19-4.76
ionized calcium (Ca++)	1.21	mmol/L	1.19-1.35
chloride (Cl)	115	mmol/L	113-121
glucose	226	mg/dL	75-120
lactate	1.98	mmol/L	0.5-5.23
anion gap	20.2	mmol/L	15.4-23.4

CBC			
Test	**Results**	**Unit**	**Reference Range**
RBC	7.66	million/microliter (M/µL)	6.54-12.2
Hct	34.7	%	30.3-52.3
Hgb	11.3	g/dL	9.8-16.2
MCV	45.3	femtoliters (fL)	35.9-53.1
MCH	14.8	picograms (pg)	11.8-17.3
MCHC	32.6	g/dL	28.1-35.8
red blood cell distribution width (RDW)	21.9	%	15-27

reticulocytes	0.4	%	
absolute reticulocytes	28.3	kilo/microliter (K/µL)	3.0-50.0
reticulocyte-Hgb	16.1	picograms (pg)	13.2-20.8
WBC	8.02	kilo/microliter (K/µL)	2.87-17.02
% neutrophils	79.1	%	
% lymphocytes	11	%	
% monocytes	3.4	%	
% eosinophils	5.4	%	
% basophils	1.1	%	
neutrophils	6.35	kilo/microliter (K/µL)	2.30-10.29
lymphocytes	0.98	kilo/microliter (K/µL)	0.92-6.88
monocytes	0.27	kilo/microliter (K/µL)	0.05-0.67
eosinophils	0.43	kilo/microliter (K/µL)	0.17-1.57
basophils	0.09	kilo/microliter (K/µL)	0.01-0.26
platelets	335	kilo/microliter (K/µL)	151-600
mean platelet volume (MPV)	17.6	femtoliters (fL)	11.4-21.6
plateletcrit (PCT)	0.59	%	0.17-0.86

Chemistry			
Test	**Results**	**Unit**	**Reference Range**
glucose	220	mg/dL	71-159
CREA	1.4	mg/dL	0.8-2.4
BUN	16	mg/dL	16-36
BUN/CREA	11		
phosphorus	4.5	mg/dL	3.1-7.5
calcium	9.4	mg/dL	7.8-11.3
total protein	8.4	g/dL	5.7-8.9
albumin	3.2	g/dL	2.3-3.9
globulin	4.2	g/dL	2.8-5.1
albumin/globulin	0.6		
ALT	16	units/L (U/L)	12-130

ALKP	22	units/L (U/L)	14-111
GGT	0	units/L (U/L)	0-4
T.Bili	0.4	mg/dL	0.0-0.9
cholesterol	76	mg/dL	65-225
amylase	822	units/L (U/L)	500-1500
lipase	625	units/L (U/L)	100-1400
sodium	159	mmol/L	150-165
potassium	3.7	mmol/L	3.5-5.8
sodium/potassium	43		
chloride	113	mmol/L	112-129
osmolality	322	mmol/kg	

Coagulation Parameters			
Test	**Results**	**Unit**	**Reference Range**
prothrombin time (PT)	94	seconds	15-22
partial thromboplastin time (PTT)	18	seconds	65-119

Appendix C

Diagnostic Imaging Results

Thoracic radiograph report:
The cardiac silhouette is normal in size. The pulmonary vessels are normal in diameter. The pulmonary pattern is normal. There is no evidence of mediastinal lymphadenopathy.

Skull CT report:
A large amount of heterogeneously contrast-enhancing soft tissue is interspersed within the left and right nasal cavity. Nasal turbinate loss is associated with this soft tissue. A mild to moderate amount of contrast-enhancing soft tissue extends from the nasal cavity into the rostral nasopharynx, more severe left-sided. This causes left sided attenuation of the nasopharynx. There is a punctate symmetric defect within the left and right maxilla adjacent to this tissue. There are faint multifocal punctate relative lucencies within the adjacent maxilla without definitive cortical lysis. Noncontrast enhancing soft tissue fills the frontal sinus bilaterally. The tympanic bullae and salivary glands are unremarkable. The thyroid glands are subjectively mildly rounded and symmetric. A few teeth are absent.

Appendix D

Postanesthetic Care Instructions

Discharge Instructions

11-03-2022

Zoe underwent a CT scan, rhinoscopy, and nasal biopsies today. She recovered uneventfully from anesthesia and while there was a small amount of bleeding that occurred subsequent to the nasal biopsies, this phenomenon is expected. Continued mild nasal bleeding may be observed at home this evening. As discussed, based on the CT scan and rhinoscopy, we are concerned about severe rhinitis (either idiopathic/immune-mediated or viral). However, the pending histopathology (biopsy) and culture results will aid in confirming this suspicion or identifying other disease processes.

You may notice that Zoe is sedate this evening, as recovery from anesthesia is ongoing. It may take up to 24-48 hours before she resumes normal activity. You may also notice a mild cough for the next few days. The cough is likely due to irritation from the endotracheal tube and should subside within a few days.

MEDICATIONS:

Prednisolone 5 mg tablets: Continue to administer ¼ of a tablet (1.25 mg) by mouth every 48 hours. Do not taper further until directed to do so by a veterinarian.

ADDITIONAL INSTRUCTIONS:

We will contact you with diagnostic results as soon as they are available (expect approximately 7 to 10 days). In the meantime, if you are at all concerned with Zoe's condition, please feel free to contact the hospital at any time.

If Zoe leaves the hospital with a bandage on any leg, please remove it as soon as you return home or reach your destination.

Appendix E

Histopathology Results

Nasal mucosa:
Specimens from the left and right nasal passages were examined. Changes are similar in each. The lamina propria is expanded by moderate to marked numbers of lymphocytes and plasma cells admixed with neutrophils and a few eosinophils. Ulceration is not noted. Evidence of neoplasia is not noted.

Appendix F

Aerobic Culture Results

Nasal Mucosa:

Isolate 1: *Pseudomonas oryzihabitans* - 2+

The organism isolated is uniformly resistant to amoxicillin, amoxicillin/clavulanic acid, cefalexin, cefazolin, cefpodoxime, ceftiofur, cefotaxime, cefovecin, chloramphenicol, florfenicol, tetracycline, doxycycline, minocycline, pradofloxacin, sulfisoxazole, and trimethoprim/sulfa; therefore, susceptibility testing against these antibiotics is not indicated.

Isolate 1: minimum inhibitory concentration (MIC)

ceftazidime S 1
imipenem S <=0.25
amikacin S <=2
gentamicin S <=1
ciprofloxacin S <=0.06
enrofloxacin S <=0.12
marbofloxacin S <=0.5

INTERPRETATION KEY for Antibiotic Susceptibility Results
S = Sensitive. Organism is inhibited by the usual recommended dose.
I = Intermediate. Organism is inhibited only by the maximum recommended dose.
R = Resistant. Organism is resistant to the maximum recommended dose.
These standards have been established by the Clinical and Laboratory Standards Institute (CLSI).
TF = To Follow. Susceptibility testing for this antibiotic is performed by Kirby-Bauer and results will follow shortly.

Appendix G

Recheck Evaluation Data

Vital Parameters		
		Unit
Doppler blood pressure	138	millimeters of mercury (mmHg)
temperature	101.2	degrees Fahrenheit (℉)
heart rate	192	bpm
pulse rate	192	pulse rate per minute
respiratory rate	36	respirations per minute
respiratory effort	none	
capillary refill time (CRT)	1-2	seconds
mucous membrane color	pink	
weight	7.1	kg

Physical examination:
Bright, alert and responsive. Well hydrated with moist, pink mucous membranes, and normal capillary refill time.
Eyes, Ears, Nose and Throat: Clear eyes with no ocular discharge. Fundic exam normal. No aural discharge. Both nares patent with no nasal discharge Mild periodontal disease.
Peripheral Lymph Nodes: Normal.
Heart and Lungs: No murmurs or arrhythmias. Strong and synchronous pulses. Normal respiratory rate and effort with clear lung sounds bilaterally.
Abdomen: Soft and non-painful. No obvious masses.
Urogenital: Kidneys smooth and symmetrical. Moderately sized, soft bladder.
Musculoskeletal: Ambulatory with a normal gait. BCS 6/9.
Integument: Normal coat. Normal skin.
Rectal: Not performed.

CBC			
Test	**Results**	**Unit**	**Reference Range**

RBC	8.53	million/microliter (M/µL)	6.54-12.2
Hct	41.6	%	30.3-52.3
Hgb	13.7	g/dL	9.8-16.2
MCV	48.8	femtoliters (fL)	35.9-53.1
MCH	16.1	picograms (pg)	11.8-17.3
MCHC	32.9	g/dL	28.1-35.8
red blood cell distribution width (RDW)	22	%	15-27
reticulocytes	0.2	%	
absolute reticulocytes	17.1	kilo/microliter (K/µL)	3.0-50.0
reticulocyte-Hgb	15.9	picograms (pg)	13.2-20.8
WBC	6.33	kilo/microliter (K/µL)	2.87-17.02
% neutrophils	68.3	%	
% lymphocytes	19	%	
% monocytes	4.1	%	
% eosinophils	6.5	%	
% basophils	2.1	%	
neutrophils	4.33	kilo/microliter (K/µL)	2.30-10.29
lymphocytes	1.2	kilo/microliter (K/µL)	0.92-6.88
monocytes	0.26	kilo/microliter (K/µL)	0.05-0.67
eosinophils	0.41	kilo/microliter (K/µL)	0.17-1.57
basophils	0.13	kilo/microliter (K/µL)	0.01-0.26
platelets	252	kilo/microliter (K/µL)	151-600
mean platelet volume (MPV)	18.3	femtoliters (fL)	11.4-21.6
plateletcrit (PCT)	0.46	%	0.17-0.86

Chemistry			
Test	**Results**	**Unit**	**Reference Range**
glucose	144	mg/dL	71-159
CREA	1.5	mg/dL	0.8-2.4
BUN	23	mg/dL	16-36
BUN/CREA	16		

phosphorus	5	mg/dL	3.1-7.5
calcium	9.6	mg/dL	7.8-11.3
total protein	8.3	g/dL	5.7-8.9
albumin	3.4	g/dL	2.3-3.9
globulin	4.9	g/dL	2.8-5.1
albumin/globulin	0.7		
ALT	52	units/L (U/L)	12-130
ALKP	25	units/L (U/L)	14-111
GGT	3	units/L (U/L)	0-4
T.Bili	0.2	mg/dL	0.0-0.9
cholesterol	136	mg/dL	65-225
amylase	864	units/L (U/L)	500-1500
lipase	723	units/L (U/L)	100-1400
sodium	157	mmol/L	150-165
potassium	3.8	mmol/L	3.5-5.8
sodium/potassium	42		
chloride	123	mmol/L	112-129
osmolality	317	mmol/kg	