



**INDIANAPOLIS
VETERINARY
REFERRAL**



**JUNE 2012
CASE STUDY**



Signalment:

An 18-month old 3.5 kg (7.7 pounds), female spayed Bengal cat.

History:

The patient had a three-day history of corneal lesions. The patient originally presented to the referring veterinarian with a 1 mm diameter deep corneal ulcer on the left eye described as a “cloudy, blue, and raised corneal ulcer”. The referring veterinarian had treated the ulcer with the application of a third eyelid flap to cover the corneal defect, topical Gentamicin OS TID, Atropine OS BID, and systemic antibiotics (Amoxicillin/Clavulanic Acid , 62.5 mg PO every BID). Two days later, the

owners noticed acute and severe corneal edema, to the right eye. The patient was consequently referred for further evaluation and treatment.

Physical Examination:

Physical examination found the patient to be in good general condition. Mild to moderate tachycardia (216 bpm) and tachypnea (66 rpm) were identified. The third eyelid flap was taken down. Bilateral blepharospasm with photophobia was noted. Moderate to severe generalized corneal edema was present in the right eye and a 1-2 mm deep corneal ulcer was present in the left eye. Complete blood count and biochemistry panel were within normal limits. The patient was admitted to the intensive care unit and topical treatment was initiated with ophthalmic solution of Flurbiprofen and Gentamicin OU every 2 hours, artificial tears ointment OU every 2 hours, and Atropine OU BID.

Figure 1



Figure 2



Severe corneal edema and protrusion

Despite the aggressive medical therapy the corneal edema in the right eye progressed so severely that within 8 hours the right cornea protruded 12-15 mm through the eyelids, preventing the patient from blinking (Figure 1 & 2).

¹Clavamox Drops. Pfizer Animal Health, Exton, PA 19341 - USA

Questions:

1. What is your diagnosis?
2. What are the treatment options?
3. What is the prognosis?

PART II

Treatment:

Immediately after being evaluated, the patient was taken to surgery. Due to the generalized damage to the right cornea and the lack of a donor to attempt a corneal transplant, an enucleation was performed. Samples were taken for bacteriological culture and sensitivity (including mycoplasma), PCR for Feline Herpes Virus (FHV), and the patient was tested for Feline Leukemia Virus (FeLV) and Feline Immunodeficiency Virus (FIV) with a commercial ELISA test. A conjunctival flap was applied over the left corneal defect to alleviate the corneal edema and facilitate healing (Figure 4 & 5).

Results:

No microorganisms were cultured. The PCR for Feline Herpes Virus was negative as was the testing for FeLV and FIV (Figure 3). The histopathological analysis revealed severe corneal edema with destruction of the stroma and loss of the normal architecture of the collagen fibers. Neither the epithelium nor the endothelium could be identified.

Figure 3

Tests	Results
Aerobic Bacterial Culture	Negative
Mycoplasma Culture	Negative
Feline Herpes Virus PCR	Negative
Feline Leukemia Virus	Negative
FIV	Negative

Figure 4

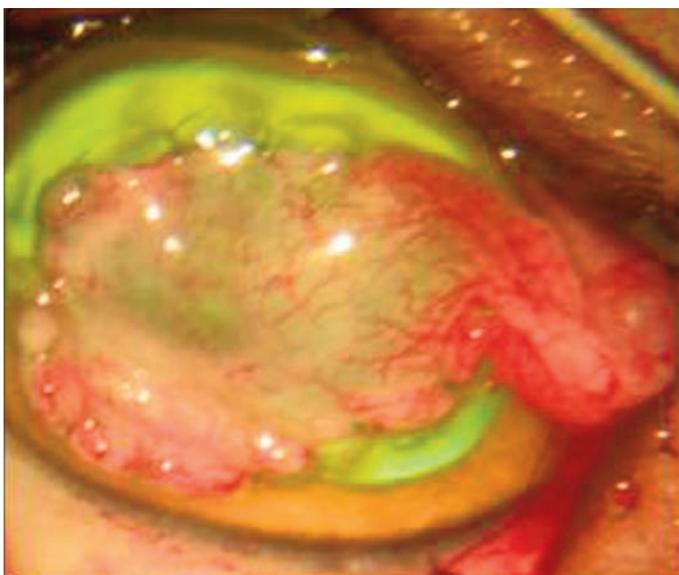
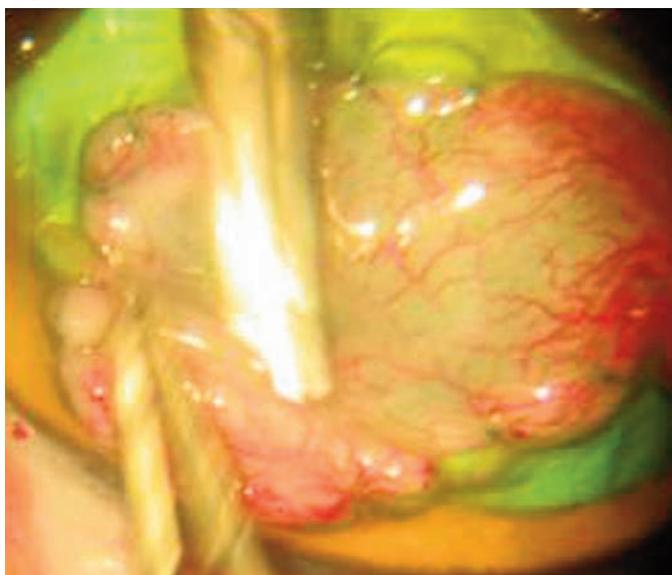


Figure 5



**Intra-op view under surgical microscope of the conjunctival flap application.
Note the rich vascular bed the flap supplies to provide fluid drainage and to alleviate edema.**

Diagnosis:

Feline Acute Bullous Keratopathy

Follow Up:

The cat was periodically reevaluated over the next few weeks and each time was found to be doing well. Three months after surgery the cat was again presented to the hospital as an emergency. A 3 mm diameter bulla was found on the left eye adjacent to the conjunctival flap which was still in place and appeared normal. The owners reported that the lesion had precipitated and rapidly progressed in a few hours. A deep ulcer with a small central perforation was detected on the ophthalmic examination and was attributed to Feline Acute Bullous Keratopathy. The patient's

owners declined treatment and requested humane euthanasia. The left cornea and conjunctival flap was collected post-mortem and sent for electron microscopy analysis (EM).

The EM analysis revealed areas of endothelial loss beneath the corneal ulcer (Figure 6 & 7), and beneath the area of the conjunctival flap were scattered areas of endothelial apoptosis.

Figure 6

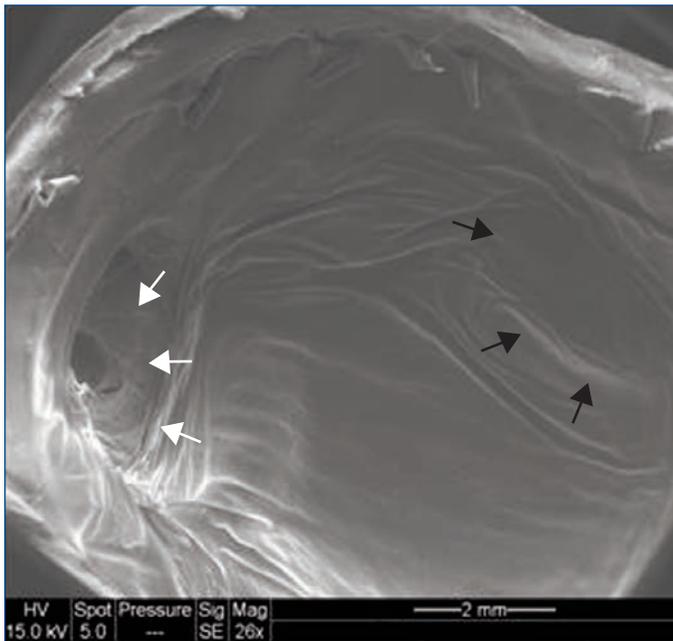


Figure 7



**View of internal surface of the cornea through a Scanning Electron Microscope.
Note the new ulcer (white arrows) and the area, externally, covered by the flap (black arrows).
It can be appreciated how this area is not covered by endothelium.**

Discussion:

The primary etiology of bullous keratopathy has not been elucidated, however, there is evidence that bullous keratopathy occurs when the pumping capability of the endothelial layer is overwhelmed. This allows water to passively diffuse across the endothelium from the aqueous humor to the corneal stroma following a concentration gradient. The highly hydrophilic proteoglycans located in the substantia propria, proteoglycan distribution within the stroma, and the ratio between various proteoglycans (dermatan sulfate, keratan sulfate, etc) will ultimately determine the water distribution in the cornea. With chronic or severe edema, formation of subepithelial and intraepithelial fluid-filled pockets, referred to as bullae, will occur. The bullae accumulate beneath or within the corneal epithelium and may spontaneously rupture causing corneal erosion or ulceration.

Bullae formation is associated with several primary keratopathies in both people and animals, but in the cat, bullous keratopathy is reported as a sole entity. In cats, a profound, rapidly progressive corneal edema follows soon after a small corneal bulla is identified. The edema worsens despite aggressive topical therapy. It is speculated the endothelial cells undergo apoptosis for an unknown reason, unleashing the events previously described resulting in corneal edema, swelling, and ulceration. The apoptotic changes (cell death with no inflammatory response) of the endothelial cells in this case, were documented with EM (Figure 9 & 10).

Figure 8

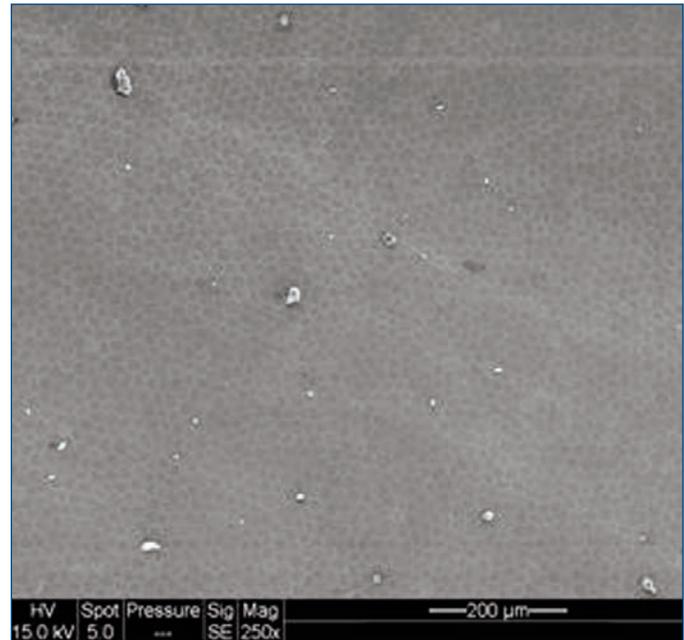


Figure 9



**Electron microscopy view of:
9) the normal endothelium.
10) Detailed view of intercellular junctions.
Note the apoptotic cells in the center
of the picture.**

INDIANAPOLIS VETERINARY REFERRAL SURGERY & ANESTHESIA



Nicolás Vecchio, DVM

Our surgeons have more than 30 years of combined experience in surgery. Our anesthetists have been practicing anesthesia in a referral only practice for more than a decade. They are proficient at anesthetizing and monitoring anything from pediatric to geriatric patients. Common monitoring equipment includes arterial catheterization for blood pressure and blood gas sampling, central venous pressure, non-invasive blood pressure, EKG, pulse oxymetry, expiratory capnography, core temperature, and cardiac output.

We perform many types of orthopedic, traumatologic, neurological, thoracic (including cardiovascular), abdominal, and reconstructive surgery. A wide variety of minimally invasive procedures are performed routinely. Some of these are diagnostic and therapeutic arthroscopy, thoracoscopy, and laparoscopy. Our surgical team is constituted by more than ten highly trained people. We perform emergency procedures 24 hours a day to maximize positive outcome and optimize patient care.

BELOW ARE LISTED SOME OF THE PROCEDURES
COMMONLY PERFORMED BY OUR SERVICE.

ORTHOPEDICS & TRAUMATOLOGY

- Fracture Repair
- Patellar Luxation Repair
- TPLO (Tibial Plateau Leveling Osteotomy)
- TTA (Tibial Tuberosity Advancement)
- THR (Total Hip Replacement)
- FHO (Femoral Head and Neck Osteotomy)
- TPO (Triple Pelvic Osteotomy)
- JPS (Juvenile Pubic Symphysiodesis)
- PennHip
- FCP (Fragmented Coronoid Process) Removal
- OCD (Osteochondritis Dissecans)
- Angular Deformity Prevention
- Prosthetic Limbs

NEUROLOGICAL SURGERY

- IVDD (Intervertebral Disc Disease)
 - Hemilaminectomy
 - Dorsal Laminectomy
 - Cervical Ventral Slot
 - Disc Fenestration
- Atlanto-Axial Luxation Stabilization
- Spinal Fracture
- Wobbler's Disease (Cervical Instability)

- Spinal or Spinal Cord Tumor
- Craniotomy for Brain Tumor
- Sub-Arachnoid Cyst Treatment
- Lumbo-Sacral Instability
- Peripheral Nerve Biopsy
- Cerebro-Spinal Fluid Collection and Analysis

CARDIO-THORACIC SURGERY

- Lungs
 - Lung lobectomy
 - Pneumonectomy
 - Lung biopsy
 - Pleural Sealing
- Cardiovascular Surgery
 - PRAA (Persistent Right Aortic Arch) Transection
 - PDA (Patent Ductus Arteriosus) Ligation
 - Pericardectomy
 - Auriculectomy
 - Thoracic Duct Ligation
 - Porto-Systemic Shunt (PSS)

ABDOMINAL SURGERY

- Liver Lobectomy
- Liver Biopsy
- Cholecystectomy
- Cholecysto-Duodenostomy
- Gastro Intestinal Biopsy
- Enteric Resection and Anastomosis
- Total and Subtotal Colectomy
- Splenectomy
- Urolith (urinary stones) Removal
- Diaphragmatic Hernia
- Perineal Hernia Repair
- Abdominal Hernia
- Inguinal Hernia
- Nephrectomy
- Adrenal Tumor
- Gastrotomy and Gastrectomy
- Cystotomy and Cystectomy
- Prostatic Omentalization and Prostatectomy

HEAD & NECK SURGERY

- Arythenoid Lateralization
- Parathyroidectomy
- Thyroidectomy
- Tracheostomy Tube Placement
- Permanent Tracheostomy
- TECA (Total Ear Canal Ablation)
- Ventral Bullae Osteotomy
- Brachycephalic Syndrome
- Maxillectomy and Mandibulectomy
- Mucocele Resection

ONCOLOGIC SURGERY

RECONSTRUCTIVE & PLASTIC SURGERY

- Wound Management and Care
- Skin Grafting
- Skin Flap
- Vulvoplasty



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James R. Speiser, DVM — jspeiser@indyvet.com

Diplomate, American Board of Veterinary Practitioners Specialist, Companion Animals

Dr. James Speiser has been a veterinarian for 33 years. He received his Doctorate of Veterinary Medicine from the University of Illinois in 1977. He then participated in a 14 month internship at South Shore Veterinary Associates in Boston prior to opening a regular veterinary hospital in Fishers in 1979. He continued to study and grow in the veterinary field by taking and passing the American Board of Veterinary Practitioners certifying examination, designating him as a specialist in Canine & Feline Practice. He opened Indianapolis Veterinary Referral in 1989 which was the first referral only specialist hospital in Indianapolis. In 1994 he opened Indianapolis Veterinary Referral and Emergency Center, offering emergency, critical care and specialized referral care for referring veterinarians and their patients. In 2007 he became certified by the Nuclear Regulatory Commission in I-131 radiation therapy for hyperthyroid cats. He received his certification in Rehabilitation Therapy in 2009. Dr. Speiser is knowledgeable in orthopedic surgery and neurosurgery, as well as being competent in ultrasound, endoscopy and CAT Scan diagnostics not normally offered at a regular veterinary clinic.



Nicolás Vecchio, DVM — surgery@indyvet.com

Practice Limited To Surgery

An Argentina native, Dr. Vecchio is a 2002 graduate of the National University of La Plata, in Buenos Aires. While in Argentina, Dr. Vecchio worked at the veterinary school teaching surgery for 4 years and also worked in private practice. Dr. Vecchio completed a fellowship in anesthesia and another in endoscopy at two different human hospitals. After relocating to the United States, Dr. Vecchio practiced in Memphis, Tennessee both in general and specialty practice. He moved to Baton Rouge, Louisiana to complete a rotating internship in companion animal medicine and surgery in 2007. He then moved back to Memphis to complete a 1-year surgical internship and a 3-year small animal surgical residency at MedVet Memphis. Dr. Vecchio joined Indianapolis Veterinary Referral in July of 2011.

Dr. Vecchio has a prolific interdisciplinary research record with multiple publications. His research interests include cardiovascular surgery, thoracic organ transplantation, and orthopedic surgery. He also has extensive experience and expertise in wound healing and reconstructive surgery.



Tracey Gillespie, DVM — medicine@indyvet.com

Diplomate, American College of Veterinary Internal Medicine Small Animal Internal Medicine

Dr. Tracey Gillespie completed her veterinary degree at Purdue University in 1997. After a private practice internship and a year of emergency medicine in New Jersey, she completed her residency in Internal Medicine at the University of Pennsylvania in 2001 and became board certified in 2003. She joined a surgical referral hospital and built an Internal Medicine practice in Memphis, TN where she practiced for 7 years. In 2008, she joined IDEXX labs as a consultant for the reference laboratory. She joined Indianapolis Veterinary Referral in the summer of 2011 and is enjoying her return to clinical practice.

IODINE 131 THERAPY FOR CATS WITH HYPERTHYROIDISM PROVIDED EVERY WEEK AT INDIANAPOLIS VETERINARY REFERRAL.

The Process

Cats are admitted each Monday or Tuesday for I-131 therapy. Baseline blood work, chest x-rays, and blood pressure evaluation is needed and can be provided by the referring veterinarian during the week prior to I-131 therapy. Additionally, if a cardiac assessment is needed, this can be done the day of admission into Indianapolis Veterinary Referral, or may also be done by the referring veterinarian the week before I-131 therapy. Methimazole therapy should be stopped at least one week prior to admission. All data collected by the referring veterinarian should be given to the client so that they can bring it with them at the time of referral.

Once the patient is admitted, they are further examined to assure that they are good candidates for the I-131 therapy. Those that are fully qualified are treated, and are maintained in a specially designed radiation containment housing ward in the hospital. The patient's radiation levels are monitored closely until they can be safely released, usually on Thursday or Friday afternoon or evening.

What Do I Need To Know?

At the time of release, although the pets are within the safety guidelines developed by the Nuclear Regulatory Commission for radiation, owners are instructed on the safe handling of the cat's litter and waste during the following two weeks to minimize any possible radiation exposure to the pet owner from handling waste. A re-check appointment in 7 to 10 days is required to re-check renal and liver values post therapy. It is recommended that the thyroid value of the patient be re-tested at 30 days post treatment. The re-check appointments may be scheduled at the office of the referring veterinarian, or at Indianapolis Veterinary Referral. We are very pleased to provide this state of the art treatment for feline hyperthyroidism to our partners and their clients. We are happy to answer any further questions you may have about this treatment. Just call our office at 317-782-4484, or e-mail us at service@indyvet.com.

**Please Call 317-782-4484
to Schedule An Iodine 131 Consultation
With Our Internal Medicine Specialist.**



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JUNE CASE STUDY

Pets Need Specialists Too



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Mission Statement

Restore patient health and client happiness by educating and delivering to the public state of the art veterinary critical, medical, and surgical care that demonstrates the full value and potential of veterinary medicine.