

# **Feline Arterial Thromboembolism (FAT) - Nobody Wants A Cat to Get FAT!**

This week I've dedicated time to sharing information about a very important disease in feline medicine - feline arterial thromboembolism or FAT. I have a love-hate relationship with FAT. I love it because it's complicated, and it challenges me as a board-certified veterinary critical care specialist. I hate it because of the sudden devastation that comes with it, both for affected cats and their families. So, in an effort to increase knowledge of FAT, I've composed this week's post. Happy reading!



## **FAT - What is it?**

Unoxygenated blood flows from the body into the right-side of the heart and then to lungs to be oxygenated. Oxygenated blood then returns to the left-side of the heart to be pumped out to vital organs. Underlying heart muscle diseases like

hypertrophic cardiomyopathy (HCM), dilated cardiomyopathy (DCM), restrictive cardiomyopathy (RCM), and unclassified/ischemic cardiomyopathy (UCM/ICM) often cause a chamber of the heart called the left atrium dilate. Additionally, clot-forming cells called platelets inappropriately aggregate or stick together. Slowed blood flow through the left atrium (called blood stasis), damage to the inner surface of the heart (called the endocardium), and platelet aggregation cumulatively cause a clot (aka thrombus) to form in the left atrium.



Maine Coon cats have a hereditary heart muscle disease called hypertrophic cardiomyopathy (HCM)

When pieces of a clot break away, they then can travel in the bloodstream to other areas of the body where they cause potentially life-threatening complications like strokes and organ failure - this is called embolization. In addition to heart muscle disease, other medical conditions can predispose cats to develop abnormal blood clots, including:

- Protein-losing kidney disease
- Hyperadrenocorticism (Cushing's disease) - rare in cats
- Endocarditis
- Excessive and/or chronic corticosteroid administration

## **FAT - What does it look like?**

One of the most common places for clots to lodge in the body is in the last part of the aorta (largest artery in the body) before it divides into the external iliac artery of each leg - this area is called the saddle, giving way to the common term saddle thrombus. While clinical signs associated with underlying heart disease are often subtle, those associated with arterial thromboembolism are not. They are often acute, meaning they manifest suddenly. Pets often develop sudden weakness or paralysis in one or both of their pelvic limbs. Thoracic limbs can be affected too. Affected legs are typically cold to the touch, limp, and paw pads and nail beds are grey blue due to compromised blood flow. Pulses in the limbs are markedly reduced or undetectable. Cats are painful, often vocalizing intensely due to discomfort. Occasionally, pets have neurologic deficits due to a stroke, and rarely clots to the kidneys and intestines cause intense abdominal discomfort. See the video below with commentary by Dr. Michael Schaer, a dual-board-certified veterinary emergency & critical care and internal medicine specialist.

## **FAT - How is it diagnosed?**

Definitively diagnosing FAT is challenging. Currently, veterinarians make a presumptive diagnosis based on a patient's history and compatible clinical signs. Reviewing a patient's complete medical history and performing a thorough physical examination is essential to help rule out neurological and musculoskeletal disorders that can have similar clinical signs. Veterinarians may compare the blood glucose samples obtained from affected and non-affected foot pads; a discrepancy in glucose readings is supportive of feline arterial thromboembolization.

Non-invasive blood tests may identify elevations of important muscle enzymes, including creatine kinase (CK) and aspartate aminotransferase (AST). Chest radiographs (x-rays) may reveal a variety of changes, including an enlarged heart (called cardiomegaly), pleural effusion, and "water on the lungs" called

pulmonary edema. An ultrasound examination of the heart called echocardiography is of paramount importance. This is a very specialized diagnostic imaging procedure, and pet parents will likely find it invaluable to partner with a board-certified veterinary cardiologist. This test will identify underlying heart disease. Echocardiography can also visualize a thrombus or evidence of early blood aggregation called echo-contrast or “smoke.” Click [here](#) to watch a video of a cat with both a thrombus and echo-contrast in the left atrium. Cardiologists will often use ultrasonography to perform a minimally invasive technique called color-flow Doppler to assess blood flow in the aorta in an attempt to visualize the point of obstruction.

## **FAT - How is it treated?**

There is no current consensus regarding the optimal interventions for the treatment of FAT. Aggressive pain management is absolutely essential, as pain promotes inflammation. Patients experiencing respiratory distress are provided supplemental oxygen using the least stressful modality. Treatment of underlying heart disease and congestive heart failure is also profoundly important. Multimodal therapy to break-up the thrombus and to prevent new clots from forming is logical.

Drugs to prevent new clots from forming (called antithrombotic medications) have an important role in the treatment of FAT. These drugs include:

- Anticoagulants: dalteparin (Fragmin®), enoxaparin (Lovenox®), warfarin
- Anti-platelet agents: aspirin, clopidogrel (Plavix®)
- Thrombin inhibitors: dabigatran (Pradaxa®)
- Factor Xa inhibitors: fondaparinux (Arixtra®)

Breaking up an existing clot (called thrombolytic therapy) with medication is unfortunately rather challenging. Systemically administered thrombolytic drugs (i.e.: streptokinase, tissue plasminogen activator) have not been shown to have consistent clinical efficacy, and serious complications like reperfusion injury are common (40-70% occurrence). Some specialty/referral hospitals offer interventional radiology. Using this diagnostic imaging technique, a special catheter can be guided in an artery to the site of the thrombus; subsequently, a micro-dose of a clot-dissolving drug can be directly deposited to help break up the clot.

Veterinarians are always looking for novel therapies for FAT. One newer intervention that may hold promise is hyperbaric oxygen therapy (HBOT). Patients are placed in a special pressurized chamber that increases the amount of dissolved oxygen in plasma. Some positive effects include anti-inflammatory properties, reduction of tissue swelling, increased cellular energy production, and immune system modulating effect. Pet parents are strongly encouraged to partner with a board-certified veterinary emergency and critical care specialist and board-certified veterinary cardiologist to determine the most effective acute and chronic treatment plans for cats with FAT.

Feline arterial thromboembolism is a devastating disease associated with poor survival rates ranging from 33-39%. However, not all cats with FAT have the same prognosis. Cats with only one pelvic limb affected have dramatically higher survival rates (68-93%) than those with bilateral involvement (15-36%). Many board-certified veterinary cardiologists and emergency and critical care specialists recommend 72 hours of initial acute management of affected cats, as some will dramatically improve with aggressive care during time period. Furthermore, continued improvement over 4-6 weeks is possible following acute management. See the video below of a cat who recovered very well.

## **The take-away message about FAT in cats...**

Feline arterial thromboembolism or FAT is often a distressing medical condition where a blood clot forms abnormally becomes lodged inappropriately in an artery. Clinical signs are often acute and dramatic. Timely multimodal therapies to improve blood flow, prevent new clot formation, control pain, and treat underlying heart disease and congestive heart failure are essential. Survival rates remain disappointingly low, but some can and do return to high quality lives with aggressive critical care.

To find a board-certified veterinary emergency and critical care specialist, please visit the American College of Veterinary Emergency and Critical Care.

To find a board-certified veterinary cardiologist, please visit the American College of Veterinary Internal Medicine.

Wishing you wet-nosed kisses,

CriticalCareDVM