

Aortic Thromboembolism in Cats

What is aortic thromboembolism?

Aortic thromboembolism (ATE) is a condition in which a blood clot forms within the heart, is released into the aorta (the large artery that leaves the heart and supplies blood to the body), and becomes lodged in a smaller artery. The result is that blood flow is blocked downstream of the point where the clot is lodged. The most common site for this to occur is in the final segment of the aorta, itself, before it divides into the smaller arteries which supply blood to the hindlimbs. A less common site is an artery that supplies blood to either forelimb. Although infrequent, other arteries can be affected as well, such as those that supply blood to the kidneys, intestines, or the brain.

The most common cause of ATE in cats is heart disease. The exact details of the process leading to clot formation secondary to heart disease remain unclear, but likely involve the enlargement of the heart's chambers typically accompanying heart disease. The end result is the abnormal formation of a blood clot inside one of the heart's chambers (usually the left atrium), from which the clot is subsequently released. Other conditions that rarely cause ATE include cancer and atypical infections involving blood vessels.

How is ATE diagnosed?

Diagnosis of ATE is based largely on the provided **history** and on **physical examination**. Affected cats typically experience sudden onset of severe weakness or paralysis (hindlimb or forelimb), often associated with apparent pain and distress. Approximately half of cats diagnosed with ATE are concurrently diagnosed with congestive heart failure, likely resulting from a combination of underlying structural heart disease and the sudden stress associated with ATE. In such cases, rapid and labored breathing is observed.

On physical examination, the affected limb(s) may be cool to the touch compared with the unaffected limbs. Footpads which are normally pink may instead be blue or black. Muscles of the limb may be firm and painful, and voluntary motion of the limb is reduced or absent. These abnormalities are the result of poor or absent blood flow to muscles and nerves. If congestive heart failure is present, the rate and effort of breathing are increased. Examination of the chest using a stethoscope may reveal abnormal heart sounds (e.g. a heart murmur or arrhythmia) and/or breath sounds (e.g. "crackling" noises due to fluid in the lungs).

Ultrasound examination of the heart (an **echocardiogram**) is performed to determine the nature and severity of heart disease if present. Specific echocardiographic findings in cats with ATE are variable and depend on what kind of heart disease exists. In some cats, a blood clot can be seen inside the heart, itself. This is an ominous sign that implies high risk for further episodes of ATE in the future.

Chest x-rays are obtained to confirm or rule out the presence of congestive heart failure. An electrocardiogram may be performed if an arrhythmia (irregular cardiac rhythm) is detected during physical examination. Finally, bloodwork and urine analysis are important in order to assess kidney function, identify electrolyte abnormalities, and to screen for other concurrent problems such as hyperthyroidism (elevated thyroid hormone levels) in older cats.

Other diagnostic tests that may be useful in some cases include measurement of blood pressure in affected limbs, and abdominal ultrasonography to evaluate the region of the aorta where it gives rise to the branches that supply blood to the hindlimbs. Both of these tests can help to confirm the diagnosis of ATE in situations where this remains uncertain.

How is ATE treated?

Therapy for ATE is challenging, controversial, and variable between cats depending upon individual circumstances. While several options for therapeutic intervention exist, none has been proven to reliably improve chances of successful recovery, likelihood of recurrent episodes, or survival time.

Surgical removal of the blood clot would appear to be the ideal solution and has been reported, but failed to gain popularity due to its associated high risk and low success rate. *Thrombolytic* agents are the medical alternative to surgical removal, and may be used in an attempt to dissolve the blood clot. These include the drugs *streptokinase* and *tissue plasminogen activator*. While these are appealing in their purpose, they carry significant risks such as spontaneous bleeding and life-threatening electrolyte abnormalities, and have not been shown to improve prognosis for recovery or survival.

Anticoagulant agents are used with the goal of preventing further clot formation and reducing the likelihood of forming new clots. These include aspirin, *heparin*, and *warfarin*. Risks again include bleeding and, in the case of aspirin, gastrointestinal ulcers. When used with appropriate caution and monitoring, these agents seem to carry less risk than surgery or thrombolytic agents, although their effectiveness remains unproven.

Analgesic medications are used to reduce the pain associated with ATE, particularly in the immediate period following the event. Finally, if congestive heart failure is present, medical therapy and supplemental oxygen are administered to treat this condition.

What is the prognosis? What should I watch for?

Prognosis for cats with ATE is guarded and depends partly on the severity of underlying heart disease if present. One study suggests that approximately one third of affected cats survive the initial episode to be discharged from the hospital. For these cats, average survival time is approximately one year. Cats with less severe heart disease and which begin to regain blood flow and limb function soon after the event may have a more favorable prognosis.

As discussed above, symptoms of ATE include sudden **paralysis** or severe **weakness**, often accompanied by pain in affected limbs. **Rapid or labored breathing** may be seen if there is concurrent heart failure. If any of these are noted, or if you have any questions or concerns, please bring your cat to Veterinary Specialty Services for emergency evaluation.