

Comparative study of feline arterial thromboembolism treated with the combination of atenolol-clopidogrel and single clopidogrel

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ABSTRACT: Feline Arterial Thromboembolism (FATE) is one of the most devastating consequences of cardiac disease in cats, characterized by a thrombosis that leads to an obstruction in the blood vessel. This disease predominantly occurs with Hypertrophic Cardiomyopathy (HCM) condition. The purpose of this case study is to corroborate the comparison of therapy between two FATE cases treated with a combination of atenolol and clopidogrel compared to clopidogrel only. Two cats were brought by the owner to the clinic with the same conditions including paraparesis, hypothermia, and pale hind paws. Physical examination revealed that both cats got hypothermic, had no femoral pulse, and pale hind legs. The blood test result showed an increase in lactate from the femoral vein and hyperkalemia in the body. Echocardiographic found HCM characterized by thickening of the left ventricular posterior wall and interventricular septum. The first cat was given the combination of atenolol (beta-blocker) and clopidogrel (antiplatelet), with supportive medications such as analgesic, omega 3, and diuretic. On the other hand, the second cat was given the same exact medications, but without atenolol (beta-blocker). After 9 days of treatment and hospitalization, the first cat that was administered a combination of atenolol and clopidogrel died after got hypotension and dyspnea. While the second cat that was given single clopidogrel survived with good clinical conditions and recovered from the lameness.

Keywords:

arterial thromboembolism, feline, atenolol, clopidogrel, cat.

■ INTRODUCTION

Feline Arterial Thromboembolism (FATE) is one of the most distressing emergency situations that owners and veterinarians had to face, characterized by acute ischemic necrosis of one or more limbs due to cardiac diseases (Mitropoulou *et al.* 2022). Currently, most of the patients are commonly euthanized when diagnosed (Borgeat *et al.* 2014). Diagnosis is fundamentally made based on physical examination. The most typical clinical signs that occur include pain, absence of pulses, paralysis/paralysis, pale, and hypothermia. Since the underlying cardiomyopathy disease is one of the most prevalent etiological causes, it is crucial to recognize the presence of linked cardiac disorders (Busato *et al.* 2022). The limitation report of FATE treatment was found in this disease. This report was then corroborates the comparison of therapy on two FATE cases treated with a combination of atenolol-clopidogrel compared to clopidogrel only.

■ CASE DESCRIPTION

Signalmen and anamnesis: The 2 cats ages of 1 and 3 years were brought by the owner to Joint Veterinarians drh. Cucu K. Sajuthi at different times with the same conditions including paraparesis (lameness of both hind legs), hypothermia, and pale hind paws. Both cats were full-indoor, and no rec-

orded history of toxic exposure was found. **Physical examination:** The 2 cats were hypothermic, the femoral pulses were absent, and both hind paws were pale. **Laboratory test:** Blood lactate level was increased and an occurrence of hyperkalemia. **Diagnostic imaging:** Echocardiography showed an enlargement of the left atrium (Figure 1), and hypertrophy of the left ventricle posterior wall as well as the interventricular septum (Figure 2). **Therapy:** Both patients were given clopidogrel and only first cat was given atenolol. **Supportive medications:** Omega-3, furosemide as diuretic, and gabapentin as analgesic.

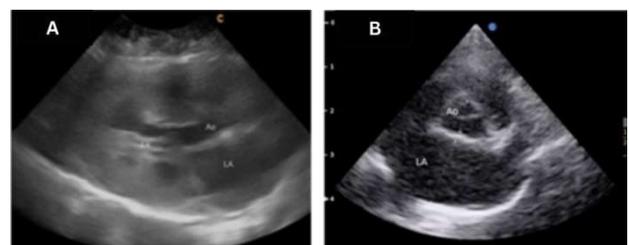


Figure 1. Echocardiography of feline arterial thromboembolism in two cat showed an overload volume in their left atrium. (A) first cat and (B) second cat.

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■ RESULTS AND DISCUSSION

The blood test result showed an increase in lactate level of blood obtained from femoral vein (2 mmol/L) compared to the cephalic vein (1.7 mmol/L) from the second cat. The blood normal lactate level is <2 mmol/L. However, the first cat did not take any blood lactate test due to a machine error. Both cats also showed an occurrence of hyperkalemia (the first cat were 6.2 mmol/L and the second cat were 7.2 mmol/L; normal range 3.7-5.2 mmol/L). Increased lactate production is often caused by impaired tissue oxygenation, either due to decreased oxygen delivery or defects in mitochondrial oxygen utilization (Emmett & Szerlip 2014). While increased tissue damage can cause the release of intracellular potassium into the blood and then cause hyperkalemia to occur.

Figure 1 depicts the echocardiography showed an enlargement of the left atrium (volume overload), and hypertrophy of the left ventricle posterior wall as well as the interventricular septum appear in echocardiogram (Figure 2). These findings result lead to hypertrophic cardiomyopathy (HCM). Based on the examination results and clinical signs, both cats were diagnosed with FATE.

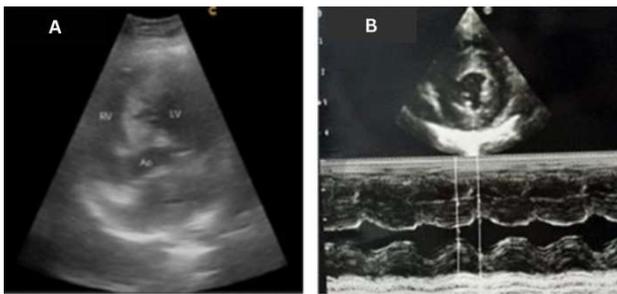


Figure 2. Echocardiography of feline arterial thromboembolism in two cat showed hypertrophic cardiomyopathy. (A) first cat and (B) second cat.

Both patients were given clopidogrel with the dose of 75 mg/cat as the initial dose, followed by 18.75 mg/cat q24h for the antiplatelet effect. Supportive medications include omega-3, furosemide with the dose of 1 mg/kg BW q12h as a diuretic (to decrease the volume overload in the left atrium), and gabapentin with the dose of 5 mg/kg BW as an analgesic agent. The only difference in treatment was the administration of atenolol with a dose of 6.25 mg to the first cat. After the administration of atenolol for three days, hypotension was found, and atenolol administration has been immediately stopped to prevent the blood pressure to drop more significantly. However, after 2 days of the cessation of atenolol, the first patient developed edema in the extremities, and dyspnea before dying. While the second patient that was not given atenolol successfully survived and was able to walk normally again after 9 days of treatment and was allowed to go home with long-term prescribed clopidogrel. Moreover, a decrease in volume on the left atrium was found in the second patient, indicating that the atrial enlargement and volume overload has been fixed slowly.

Hypertrophic Cardiomyopathy often coexists with FATE as one of the underlying cardiac diseases. Atenolol is a second-generation beta-1-selective adrenergic antagonist indicated in treating hypertension (Rehman *et al.* 2021). It acts as a negative chronotropic and negative inotropic agent and is mainly used in HCM condition. An antiplatelet is the main medication to be administered in FATE. The most common antiplatelet medication is clopidogrel. Clopidogrel works by inhibiting platelet activation and aggregation by irreversibly binding the active metabolite to the P2Y₁₂ class of ADP receptors on platelets (Harrison & Keeling 2007). The abrupt beta-blockers withdrawal has been associated with rebound tachycardia. The abrupt cessation of administration of beta-adrenergic receptor blocker (BB) can cause tachycardia, blood pressure rise, worsening of heart failure symptoms, etc., which is known as the "BB rebound phenomenon" (Koracevic 2011). Thus, the abrupt cessation of beta-blocker is not recommended. Moreover, atenolol is a negative chronotropic and negative inotropic agent, which can lower blood pressure and increase the risk of blood stasis, leading to clot formation. On the other hand, long-term single clopidogrel therapy showed no complications in treating feline arterial thromboembolism in this case study.

■ CONCLUSION

A single clopidogrel therapy has less risk and better progression rather than a combination of atenolol-clopidogrel in managing feline arterial thromboembolism in this comparative case study.

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■ REFERENCES

- Borgeat K, Wright J, Garrod O, Payne JR, Fuentes VL. 2014. Arterial thromboembolism in 250 cats in general practice: 2004–2012. *Journal of Veterinary Internal Medicine*. 28(1):102-108.
- Busato F, Drigo M, Zoia A. 2022. Reduced risk of arterial thromboembolism in cats with pleural effusion due to congestive heart failure. *Journal of Feline Medicine and Surgery*. 1098612X221094663.
- Emmett M, Szerlip, H. 2014. Causes of lactic acidosis. UpToDate. Wolters Kluwer.
- Harrison P, Keeling D. 2007. Clinical tests of platelet function. *Platelets*. 2: 445-466.
- Koracevic G. 2011. Significance of "beta blocker rebound phenomenon" and new suggestions how to avoid it. In *Proceedings of the World Medical Conference, WSEAS (26-28 September 2011, Prague, Czech Republic)*, Prague (pp. 79-84).
- Mitropoulou A, Hassdenteufel E, Lin J, Bauer N, Wurtinger G, Vollmar C, Henrich E, Hildebrandt N, Schneider M. 2022. Retrospective evaluation of intravenous enoxaparin administration in feline arterial thromboembolism. *Animals*. 12(15):1977.
- Rehman B, Sanchez DP, Shah S. 2021. Atenolol. National Library of Medicine. StatPearls Publishing.