

Effect of Anticoagulation Therapy in Management of Isolated Non-Occlusive Thrombosis of Non-Aneurysmal Aorta

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Background: Non-aneurysmal Aortic non-occlusive thrombus is considered serious life-threatening condition. Nowadays, there are no established consensus or guidelines for aortic thrombus management.

Aim of work: to assess the effect of anticoagulation therapy in managing this thrombus as a non-invasive modality.

Methods: It is a prospective cohort study of isolated non-aneurysmal aortic non-occlusive thrombus and were treated conservatively by Therapeutic dose of anticoagulation. All patients were assessed initially, by clinical examination and CT angiography of whole aorta. Follow up plan was focusing on clinical evidence of distal arterial embolization and recurrent aortic thrombus by CT angiography of whole aorta.

Results: During the study period, only 10 cases were presented by aortic non-occlusive thrombosis without aneurysm. Four patients were asymptomatic while 6 cases were presented with lower limb acute ischemia. All patients received Therapeutic dose of Low Molecular Weight Heparin (Till complete resolution of aortic thrombus, which were achieved in 7 cases after 1 month of treatment and in the remaining 3 cases after 3 months of treatment, confirmed during CT angiography follow up after that patients resumed treatment using Apixaban 5mg twice daily with No distal embolization detected clinically in peripheral circulation. All cases completed the study period without recurrent aortic thrombus formation.

Conclusion: Aortic non-occlusive thrombus without aneurysm is a dangerous source of systemic embolization. Offering Anticoagulation therapy as an effective and non-invasive approach, it has high success rate with no reported complications, in contrast to other invasive modalities. We call for randomized multicentric studies due to scanty reported cases.

Key words: Non-aneurysmal aortic non-occlusive thrombus, lower limb acute ischemia, aortic thrombus management.

Introduction

Non-aneurysmal Aortic non-occlusive thrombus is an uncommon pathology which can result in distal arterial embolization that is considered a serious life-threatening condition.¹ Consequently, early management is of utmost importance for better prognosis. Despite that aortic thrombus could be accidentally discovered, most cases are detected during investigation for peripheral embolization. That is why early detection is considered a challenge.² Advancement of diagnostic modalities significantly discover various aortic pathologies as echocardiography, computed tomography angiography (CTA), and magnetic resonance imaging (MRI).³ Aortic thrombi are located most commonly in descending thoracic aorta in about 38% of cases despite being found in the ascending aorta, aortic arch, and abdominal aorta.⁴ At the present time, there are no established consensus or guidelines for aortic thrombus management.^{5,6} Variety of modalities for such management have been described with different degrees of effectiveness, as well as, invasiveness ranging from anticoagulation therapy to exclusion using endovascular stent grafting or removal by open surgery.¹

Aim of work

To assess the effect of anticoagulation therapy in managing isolated non-aneurysmal aortic non-occlusive thrombus as a non-invasive modality for management.

Methodology

It is a prospective cohort study of isolated non-aneurysmal aortic non-occlusive thrombus in patients either accidentally discovered or presented by ischemic symptoms, and they were treated conservatively by Therapeutic dose of anticoagulation. Data was collected from patients attending Ain Shams University Hospitals which included age, gender, co-morbidities (Diabetes mellitus, hypertension, dyslipidemia, coronary artery disease, smoking, vasculitis, hypercoagulation disorders, malignancy and chemotherapy). Any patient with one or more of the following was excluded:

1. Aortic aneurysm, chronic occlusive lesions, patient with previous aortic intervention and complete aortic thrombosis.
2. Contraindication to anticoagulation in patients

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with 7:

- Active major bleeding within 48-72 hours.
 - Thrombocytopenia <25.000.
 - Hypersensitivity to heparin or pork products.
 - Hypertensive crisis.
 - Coagulopathy.
 - Recent head trauma or CNS hemorrhage.
 - Multiple trauma with high bleeding risk.
 - Proven or suspected peri-spinal hematoma.
3. Contraindication to non-ionized contrast medium or renal impairment.
 4. Extra-aortic pathology invading or compressing aorta.

It is a prospective cohort study of isolated non-aneurysmal aortic non-occlusive thrombus in patients either accidentally discovered or presented by ischemic symptoms, and they were treated conservatively by Therapeutic dose of anticoagulation. All patients were assessed initially, by clinical examination and multislice CT angiography of whole aorta down to extremities to document thrombus characteristics, location and size progression, atherosclerosis and intimal irregularities. Follow up plan, at 1,3,6 months and annual intervals, focused on clinical evidence of distal arterial embolization and recurrent aortic thrombus by CT angiography of whole aorta.

The cases which included intervention for any symptomatic patient who underwent peripheral revascularization were mentioned. In addition to that, we traced the complications and side-effects of anticoagulation therapy, including major bleeding,

hematomas, heparin induced thrombocytopenia and osteoporosis, as well as complications of the conservative approach as distal embolization or recurrence of aortic thrombus.

Results

During the study period from February 2018 till July 2022, only 10 cases were presented by aortic non-occlusive thrombosis without aneurysm, as it is uncommon pathology. The patients included 6 females and 4 males, with ages range from 45-70 years, range of patients' body weight was 76-113 Kg. Comorbidities data is shown in **(Table 1)**.

Four patients were asymptomatic isolated aortic non-occlusive thrombosis without aneurysm accidentally discovered during investigation for other reasons while 6 cases were presented with lower limb acute ischemia and underwent successful peripheral revascularization. No patients were presented by visceral ischemia. CT findings of initially discovered aortic thrombus found in **(Table 2)**.

All patients received Low Molecular Weight Heparin (LMWH) (1mg/kg/12hrs) daily till complete resolution of aortic thrombus which were achieved in 7 cases after 1 month of treatment and in the remaining 3 cases after 3 months of treatment, confirmed during CT angiography follow up as shown in **(Table 3)**. After that, patients resumed treatment using New Oral AntiCoagulant (NOAC), Apixaban 5mg twice daily 8, with No distal embolization detected.

All cases completed the study period without recurrent aortic thrombus formation (2 cases completed 4 years, 2 cases completed 3 years, 4 cases completed 2 years and 2 cases completed 1 year free of aortic thrombus). Throughout our study period, there were no major complications of the used anticoagulation drug.

Table 1 : Comorbidities

	No.
Diabetes Mellitus	4
Hypertension	6
Coronary Artery Disease	3
Dyslipidemia	8
Smoking	5
Vasculitis, Hypercoagulopathy, Malignancy, Chemotherapy	0

Table 2 : Thrombus Characteristics

Thrombus	No.
Type:	
Mural	3
Floating	7
Aorta	
Descending Thoracic Aorta	8
Abdominal Aorta	2
Site of Embolization	
Right lower limb	2
Left lower limb	4
Femoral embolization	3
Popliteal embolization	2
External iliac embolization	1
Length (cm)	
<1	1
1-5	5
>5	4
Percentage of occluded lumen circumference	
<25%	2
26-50%	6
51-80%	2
Aortic Atherosclerosis	10
Intimal Irregularity	2

Table 3 : Course of Thrombus size during 1 and 3 months follow up

Thrombus Size (cm)	Initially	After 1 month	After 3 months
<1	1	2	0
1-5	5	1	0
>5	4	0	0

Discussion

Aortic Thrombus is a relatively uncommon entity presenting most commonly in the descending thoracic aorta.⁴ In our study, aortic thrombi were found mostly in the descending part of thoracic aorta.

In our study, the risk factors were mainly those of atherosclerosis as diabetes, hypertension, dyslipidemia and smoking with no cases with malignancy, chemotherapy, vasculitis nor any hypercoagulable states. In the literature, there were a lot of risk factors for Aortic Thrombus have been described, including Atherosclerosis, smoking, Vasculitis, hypercoagulable states, drug abuse, heparin-induced thrombotic thrombocytopenia, iatrogenic causes.^{9,10}

Currently, there is no consensus for the best treatment option for patients with Aortic thrombus found in the literature.^{5,6} A review of literature was done by Meyermann et al., including 32 publications

throughout 15 years about thoracic aortic mural thrombus with 74 patients in 26 single case reports and case series with up to 10 patients reported, found that 34.6% of patients who received medical therapy initially had persistent thrombus which was comparable to those who underwent open surgical repair initially. Contrary to these findings, patients who underwent Thoracic Endovascular Aortic Repair (TEVAR) showed complete thrombus exclusion with no recurrent embolization, but they finally concluded that endovascular option needs further study despite good outcomes in the reviewed literature.¹ In contrary to that, Nguyen et al during review of literature, including 1611 articles published from 2000 to 2019 with 64 patients about descending thoracic aortic thrombus, found that anticoagulation therapy offers high success rate, while endovascular option can play a role when anticoagulation therapy fails. However, the anticoagulation effectiveness lack of long-term data.¹¹

In our study, we found that there were good and promising results for patients on therapeutic

anticoagulation therapy, with LMWH initially and NOAC as maintenance therapy, as regard aortic thrombus size regression and resolution. In addition, no evidence of distal embolization events shown throughout the study period even in cases who were presented initially with embolic peripheral ischemia. But limited series of studies and case reports documented that 0% to 50% of patients receiving anticoagulation therapy alone showed recurrence of aortic thrombi.^{10,12,13}

In addition to that, in our study there were 4 patients completed more than 3 years of follow up on therapeutic anticoagulation with no recurrence of either aortic thrombus or distal embolization. Supporting findings of previous studies which stated that long-term anticoagulant therapy results are more effective and less invasive than surgery.¹⁴

Moreover, the cost of TEVAR is not comparable to anticoagulation especially in limited resources countries with lack of medical insurance coverage. That is why, we call for more multicentric randomized controlled trials to settle the proper management.

Conclusion

Aortic non-occlusive thrombus without aneurysm is a dangerous source of systemic embolization. Offering Anticoagulation therapy as an effective and non-invasive approach has high success rate with no reported complications, in contrast to other invasive modalities. We call for randomized multicentric studies due to scanty reported cases.

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