Treatment of mobile right heart thrombi with low-molecular-weight heparin

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SUMMARY

Treatment of choice in patients with mobile thrombi in the right heart chambers is still controversial owing to the increased risk of recurrent pulmonary embolism (PE). Thrombolysis and surgical or catheter embolectomy are the preferred options. We present a case of an elderly patient with PE and free-floating atrial thrombi who was treated successfully with low-molecular-weight heparin (LMWH).

BACKGROUND

The visualisation of right-sided heart thrombi in patients with pulmonary embolism (PE) is below 4%. A majority of them are in transit, arise from peripheral deep vein thrombosis and are associated with high death rate owing to recurrent PE. Thrombolysis, embolectomy or anticoagulation are the different options in the management of these patients.¹

We report a case of a patient with PE and free-floating atrial thrombi who was treated successfully with low-molecular-weight heparin (LMWH).

CASE PRESENTATION

An 88-year-old man presented to our hospital after an episode of syncope. He had a 10-day history of inguinal surgery and was on bed rest during this period. Upon examination the patient was normotensive. The electrocardiogram demonstrated atrial fibrillation (AF) with a heart rate of 120 bpm. Oxygen saturation was 90% on room air. A bedside transthoracic echocardiogram visualised dilated right heart chambers, right ventricular hypokinesis and worm-like mobile masses in the right atrium consistent with free-floating thrombi (figure 1A,B). Laboratory tests showed elevated D-dimers ($>23\,100\,\mu\text{g/l}$, normal values: $170\text{--}23\,000\,\mu\text{g/l}$).

The suspicion of PE as the cause of the syncope was evident and because of the increased risk of an acute massive new PE, we recommended thrombolysis or catheter embolectomy but the patient and his relatives denied. Thus therapeutic anticoagulation with LMWH, enoxaparin, was started. The patient also received diltiazem for heart rate control.

During hospitalisation there were no clinical or laboratory signs of repeat PE. Eighteen hours later, a new transthoracic echocardiographic examination showed the thrombus had been completely dissolved. 24 hours later spiral CT scanning which is the method of choice for the diagnosis of PE verified the existence of emboli in the right and left pulmonary arteries, while two residual thrombi (1.61×0.85 and $0.972\times 0.917\,\text{cm}^2$) in the left

greater saphenous vein at the above-knee segment were imaged by ultrasonography (figure 1C–F). Acenocoumarol was added on the 5th day and LMWH was discontinued when international normalised ratio was >2 . The patient was discharged after 12 days of hospitalisation in a good condition.

TREATMENT

According to the guidelines patients with mobile thrombi in the right heart chambers have an increased risk of recurrent PE; without treatment the death rate is 80–100%.¹

The optimal therapy is still controversial. Thrombolysis and surgical or catheter embolectomy are the preferred options. Anticoagulation alone is less effective. No randomised trials exist comparing thrombolysis with embolectomy. Small studies show excellent results with lytic therapy,^{2–3} on the contrary in the International Cooperative Pulmonary Embolism Registry (ICOPER Registry) the mortality was $>20\%$.⁴ The percentage of in situ thrombi lysis or their partial lysis, fragmentation and subsequent embolisation is also unknown. Unfractionated heparin (UFH) is not recommended because of poor results, while the use of LMWH has been validated in the treatment of right heart thrombi only in few case reports.^{4–6}

OUTCOME AND FOLLOW-UP

The use of LMWH instead of UFH was successful, as the patient improved, and at follow-up, 1 month later was free of symptoms.

DISCUSSION

Right heart thrombi may develop in situ in association with an underlying heart disease such as valvulopathy and AF, or may derive thrombi from peripheral venous clots migrating into the right heart. The latter are worm-like mobile thrombi mainly from deep and sometimes from superficial vein thrombosis of the lower limbs.^{1–3}

The origin of the whole clinical picture in our patient was apparently the thrombosis of the left greater saphenous vein, while the coexistence of AF could have played a complementary role.

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Figure 1 (A and B) A bedside transthoracic echocardiogram visualised dilated right heart chambers, right ventricular hypokinesis and worm-like mobile masses in the right atrium consistent with free-floating thrombi. (C and D) Spiral CT scanning verified the existence of pulmonary emboli in the right and left pulmonary artery. (E and F) B-mode and Doppler ultrasonography of the lower limbs demonstrated two residual thrombi diameter (1.61×0.85 and 0.972×0.917 cm²) in the left greater saphenous vein (pre- and post-vein compression).

therapy^{4 5}; on the contrary, in the ICOPER registry the mortality was $>20\%$.⁶ It is also unknown the percentage of in situ thrombi lysis or their partial lysis, fragmentation and subsequent embolisation. UFH is not recommended because of poor results, with overall death rates at 14 days, and at 3 and 70 months were 21%, 29% and 62.5%, respectively, while the use of LMWH has been validated in the treatment of right heart thrombi only in few case reports.^{6–8} It is also well known that UFH and LMWH have no thrombolytic properties. They favour spontaneous fibrinolysis by the activated intrinsic fibrinolytic system, resulting in self-limitation or disappearance of the thrombus.

LMWHs have been proven to be no less safe and effective as intravenous UFH in the treatment of submassive PE.^{9 10} In addition, LMWH monotherapy without oral anticoagulation appears promising and may be preferable in patients with malignancy.¹¹ Advantages of LMWH include longer half-life, increased bioavailability, a more predictable dose response, they are dosed by weight, administered subcutaneously and usually do not require dose adjustments or laboratory monitoring.^{12 13}

Our patient denied thrombolysis or catheter embolectomy. Cardiothoracic surgery was also excluded owing to his advanced age. The only available alternative therapy was anticoagulation with heparin. The use of LMWH instead of UFH was successful, as the patient improved and at follow-up, 1 month later was free of symptoms.

Learning points

- ▶ Right heart thrombi may develop in situ in association with an underlying heart disease such as valvulopathy and atrial fibrillation or derive thrombi from peripheral venous clots migrating in the right heart. According to the guidelines patients with mobile thrombi in the right heart chambers have increased risk of recurrent pulmonary embolism (PE), without treatment the death rate is 80–100%.¹
- ▶ The optimal therapy is still controversial. Thrombolysis and surgical or catheter embolectomy are the preferred options. Anticoagulation alone is less effective. No randomised trials exist that compare thrombolysis with embolectomy. Small studies show excellent results with lytic therapy,^{4 5} on the contrary in the International Cooperative Pulmonary Embolism Registry the mortality was $>20\%$.⁶
- ▶ Unfractionated heparin (UFH) is not recommended because of poor results, with overall death rate at 14 days, at 3 and 70 months was 21%, 29% and 62.5%, respectively, while the use of low-molecular-weight heparin (LMWH) has been validated in the treatment of right heart thrombi only in few case reports.^{6–8}
- ▶ LMWHs have been proven to be no less safe and effective as intravenous UFH in the treatment of submassive PE.^{9 10} In addition, LMWH monotherapy without oral anticoagulation appears promising and may be preferable in patients with malignancy.¹¹ Advantages of LMWH include longer half-life, increased bioavailability, a more predictable dose response, they are dosed by weight, administered subcutaneously and usually do not require dose adjustments or laboratory monitoring.^{12 13}

Competing interests None.

Patient consent Obtained.

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