A largesnake-likethrombus in Transit across a Patent Foramen Ovale in a rare case with massive pulmonaryembolism

ABSTRACT

Reports of thrombus straddling the patent foramen ovale are extremelyrare. Thrombus development in cardiacchambersincreases the risk of mortality, compared to pulmonaryembolismalone, and can require change in therapy.(1)Wehereindescribe a rare case of a 53-year-old patient with massivepulmonaryembolism in which a large thrombus entrapped in patent foramen ovale and prolapsinginto the leftheartchamberswithincreasedpulmonaryartery pressurewasfound by echocardiography, whichis a very rare and critical condition .Echocardiographyis a readilyavailable and safetool for demonstrating the size, location, and extent of a thrombus, and itplays an important role in the earlydiagnosis and treatmentevaluation for patients with a thrombus trapped in a PFO with concurrent pulmonaryembolism.Our patient wastreatedwiththrombolysis and anticoagulation and dischargedfrom the hospitalwith an uneventfulrecovery.Our treatment of the present patient achieved a satisfactoryresult, but itmay not be applicable to every patient. Becausethisis a rare diagnosis, withinsufficient data, thereis no formallyestablishedtreatment guideline. However, in patients who are good surgical candidates, studies have shownbetteroutcomewithsurgicalembolectomy as compared to anticoagulation alone or thrombolysis.However, Anticoagulant treatmentappears to be an acceptable therapeutic alternative to surgery, particularly in patients withcomorbiditieswho are at high surgicalrisk and for patients withsmall PFO. Thrombolysisislinked to the highestmortality, whichcouldbeexplained by the severity of the patient's initial presentation.

Keywords: Patent foramen ovale; massive pulmonaryembolism; thrombus.

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Introduction

Thrombus straddling the patent foramen ovale is a rare and critical condition.(2) Thrombi in cardiacchambersappear to increase the risk of mortality, compared to PE alone, and can require a change in therapy.(3) In the presence of patent foramen ovale (PFO), paradoxicalsystemicembolization can occur, particularlywhen the pulmonaryarterial and right atrial pressures are elevatedwichfacilitate passage of the transitional thrombus through a patent foramen ovale (PFO), therebyincreasing the incidence of embolic complications such as ischemic stroke and evensuddendeath.(4,5) As thisfindingremainsextremely rare, the clinicalfeatures and therapeutic management of the condition remainsunclear.The treatment of a transitional thrombus in patients with PE iscontroversial. Therapeutic options includesurgicaltreatmentwiththrombectomy or medicaltreatmentwithheparin or thrombolysis.Surgicalembolectomy has shown a trend towardimprovedsurvival, but the postoperativemortality rate is high.(6) Herein, wepresent a rare case involving a 53-year-old patient withright atrial huge thrombus entrapped in PFO and prolapsinginto the leftheartchambersand extensive bilateral PE. The patient underwentthrombolytic and anticoagulation therapy. After 30 days, shewasdischargedfrom the hospitalwith an

uneventfulrecovery. This case isbeingreported to illustratethatthrombolytic and anticoagulant therapy can beused as an alternative treatment in this condition.

Case presentation

A 53-year-old womenwasbrought by non-medicalparamedics to the emergency departmentwith a 1-week history of chesttightness, unspecifiedchest pain, and shortness of breath. Of note, shelives a sedentary lifestyle since 26 daysfollowing to a second degreeburn of the 2 legs (Figure1). She has no notable familyhistory, takes no treatment and is not followed for neoplasia. Shereported the spontaneousonset of recurrentunspecifiedchest painassociatedwith stage 3 NYHA dyspnea. The patient had no palpitations or neurologicalsymptomprior to the discomfort. Uponarrival, the patient wasconscious and orientedwith a Glasgow score of 15/15. Shehad a body temperature of 38°C, the systolicblood pressure wasmeasured at 120 mmHg, and the diastolicblood pressure at 60 mmHg, the heart rate at 100 beats per minute. Shewasbreathless, with a respiratory rate of 31 cycles per minute with a capillaryoxygen saturation in ambient air of 85%. On cardiacexamination, shehad normal heartsoundswithregularrhythm and no murmurs, rubs, or gallops. Breathsoundswerevesicular on respiratory exam and no wheezes or crackleswereappreciated. Extremitieswerewithoutedema and the left foot woundwaswellhealed.Theperipheral pulses are all perceived and symmetrical. The abdomen was soft, painless, without palpable hepatosplenomegaly, and the superficiallymphnodeswere free. The electrocardiogramshowed a sinusal tacchycardiaat 100 beats per minute, with no anomaly in the PR space, negative T waves in the antero-septal leads (Figure2). The initial biologicalassessmentfinds a hemoglobin at 12,1 g/dl, platelets at 267000/µl, serumcreatinine at 7.5 mg/l, D-dimers at 41560ng/ml, highly sensitive cardiactroponin marker at 4510ng/l and C-reactiveprotein 35 mg/l. The hemostasisassessmentwaswithoutabnormality. The performedtransthoracicechocardiography (TTE) showed a large serpentine, free-floatingechogenic mass in the right atrium(Figure 3) and extending to the left atrium(Figure 4)through a PFO(Figure 5)part of the mass moved to the leftventriclеduring diastole. The right heartcavitiesweredilated, and moderate right ventriculardysfunctionwaspresent. No emboliwere visible in the central pulmonaryartery. The systolicpulmonaryartery pressure was 57 mmHg. Leftventricularfunctionwas normal. Based on the TTE findings, wedecided to performtransesophagealechocardiography (TEE). However, the patient had an esophagealdiverticulum; therefore, TEE was not carried out.

The angio-computedtomography scan confirmed a massive bilateral proximal pulmonaryembolismwith acute severepulmonary hypertension withoutparenchymallesions of the lungs(Figure 6). Lowerlimbvenousecho-Doppler showed a right femoralthrombosis.

The patient washemodynamically stable. However, shereportedthatherchesttightness and shortness of breathhadworsened. After a discussion with the patient and herfamily and surgeons, the patient underwentthrombolytic and anticoagulant therapy. Recombinant tissue plasminogenactivatorwasintravenously, and heparinwasadministered by a continuouspumpfrom 24 to 48 hours. This wasfollowed by subcutaneous injection of low-molecular-weightheparin and oral warfarin for 3 days, and the oral warfarinwassustainedthereafter. After 30 days of treatment, the serum D-dimer

levelhaddecreased to normal. Pulmonarycomputedtomographyangiographyshowedthat the PE haddisappeared (Figure 4(a)). Follow-up TTE revealed no thrombus in the heartcavities (Figure 4(b)). The right heartcavitieshadrecovered to normal size. The pulmonaryarterysystolic pressure decreased to 25 mmHg. No left-to-right shunt waspresentthrough the foramen ovale. The patient wasdischargedfrom the hospitalwith an uneventfulrecovery.

Discussion

The visualization of a right atrial thrombus isreferred to as a thrombus in transit and is a very rare echocardiographicfinding, carrying a high mortality rate of up to 29% (7,8). It iseven more rare to visualize a thrombus across PFO (9,10).Death due to cardiogenicshock and/or right heartfailure has been notedin 44% of patients whopresentedwith an embolus straddling the PFO and death due to stroke in nearly 16% (11).

In thepresent case, The foramen ovale is a remnantfrom the embryonicperiod and acts as a potentialdoor capable of openingfrom the right to left atrium. The foramen ovale is closes at 5 to 7 monthsafterbirthbecause of fusion of the first and second atrial septa. However, in up to 25% to 34% of normal adults, the foramen ovale is not completelyfused and forms a potentialspace or separationbetween the septum primum and secundum; thisistermed a PFO(12). Under normal conditions, because the pressure of the left atrium ishigherthan the right, theremay no left-to-right shunt through the atrial septum. However, the interatrial pressure gradient can bereversed, which can occur in the setting of pulmonary hypertension induced by coughing, laughing, and the Valsalva maneuver. It can alsooccur in patients withpulmonaryarterial hypertension secondary to PE and congenitalheartdisease. Once the pressure of the right exceedsthat of the left, the foramen ovale may open from the right to left atrium. A thrombus from the venous system into the right atrium mayeasily cross into the leftthrough a PFO.

The first reported case diagnosed by echocardiographywas by Nellessen et al. in 1985 .Withlessthanhundred cases beingreportedso far in the literature. In previousstudies, the mortality rate associatedwith a paradoxicalembolismsecondary to a thrombus-in-transit was 18%, and 66% of patients diedwithin 24 hours(12). Considering the high mortality of a thrombus-in-transit(13), earlydiagnosis and treatmentisvitally important. Echocardiographymay not onlyclearlyidentify the location and size of emboli, but itmayalsobehelpful for making prompt management decisions, and, whennecessary, TEE can beperformedsuccessfully.Our patient presentedwith acute shortness of breath and wasdiscovered to have saddle PE with massive clotburden and thrombus-in-transit straddling PFO: adangerousdiagnosis,mostprobably due to DVT, but withoutsystemicembolization. Doppler examinationrevealed a thrombosis of theright femoralthrombosis.

The best management of PE with an entrapped thrombus in PFO isstillcontroversial. Anticoagulation, thrombolytictherapy or surgical intervention are the treatment options; however, thereis no consensus on the optimal treatment of thisclinical situation.

Anticoagulation and thrombolysistherapyseem to behazardous in patients with a large thrombus-in-transit within a PFO because of the high risk of either fragmentation or completeembolization(13),However, Rose et al. (14) reviewedmanysuch cases during a 34-year period and showedthat the mortality rate waslowerafterthrombolytictherapythansurgery , and based on a previousreview , anticoagulant treatmentappears to be an acceptable therapeutic alternative to surgery, particularly in patients withcomorbidities (e.g., increasedage, stroke, and progressive cancer) who are at high surgicalrisk and for patients withsmall PFO.(15)Surgicaltreatmentappearsjustified in the prevention of paradoxicalembolism and must bedonewithoutdelay if itis the preferredtreatmentstrategy. In a recentreview, surgicalthromboembolectomyimprovedsurvival rates and reducedischemic stroke, compared to anticoagulation therapy.However, therewas a veryslightdifference in mortalitybetween patients treatedwithheparin and the surgical group (14% and 12%, resp.). Thrombolysisislinked to the highestmortality (36%), whichcouldbeexplained by the severity of the patient's initial presentation(15).Myers et al. (2) reviewedin 2010 the observationalstudies on thissubject to identifyprognosticfactors and to compare mortality and systemicembolismbetweentreatments. Surgicalthromboembolectomyshowed a nonsignificant trend towardimprovedsurvival (odds ratio (OR), 0.65 (0.24–1.72);) and significantlyreducedsystemicembolism and composite of mortality and systemicembolism, comparedwith anticoagulation alone. Thrombolysis, on the other hand, had the opposite effect, although not to a significantlevel (OR, 1.62 (0.43–5.97).Our patient washemodynamically stable, but shereportedthatherchesttightness and shortness of breathwereworsening. In addition, the patient's PE showed extensive bilateralinvolvement, including the segmental arteries. Moreover, lowerextremityvascularultrasoundshoweda right femoralthrombosis.Therefore, we chose thrombolytic and anticoagulation treatment, and the patient achieved a good curative effect.

Conclusion

TSFO is a complication of severethromboembolicdisease, with the migration of thrombus in left-heartcavities in favour of pulmonary hypertension. Diagnosisiseasyusingechocardiography but itisoftennecessary to complete TTE with TEE to show itclearly. In addition echocardiographyisveryhelpful to makeearly management decisions and itmaygivevaluable information regarding the response to anticoagulation during the follow-up process. Weusedthrombolytic and anticoagulation therapy to treat the patient and achievedcompleteresolution of the thrombus and the embolism. However, thistreatmentmay not be applicable to every patient because of considerationsregardingage and comorbidities.

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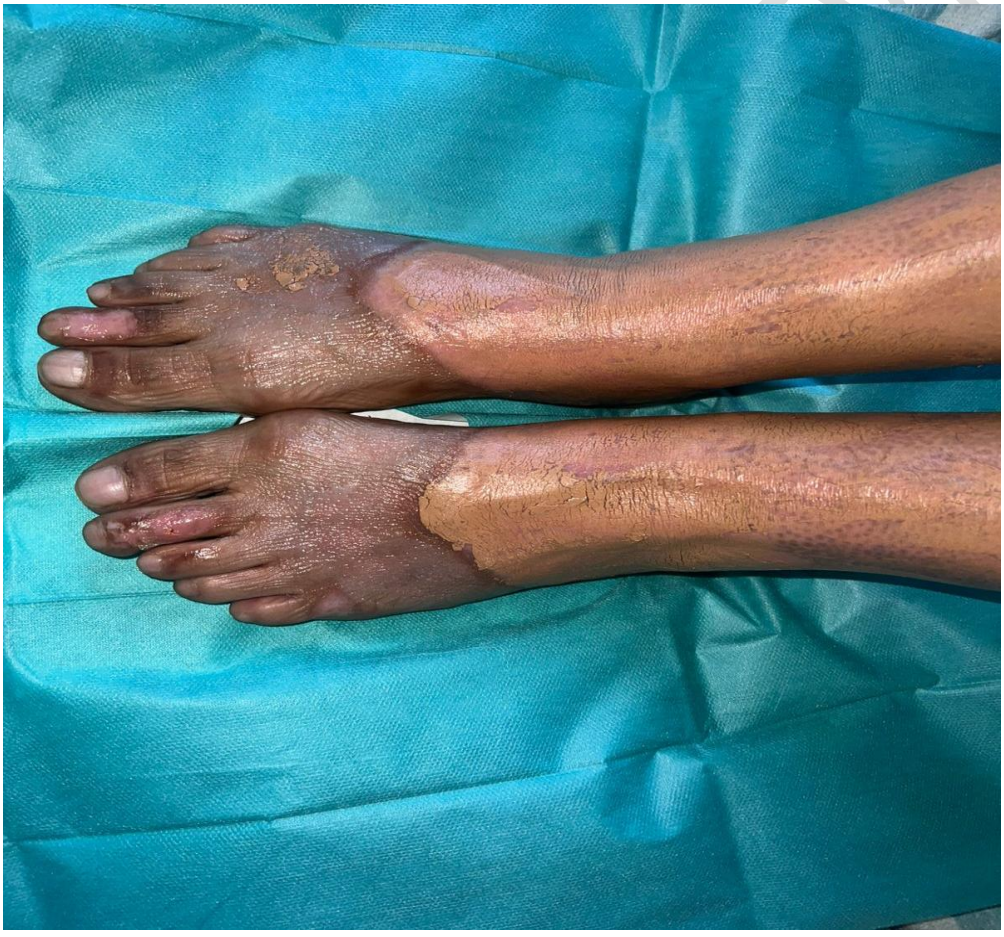

Figure1. A second degreeburn of the 2 legs.

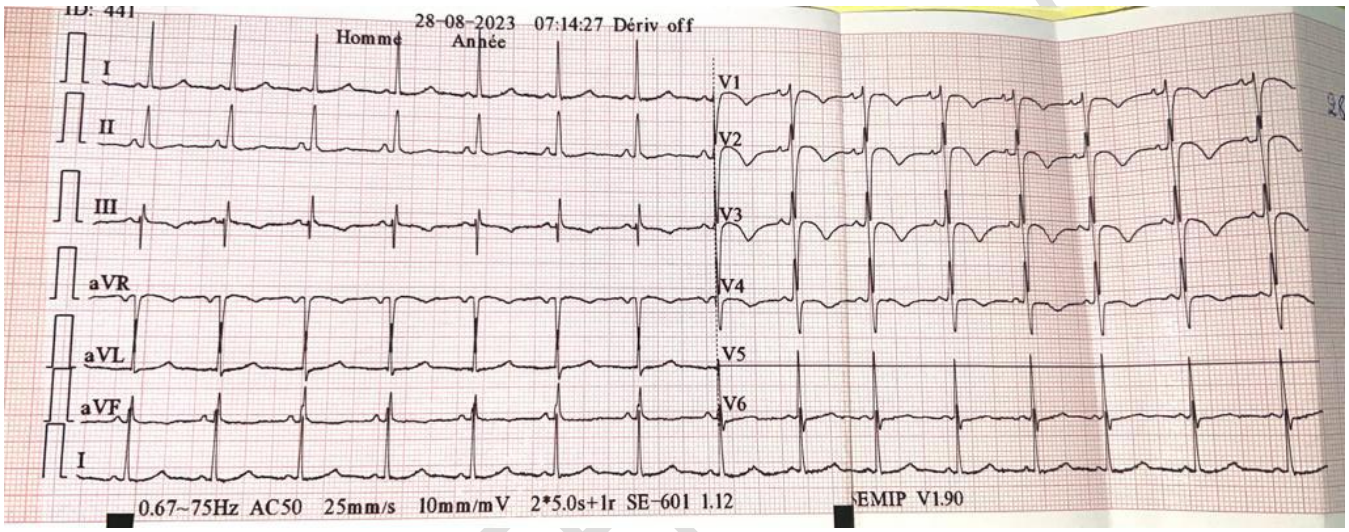

Figure 2.. ECG shows relative negative T waves in the antero-septal leads.

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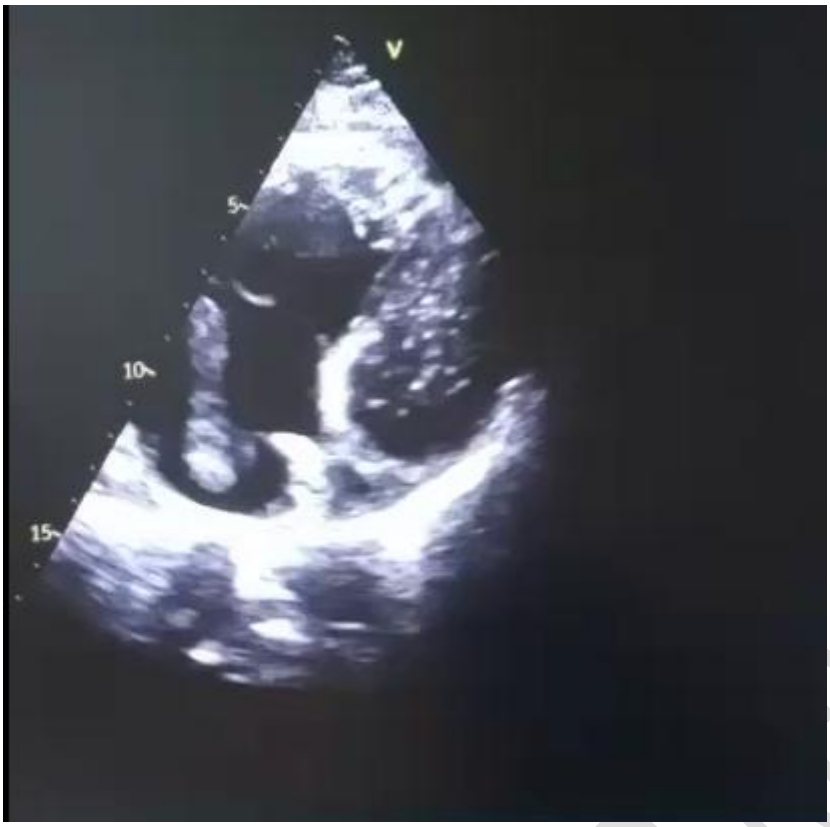

Figure 3. Echocardiogramshowing a large snake-like thrombus in the right atrium.

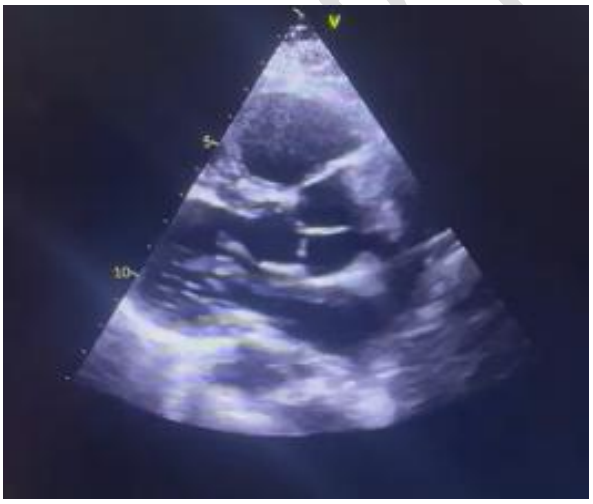

Figure 4a . Echocardiogramshowing a serpentine thrombus in the left atrium.

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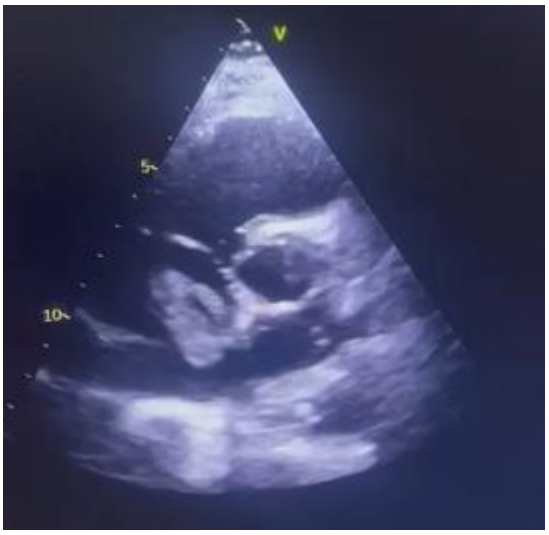

Figure 5. Echocardiographyshowed a large thrombus entrapped in the patent foramen ovale.

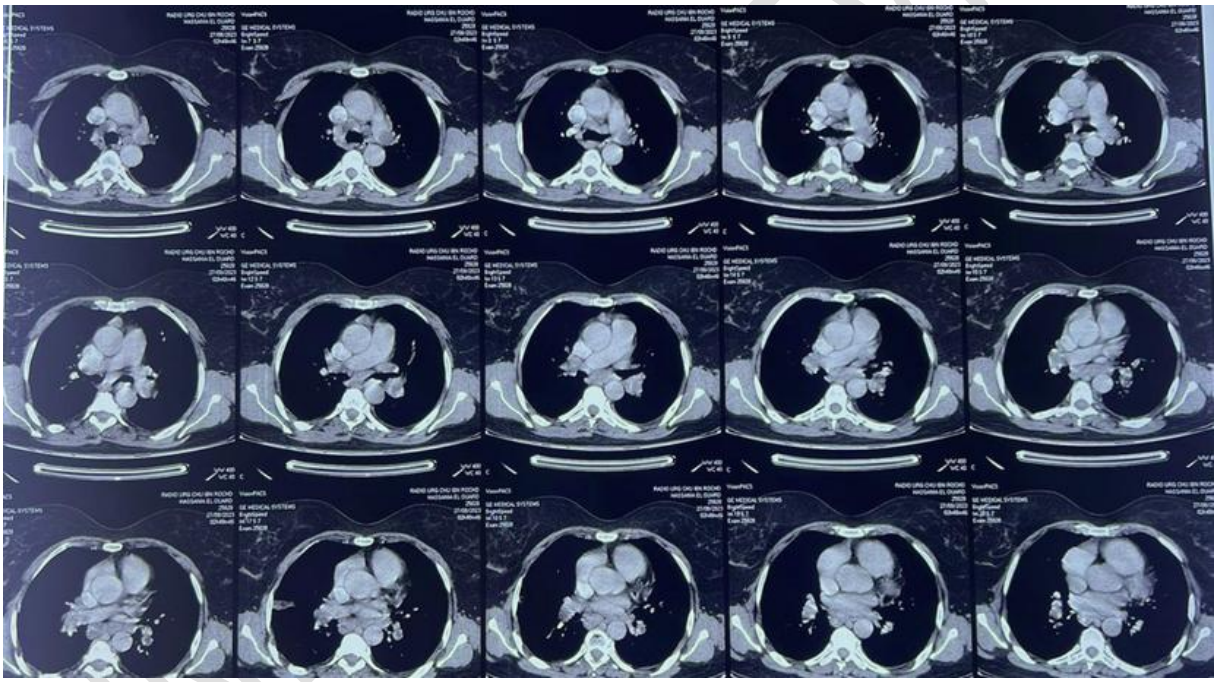

Figure 6. Thoracicangio-CT scan: shows massive bilateralpulmonaryembolism.