Abstract

Introduction: We report the case of a 18 year-old male with history of: panhypopituitarism and pituitary dwarfism (120 cm and 22 kg), complex congenital heart disease (single ventricle, L-malposition of vessels, subpulmonary stenosis, and ventricular septal defect); modified Fontan procedure connecting VCI-SVC and pulmonary arteries; S. aureus endocarditis on left atrio-ventricular valve resolved with antibiotic therapy. The patient went to our hospital because of sudden dyspnea and sharp chest pain with important respiratory effort and oxygen saturation below 50% baseline. Context of atrial flutter without oral anticoagulation. The chest CT scan showed multiple bilateral pulmonary thromboembolism with images suggestive of left basal pulmonary infarction. The echocardiogram revealed the presence of thrombotic material in the connection between VCI and right pulmonary artery. Due to severe respiratory and hemodynamic failure we decided to do fibrinolysis with Alteplase (dose 0.2 mg / kg / h continuous infusion for 24 hours). Subsequent clinical evolution was satisfactory, with disappearance of the thrombus visualized on echocardiogram on admission. He was discharged with Dabigatran because of the impossibility for regular analytical control at home. In the following 9 months there have not been any thrombotic recurrences or bleeding complications.

Discussion: Pulmonary thromboembolism is very rare in children and adolescents. There is very little experience with systemic fibrinolysis in these cases, particularly in relation to dose measurement with low body weight. Secondary prevention with Dabigatran has been studied with promising data in RE-COVER study and can be an alternative to consider in underweight patients with poor venous access and difficulty for periodic analytical controls. Our case meets therapeutic success of both fibrinolysis and secondary prevention with Dabigatran in a difficult patient to manage especially because of his low body weight.

Introduction

Pulmonary thromboembolism is the partial or total blockage of the vascular bed of pulmonary artery with resulting impacts from the degree of anatomic obstruction and release of vasoactive substances. Although pulmonary thromboembolism is a major cause of death in adults, its diagnosis is unusual in children and teenagers, because this disease is rarely considered as a possible diagnosis in this group of patients and many cases are only diagnosed when performing the autopsy [1]. Hence, the real incidence of PE is unknown in the population ≤ 18 years [2]. As for treatment, in contrast to adults, there are limited data on efficacy, dose and safety of thrombolytic agents in children, and indications for thrombolytic therapy remain highly individualized. The same happens with new anticoagulants, such as direct thrombin inhibitors, which have been tested and approved for use only in adults, because in children they have been restricted to small clinical trials. As result, we have no uniform recommendations for the use of these agents in this group of patients [3].

Objectives

We report a case of pulmonary embolism diagnosed in a 18-year-old male with history of complex congenital heart disease and low body weight (120 cm and 22 kg) in the context of pituitary dwarfism, which was successfully treated with fibrinolysis and later with a direct inhibitor of thrombin (dabigatran).

Material and Methods

This is a 18 year-old male patient with history of panhypopituitarism, pituitary dwarfism (120 cm, 22 kg), complex congenital heart disease (single ventricle, L-malposition of the vessels, subpulmonary stenosis and VSD, Fontan modified surgery with a tube connecting between inferior cava vein-superior cava vein and pulmonary branches), chronic atrial flutter without oral anticoagulation.

The patient presented to our hospital because of sudden dyspnea and sharp chest pain with significant respiratory effort and oxygen saturation below 50% at room air (his normal oxygen saturation was 83%) (Figure 1).
The patient had been discharged by the service of Cardiology the previous day after a long and torpid hospitalization due to congestive heart failure in the context of Hashimoto's thyroiditis with bad control and complicated with *Staphylococcus aureus* endocarditis on left atroventricular valve, which resolved with antibiotics. Because of a high suspicion of PE, an urgent chest CT scan was performed, which showed a multiple bilateral pulmonary embolism with images suggestive of left basal pulmonary infarction (Figure 2, 3).

![Figure 1. Chest X Ray at the ER](image1)

![Figure 2. Thoracic CT scan. Thrombus at the right pulmonary branch](image2)
The echocardiogram revealed the presence of thrombotic material in the connection between inferior vena cava and right pulmonary artery (Figure 4).

Due to severe respiratory and hemodynamic failure, systemic fibrinolysis with alteplase was decided (0.2 mg / kg / hour continuous infusion for 24 hours). Subsequent clinical evolution was satisfactory, with gradual improvement of oxygen...
saturation, without needing oro-tracheal intubation. The echocardiogram at discharge confirmed the disappearance of thrombotic material previously visualized (Figure 5).

The patient was discharged on dabigatran at individualized dosis (75 mg every 16 hours) because of the impossibility for regular analytical control due to poor venous access and intolerance to punctures, needed either for acenocumarol or low body weight heparins administration, respectively.

Results
There have not been recurrences of thromboembolic events or hemorrhagic complications after a 9-month follow-up period.

Discussion
Pulmonary thromboembolism is a disease rarely diagnosed in children, especially in younger ones, either because they can not verbalize their symptoms or because the clinical manifestations are not specific and often mimic the clinical symptoms of the underlying disease. The truth is that we rarely think of this diagnosis, which unfortunately in many cases is confirmed by the autopsy.

Identified risk factors for PE in children and teenagers are immobility, ventriculoatrial shunts for hydrocephalus, central venous catheters, solid tumors, heart disease, infections, dehydration, hypercoagulable states, low cardiac output, obesity, making contraception and pregnancy termination in women and major surgeries (especially in orthopedics) [3].

The case we have exposed describes a situation of massive pulmonary embolism with severe hemodynamic impairment in a teenager with low body weight and complex congenital heart disease. Due to the concurrence of all these factors and the limited experience in treating PE in this type of patient, there were initial doubts about the therapeutic use of fibrinolytic agents and the optimal dose to minimize bleeding complications. The most commonly used thrombolytic agents in children are urokinase (UK) and recombinant tissue plasminogen activator (r-tPA). In our case we proceeded to systemic thrombolysis with alteplase (human recombinant tPA) at a dose of 0.2 mg / kg / hour for 24 hours without any bleeding complication. For secondary prevention, we chose oral anticoagulation with a direct thrombin inhibitor, dabigatran in this case, by not requiring periodic analytical controls to adjust dose nor periodical punctures. This drug has shown to be at least as effective as warfarin for secondary prevention of pulmonary embolism and deep vein thrombosis, according to data from RE-COVER study [4]. Therefore, it can be an alternative to consider in underweight patients with poor venous access and difficulty for periodic analytical controls.
Conclusions
Pulmonary thromboembolism is rarely diagnosed in children and adolescents. There is little experience with systemic thrombolysis for its treatment in these patients. There are also no uniform recommendations for the use in children of the new generation oral anticoagulants (inhibitors of factor Xa and direct thrombin inhibitors). Our case meets the therapeutic success of thrombolysis with alteplase and secondary prevention with dabigatran in a teenager patient difficult to manage because of his low body weight.

BIBLIOGRAPHY