PULMONARY THROMBOEMBOLISM IN ADOLESCENTS CASE REPORT

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Abstract: *This paper presents the case of a patient aged 17 years who had a syncope after physical exertion. Paraclinical assessment aimed to detect the main causes of the syncope, exogenous causes as well as endogenous neurological, vascular, and metabolic disorders being excluded. Transthoracic echocardiography showed slight pulmonary hypertension, and transesophageal echocardiography raised the suspicion of a right atrial formation (not confirmed by cardiac MRI). Pulmonary perfusion scintigraphy revealed the suppression of perfusion in the first apical segment of the left upper lobe of the lung, allowing to establish the diagnosis of pulmonary thromboembolism. The determination of the parameters involved in the etiology of thrombophilia allowed to exclude the Leiden mutation and antithrombin III, S and C protein deficiency. Emergency treatment was initiated with iv heparin, followed by oral anticoagulants, with strict INR monitoring. The observation presented draws attention to the need for a complete evaluation of patients with syncope, considering the possibility of pulmonary thromboembolism*

Cuvinte cheie: *trombembolism pulmonar, sincopă, adolescent*

Rezumat: *Prezentăm cazul unui pacient în vârstă de 17 ani care a suferit o sincopă imediat după efort fizic. Evaluarea paraclinică a vizat principalele cauze ale sincopei, fiind excluse cauzele exogene, iar dintre cele endogene, afecțiunile neurologice, vasculare şi metabolice. Ecocardiografia transtoracică a evidențiat o hipertensiune pulmonară uşoară, iar cea transesofagiană a suspicionat o formațiune la nivel atrial drept (infirmată după efectuarea RMN cardiac). Scintigrafia pulmonară de perfuzie a relevat abolirea perfuziei la nivelul segmentului 1 apical al lobului superior al plămânului stâng, permițând stabilirea diagnosticului de trombembolism pulmonar. Determinarea parametrilor implicați în etiologia trombofiliei a permis excluderea mutației Leiden şi deficitul cantitativ de antitrombină III, al proteinelor S şi C. S-a instituit tratament cu Heparină iv, continuat cu anticoagulante orale, cu monitorizarea strictă a INR. Observația prezentată atrage atenția asupra necesității evaluării complete a pacienților cu sincopă, vizând posibilitatea unui trombembolism pulmonar.*

INTRODUCTION

Pulmonary thromboembolism (PTE) is the obstruction of the pulmonary arterial system by thrombi formed in the venous system and/or the right heart, or rarely, formed in situ. The incidence in the general population is difficult to assess, the disorder being underdiagnosed due to the diversity and non-specificity of the clinical picture (1). This disorder is extremely uncommon in the child, being most frequently detected on necropsy (2-4). The most frequent causes of PTE in children are: venous catheterism, burns, dehydration, heart diseases, vascular abnormalities, hematologic diseases, bone marrow or stem cell transplantation, immobilization, immunosuppressive treatment, neoplasms, renal diseases, shock, sepsis, trauma and thrombophilia (2-4,10).

CASE REPORT

Patient T.S., aged 17 years, coming from an urban area, was admitted to the Pediatric Clinic I in May 2005 for diagnosis. The patient had a maternal family history of PTE and sudden death. The current disease started 10 days before, with dizziness and subsequent loss of consciousness occurring after physical exercise, followed by a minor trauma of the nasal pyramid. The evaluation performed in a territorial medical service initially excluded a neurological disorder responsible for the appearance of syncope, the evaluation being subsequently aimed at a cardiac cause. The following were performed: cardiological examination, transthoracic echocardiography (evidencing the presence of mild pulmonary hypertension), and transesophageal echocardiography (which raised the suspicion of the presence of an echogenic formation in the right atrium, for the confirmation of which cardiac IRM was indicated).

On his admission to the clinic, the patient had a good general state, a posttraumatic wound at the level of the nasal pyramid, and his cardiorespiratory equilibrium was maintained. The following were performed: chest radiography, evidencing thickened bronchial walls by vascular mechanism (Fig. 1), confirming in this way pulmonary hypertension detected by echocardiography; electrocardiogram, which showed the presence of RBBB (Fig. 2), and cardiac IRM that allowed the exclusion of tumor masses in the heart cavities, at myocardial or extramyocardial level, refuting in this way the suspicion of right intraatrial tumor.

At this diagnostic stage, the cardiac causes of syncope (cardiac malformations, cardiac tumors, valvulopathies,

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arrhythmias) were excluded, so that paraclinical evaluation was aimed at the pulmonary causes of syncope. Pulmonary perfusion scintigraphy using Tc^{99} was decided, which revealed the suppression of perfusion in the first apical segment of the upper lobe of the left lung, showing the obstruction of the arterial axis of that segment, a finding that in correlation with the presented clinical context allowed to make the diagnosis of PTE (Fig. 3).

Figure no. 1. Thoracic radiography (accentuation of the pulmonary image through vascular mechanism)

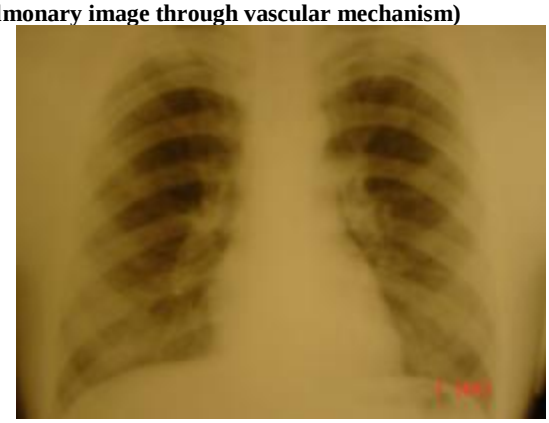

Figure no. 2. Electrocardiogram (BRD)

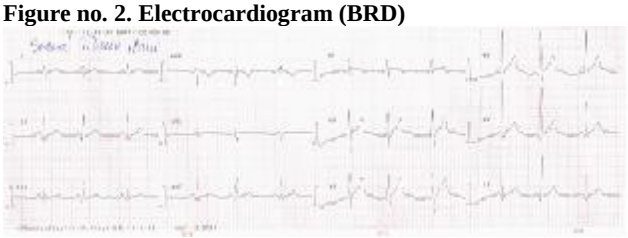

Figure no. 3. Pulmonary scintigraphy of perfusion with Tc^{99} (abolition of the perfusion at the level of the I apically segment of the superior lobe of the left lung)

The evaluation of the parameters involved in coagulation showed normal values: APTT=35.1 sec; APTT ratio=0.98; QT=11.3 sec; INR=1.06; PA=90%, and that of the parameters involved in the etiology of thrombophilia allowed to exclude the Leiden mutation, quantitative antithrombin III deficiency, and at a subsequent stage, protein S and C deficiency.

Anticoagulant treatment with heparin was initiated iv in a bolus dose of 75U/kg, followed by 18U/kg/h in continuous perfusion, then chronic oral preparations with the strict monitoring of INR, the evolution being favorable. After he reached the age of 18, the patient was transferred to an internal medicine service, under the observation of which he currently is.

DISCUTIONS

The poor clinical picture regarding pulmonary or cardiac manifestations made the diagnosis of pulmonary thromboembolism difficult; this was established across successive stages, starting from the most frequent causes of syncope at this age, the neurological, cardiac disorders (arrhythmias, congenital or acquired cardiac disease, intracardiac tumor) as well as metabolic disorders being excluded.

Given the positive family history for pulmonary thromboembolism and the presence of mild pulmonary hypertension in the absence of a congenital or acquired cardiac abnormality, paraclinical investigations were subsequently oriented in this direction; pulmonary perfusion scintigraphy showed the suppression of perfusion in the first apical segment of the upper lobe of the left lung. Pulmonary scintigraphy is a basic method in the evaluation of PTE, being used as screening in all cases of uncertainty, as well as for the assessment of posttherapeutic evolution. The combination of perfusion scintigraphy with ventilation scintigraphy is an extremely useful diagnostic modality in PTE, perfusion being affected while ventilation is normal.

Pulmonary arteriography (the gold standard), is a certain diagnostic method, with precise indications and a limited use (6). The new diagnostic methods are represented by MRA (magnetic resonance angiography) and CTPA (CT pulmonary angiography) – which allow the direct visualization of the thrombus. The methods are useful in the case of non-obstructive thrombi, with central location, where pulmonary perfusion can be normal (2,5,6,11). Other diagnostic methods used are: thoracic ultrasound, chest radiography (which provides non-specific data), electrocardiogram, the determination of serum D-dimer concentration (1,2,5,6,12,13).

Thrombophilia is genetically conditioned, its most frequent causes being represented by the Arg506Gln point mutation in the gene of coagulation factor V– Leiden mutation, and the (G20210A) point mutation in the prothrombin gene. In the first case, patients are resistant to the degradation of activated C protein, and in the second, there is an increased plasma prothrombin concentration which results in an increased risk for thrombotic events. Other causes are represented by the deficiency of proteins with an anticoagulant role (protein S, protein C, and antithrombin III), the high levels of factors VIII, IX, and X or of homocysteine. The association of these factors leads to an increased risk for thromboembolism (2,5,6,14-17). The investigations performed in the presented patient allowed to exclude the deficiency of antithrombin III, proteins S and C and the Leiden mutation. The presence of a family history (the mother deceased from PTE) supports a genetically conditioned cause, its determination requiring further investigations that were not available at the time of diagnosis.

The treatment of pulmonary thromboembolism in the child involves specific supportive measures, the administration of anticoagulants (fractioned heparin and warfarin) and thrombolytics (of these t-PA is the most frequently used) – (2, 18). Surgical measures can also be used (thrombectomy and the placement of filters at the level of the inferior vena cava in patients with recurrent PTE) – (1,2,5,6,19,20). The presented patient benefited from anticoagulant therapy with heparin and subsequently Sintrom, in order to prevent recurrences, his evolution being favorable.

CONCLUSIONS

Pulmonary thromboembolism is extremely rare in pediatric patients, but it should be suspected in the case of syncope or in the presence of pulmonary symptoms unexplained

by routine paraclinical examinations.

REFERENCES

1. Gherasim L. Trombembolismul pulmonar, în Medicina Internă, vol.2, Bucureşti: Editura Medicală; 1996. p 920-54.
2. Babyn PS, Gahuna HK, Massicote P. Pulmonary thromboembolism Pediatr Radiol 2005 Mar; 35:258-74.
3. Nowak-Gottl U., Bidlingmaier C., Krumpel A., Göttl L., Kenet G. Pharmacokinetics, efficacy, and safety of LMWHs in venous thrombosis and stroke in neonates, infants and children. Br J Pharmacol 2008 Mar; 153: 1120-7.
4. Şerban M, Schramm W. Patologia trombotică, în Hemostazeologie Clinică, Ed.Brumar, Timişoara, 2001: 499-568.
5. Torbicki A, van Beek EJR, Charbonnier B, Meyer G, Morpurgo M et al. Guidelines on diagnosis and management of acute pulmonary embolism. Eur Heart J 2000 Aug; 21 (16):1301-36.
6. Torbicki A, Perrier A, Konstantinides S, Agnelli G, Galiè N, Pruszczyk P et al. Guidelines on the diagnosis and management of acute pulmonary embolism. Eur Heart J 2008 Sep; 29:2276-315.
7. Marchi P, Uderzo C, Riva A, Rovelli A, Biagi E, Arrigo C et al. Role of early diagnosis for a noninvasive treatment of pulmonary thromboembolism in leukemic children. Support Care Cancer 1997 Sep; 5(5):417-20.
8. Gulbahce HE, Manivel JC, Jessurun J. Pulmonary cytolytic thrombi: a previously unrecognized complication of bone marrow transplantation. Am J Surg Pathol 2000 Aug; 24(8):1147-52.
9. Huang J, Yang J, Ding J. Pulmonary embolism associated with nephrotic syndrome in children: a preliminary report of 8 cases. Chin Med J Engl 2000 Mar;113(3):251-3.
10. Cyr C, Michon B, Pettersen G, David M, Brossard J. Venous thromboembolism after severe injury in children. Acta Haematol 2006;115(3-4):198-200.
11. Van Ommen CH, Peters M. Acute pulmonary embolism in childhood. Tromb Res 2006;118(1):13-25.
12. Kelly J, Rudd A, Lewis RR, Hunt BJ. Plasma D-dimers in the diagnosis of venous thromboembolism. Arch Intern Med, 2002 Apr 8;162(7):747-56.
13. Mathis G, Blank W, Reisig A, Lechleitner P, Reus J, Schuler A et al. Thoracic Ultrasound for Diagnosing Pulmonary Embolism. ***Chest*** 2005 Sep;128:1531-8.
14. Zoller B, Garcia de Frutos P, Hillarp A, Dahlback B. Thrombophilia as a multigenic disease. Haematologica 1999 Jan;84(1):59-70.
15. Procopciuc LM, Jebeleanu G, Olteanu I. Mutația factor V Leiden şi mutația G20210A – factori de risc pentru pacienții cu afecțiuni trombotice venoase. Clujul Medical, 2006; 2:176-82.
16. Christiansen SC, Cannegieter SC, Koster T, Vandenbroucke JP, Rosendaal FR. Thrombophilia, clinical factors and recurrent venous thrombotic events. JAMA 2005 May 18;293(19):2352-61.
17. Kosch A, Junker R, Wermes C, Nowak-Gottl U. Recurrent pulmonary embolism in a 13-year-old male homozygous for the prothrombin G20210A mutation combined with protein S deficiency and increased lipoprotein (a). Thromb Res 2002 Jan 1;105(1):49-53.
18. Canizzaro V, Berger F, Kretschmar O, Saurenmann R, Knirsch V, Albisetti M. Thrombolysis of venous and arterial thrombosis by catheter-directed low-dose infusion of tissue plasminogen activator in children. J Pediatr Hematol Oncol 2005 Dec;27(12):688-91.
19. Jamieson SV, Kapelanski DP, Sakakibara N, Manecke JR, Thistlethwaite PA et al. Pulmonary endarterectomy: experience and lessons learned in 1,500 cases. Ann Thorac Surg 2003 Nov; 76(5):1457-62.
20. Cook A, Shackford S, Osler T, Rogers F, Sartorelli K. Use of vena cava filters in pediatric trauma patients: data from the National Trauma Data Bank. J Trauma, 2005 Nov; 59(5):1114-20.