CASE REPORT

Calcifications from cardiac etiology in chest radiography

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Abstract

Objective: children’s chest X-ray calcification images can be related to pulmonary, mediastinal and rarely cardiac parenchymatous pathology. This report describes cases of cardio thoracic calcifications. We emphasize the importance of chest X-ray to track thoracic calcifications. In spite of the fact that it is rare, the cardiac etiology must be considered due to the possibility of surgical treatment.

Methods: regarding the period from 1988 to 1997 the authors reviewed the chest X-rays of 2108 patients. In 3 of them thoracic calcifications of cardiac etiology were observed.

Results: of these three patients, two were 7 years old and the third was 3 years old. Case 1 presented a calcification in the right atrium topography caused by a heart tumor of Fibroma type. In case 2 the calcification was in the pulmonary trunk, presenting as a calcified aneurysm of the ductus arteriosus. In case 3 the child had pulmonary stenosis and the chest X-ray showed a calcified image on the left cardiac boards caused by a thrombo in the right ventricle wall.

Conclusion: the authors emphasize the importance of chest X-ray in the diagnosis of thoracic calcifications, and comment that in spite of the being rare, the cardiac causes should be considered due to the possibility of surgical treatment.


Introduction

The incidence of congenital cardiopathies in the pediatric population is of approximately 0.3 to 0.8%. In order to obtain the diagnosis, we should use the physical examination along with complementary examinations, which allow an accurate recognition of most of these anomalies, due to the great technological advance of the present days, mainly in echocardiography. We must stress, though, that the simple chest radiography is greatly important, since it provides several information about morphological aspects and cavitary dimensions, and still displays images that may suggest specific cardiac pathologies. Especially, we may find images of calcifications with different locations, such as parenchymal, ganglionar, mediastinal, pleural, and osseous. Findings of thoracic calcifications in infancy are extremely rare, and those of cardiac origin are uncommon. Among cardiac causes, we may point out mediastinal tumors, such as teratoma or fibroma, calcified mural thrombi, aneurysm of the ductus arteriosus or of the pulmonary arteries.¹⁴ The tracking of these pathologies through simple chest radiography is very important, since in most cases an early diagnosis makes it possible to perform a definitive surgical treatment.
Case reports

Case 1

A 3-year old, white, female child, with chronic neuropathy secondary to perinatal anoxia, characterized by neuropsychomotor retardation and epilepsy (Lennoux-Gasteau syndrome). At admission, she presented convulsive crises, and the examination of her cardiovascular system demonstrated irregular rhythm, with approximately 10 extrasystoles per minute. Sounds were phonetically normal, without murmurs or signs of cardiac insufficiency. An electrocardiogram presented sinus rhythm, QRS axis at 60 degrees, PR interval of 0.12 seconds, normal QT interval, rare ventricular unifocal extrasystoles (type blockade) at the left branch, suggesting that the origin was the right ventricle. Simple chest radiography in anatomical position and profile, displayed a normal cardiothoracic index, and a radiopaque image in the right atrium topography (Figure 1). A bidimensional echocardiogram presented normal cavitary diameters, absence of structural lesions, and multiple, hyperechoic nodular images, tending to coalescence, occupying approximately 2 cm² of area, located at the inferior vena cava/right atrium junction. The tracking by color Doppler did not show obstruction signs, and a computed tomography confirmed the location and dimensions of the intracardiac mass. There were no clinical or laboratory evidences compatible with infectious endocarditis. Surgery confirmed the mass location and identified other smaller nodules on the lateral wall of the right atrium. Every tumor was completely desiccated, and the histopathologic study was compatible with fibroma. The child presented favorable evolution, with the disappearance of extrasystoles and images in the echocardiogram. After 10 months of evolution, the control echocardiogram demonstrated the appearance of new nodular images, located in the topography of the superior vena cava, next to the junction with the right atrium. The fast growth of the mass determined moderate venous obstruction, with the manifestation of superior vena cava syndrome. The patient was submitted to thrombolytic treatment (heparin) with no success, and then a new surgery was performed for the withdrawal of the mass. The histopathologic study confirmed that it was fibroma associated with thrombus. The child had an unfavorable evolution during the postoperative period due to her infectious status, and eventually died.

Case 2

A 7-year old, female, asymptomatic child, taken to the health service for presenting murmur and calcification images in the simple chest radiography in anatomical position. On examination, we could observe a child with good weight/height development, normal pulse, normal precordium at palpation and a systolic murmur 2+/6+ at the basis at auscultation. ECG was normal, but chest radiography demonstrated an image compatible with concave and thin calcification next to the medium arch of the left cardiac border. Echocardiogram demonstrated a small ductus arteriosus. Angiography verified a large aneurysm of the ductus arteriosus, calcified with patent pulmonary and aortic mouths. In the same injection, the absence of the left branch of the pulmonary artery was observed (Figure 2). The child was submitted to a corrective surgery, with excision of the aneurysmal canal, and presented favorable evolution.

Case 3

A 3-year old, female child was admitted with anasarca and cyanosis. She presented a severe pulmonary valvar stenosis, and was submitted to a cardiac catheterization for valvuloplasty in the occasion. However, the procedure was interrupted due to a cardiorespiratory arrest during anesthesia. She presented a significant weight/height deficiency, cyanosis 3+/4+, and digital clubbing. The cardiovascular examination showed palpable right ventriculography 3+/4+, systolic murmur at tricuspid regurgitation, ascites, and significant hepatomegaly. A simple chest radiography demonstrated a large, prolonged, calcified image in the cardiac topography (Figure 3). Echocardiogram confirmed a severe pulmonary valvar stenosis and the presence of a large image suggesting calcified thrombus in the outlet of the right ventricle. We performed a surgery for the total correction of cardiopathy and the thrombus withdrawal. She obtained a good postoperative evolution.
Discussion

In the assessment of a simple chest radiography, we should pay attention to the thoracic calcifications, which may have several locations, such as parenchymal, ganglionar, mediastinal, pleural, and osseous. We know that most of thoracic calcifications that are located in the lymphatic ganglions and in the pulmonary parenchyma region result from a granulomatous extinct infection, provoked by the tuberculosis bacillus or a fungus. There are infections that may determine disseminated parenchymal calcifications, such as histoplasmosis, for example; this kind of miliary calcification also occurs in coccidioidomycosis and, rarely, in tuberculosis. Noninfectious lesions, such as silicosis, may calcify, since they have the characteristic aspect of eggshell-type ganglionar calcification. They may be found in the cervical and abdominal lymphatic ganglions, similarly to those found in the thoracic region.

Figure 2 - Cardiac catheterization. Opacified right ventriculography, dilated pulmonary artery trunk, image of the large calcified aneurysm of the ductus arteriosus (arrows), and absence of the left branch of the pulmonary artery.

Figure 3 - Chest radiograph in anatomical position demonstrates large, prolonged, calcified image along the left cardiac border (arrows).
Long-term organized thromboemboli may calcify, and this sort of vascular calcification acquires the cylindrical or ramified form of a vase, that is, in a branch, at the central level of a pulmonary artery, in the superior or inferior vena cava, or even in the aorta. There are reports, in adults, of calcifications on the wall of pulmonary arteries in late pulmonary hypertension cases and those associated with congenital cardiopathies with shunt. Pulmonary artery or aorta aneurysm may also occasionally present calcifications on its boards.

Other diseases that cause alterations in phosphorus and calcium metabolism, such as hyperparathyroidism, hypervitaminosis, etc., can present isolated pulmonary parenchymal calcifications.

Calcium is also commonly found in tumoral lesions of the mediastinum, such as thymoma or teratoma. The calcifications that are visualized at the level of isolated pulmonary nodules may be a sign of benignity, but they rarely represent a preexisting granuloma involved by neoplasia.

In childhood, the description of thoracic calcifications cases are relatively rare, mainly those with cardiac origin. In the present survey, during a retrospective study, out of 2,108 chest radiographs analyzed, we identified only three patients (0.14%).

In the first case, a right atrial fibroma case, the radiological finding was important in the tracking of the origin of cardiac arrhythmia associated with thoracic calcification. The echocardiogram showed a calcified mass, suggesting a cardiac tumor, which could be the fibroma type due to its location and to the age group it affects. Among the cardiac tumors in childhood, rhabdomyoma is the most common one. It presents a benign evolution, with spontaneous regression, regardless of its characteristic multiplicity. Fibroma is the second most frequent tumor, and it is generally located in a free ventricular wall, and, more rarely (as in the case studied), it is found in multiple locations. Teratoma is the second most frequent tumor during the neonatal period, but the third one in this age group. A surgery was performed, and the diagnosis was confirmed through the histopathologic study. The child presented a good evolution during a 10-month follow-up. However, the tumor reappeared in a different place (superior vena cava). This child died after some complications during another surgery. The exceptional and important aspects in this case are its evolution, with the reappearance of the fibroma, as well as its location in the right atrium, which are little frequent characteristics in worldwide literature.

Aneurysm of the ductus arteriosus and calcification of its wall are uncommon complications of the persistent ductus arteriosus. We should remember that we may find aneurysm of the ductus arteriosus with no calcification or shunt in neonates, due to the fact that the canal closure is goes from the pulmonary side to the aortic side. In these cases, we observed the permanence of an extended aortic mouth, without shunt, however. These cases must be followed in order to verify the anatomical normalization, or, in the worst cases, the persistence of the aneurysm, which may lead to the risk for local rupture and/or thrombosis. Our patient presented aneurysm of the ductus arteriosus with right-left shunt, and absence of the left branch of the pulmonary artery. The association of these two anomalies is a rare finding, and this seems to be the first case described in literature. Surgery confirmed the clinical diagnosis, and the patient presented a satisfactory evolution.

The mural thrombus, either calcified or not, may be present in certain congenital cardiopathies, such as pulmonary atresia and tricuspid atresia, or during the Fontan/Senning operation postoperative period. Right ventricle thrombus is an extremely rare finding in childhood, and it is the cause of pulmonary embolism. It may be even responsible for cerebral vascular accidents in certain congenital cardiopathies with left-right shunt. Our last case was a pulmonary valvar stenosis, associated with a large calcified thrombus in the right ventricle. This case could reproduce other causes of intracardiac masses, such as tumor at the outlet of the right ventricle, for example. Echocardiogram is the first-option non-invasive technique for the differential diagnosis of thrombus, tumor, and/or infectious vegetation. However, in some cases, only the histopathologic study, through biopsy, may define the etiology. The handling of thrombus in the heart is very controversial. Some authors defend the clinical treatment with anticoagulants and streptokinase, but when thrombus has large proportions and/or mobility, surgery must be urgently performed, due to the risk for embolization. Authors point out the importance of the detailed analysis of a simple chest radiography for the tracking of cardiac pathologies that may, in some cases, need an earlier surgical treatment.

References

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