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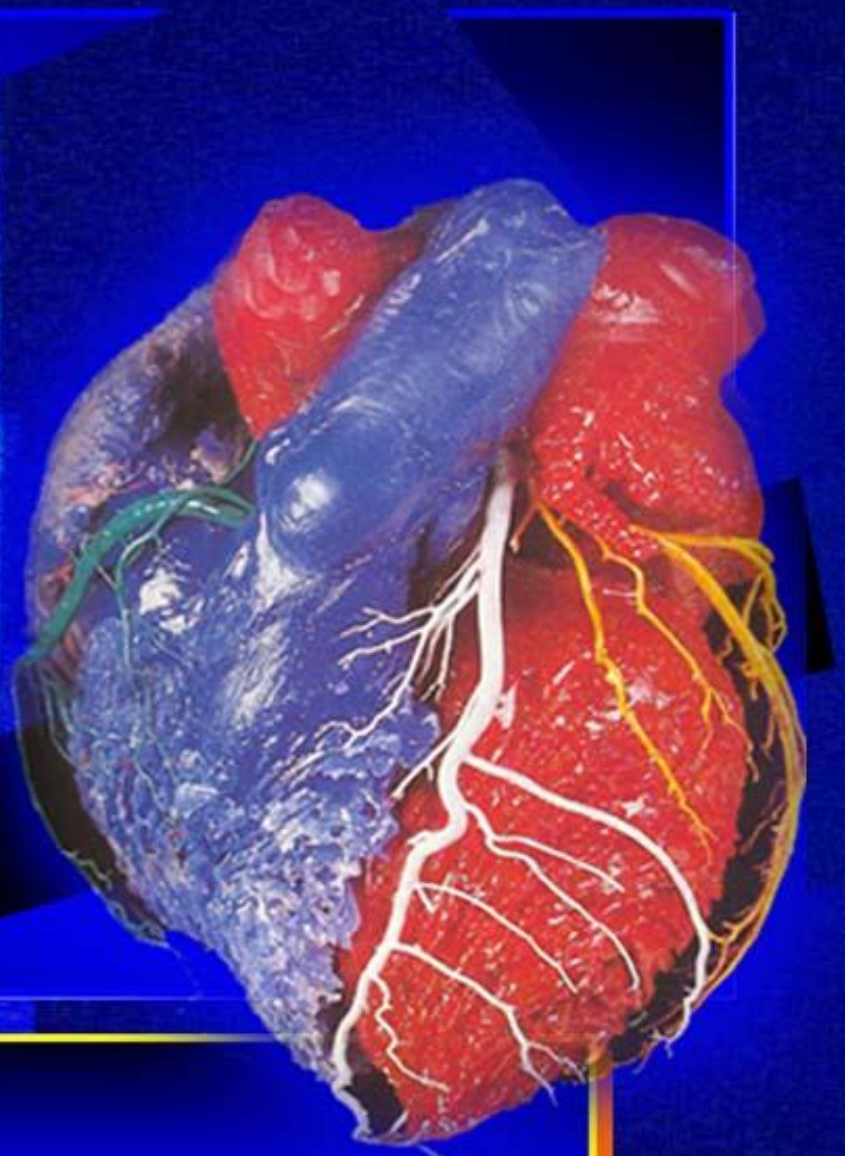
JOANA DE GUSMÃO CHILDREN'S HOSPITAL/UNIVERSITY HOSPITAL

FLORIANÓPOLIS-SC-BRAZIL

CARDIAC DIASTOLIC FUNCTION IN PEDIATRIC AIDS/HIV-CARRIERS: ASSESSMENT, TREATMENT AND PREVENTION OF FUTURE CARDIOVASCULAR DISEASES



MAURICIO LAERTE SILVA,MD

BEFORE

CARE

AFTER

- Cardiovascular manifestations occur frequently in children with human immunodeficiency virus (HIV) vertical infection.

- The prevalence of HIV infection among children is still high as advances in therapy and management of the disease improve life expectancy.

J Pediatr 2002;141(3):327-34.;Pediatrics 2001;107:328-38.

- In a prospective study, the 5-year cumulative incidence of cardiac dysfunction in children ranged from 18% to 39%.

→ underlying cause of HIV-related death in 11.8% of them.

- The exact pathogenesis of the cardiac manifestations remains unclear.

→ most likely multifactorial.

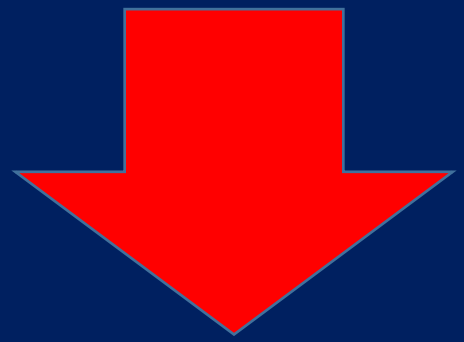
Pediatrics 2001;107:328-38; J Pediatr 2002;141(3):327-34;Circ Heart Fail 2010;3(1):132-9.

The cardiac abnormality most commonly seen is dilated cardiomyopathy.

ranging from asymptomatic cardiac dilation to severe chronic heart failure.

Mild depression of left ventricle (LV) and LV mass were risk factors for death, independent of age, duration of illness, CD_4^+ count, HIV-1 viral load, neurologic disease or malnutrition.

J Pediatr 2002;141(3):327-34; Pediatrics 2001;107:328-38;AIDS 2003;17(Suppl. 1):S46–S50; Circulation 2000;102:1542-8; Pediatr Infect Dis J 2004;23(6):559-63.



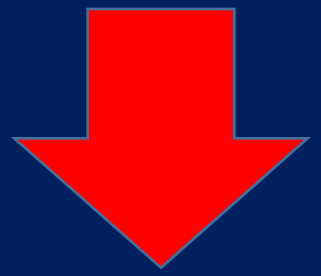
Subclinical cardiac abnormalities develop early in HIV-infected children, even among those with asymptomatic HIV disease or for cardiac dysfunction.

J Pediatr 2002;141(3):327-34; Circulation 2000;102:1542-8;Indian Pediatr 2005 ;42(2):146-9; Afr Health Sci 2005;5(3):219-26; Cardiovasc J S Afr 2005;16(4):206-10.

After beginning highly active antiretroviral therapy (HAART), there are reports of reductions in the incidence of left ventricular dysfunction and more favourable outcomes of cardiac alterations.

It was reported the resolution of dilated cardiomyopathy in vertically-infected HIV affected children who received a combination of drugs.

Pediatr Infect Dis J 2004;23(6):559-63; Arq Bras Cardiol 2008;90(1):11-7;Arq Bras Cardiol 2003;80(3):316-20; Arq Bras Cardiol 2005;85(4):233-40.



It is possible that an alteration in diastolic function precedes systolic dysfunction, as seen in other clinical conditions

Heart 2000;84(6):620-4; AIDS Patient Care STDS 2009 ;23(4):231-8; Circ Heart Fail 2010;3(1):132-9.

- **An observational, cross-sectional study was conducted at the Joana de Gusmao Children's Hospital, Santa Catarina Health State Secretary, Brazil.**
Convenience and not probabilistic sample.*

*Silva,ML et al. Biventricular diastolic function assessed by Doppler echocardiogram in children vertically infected with human immunodeficiency vírus. J Pediatr (Rio J). 2014;90(4);403-407

- **94 symptomatic (CDC classes A, B or C) vertically HIV-infected children.**

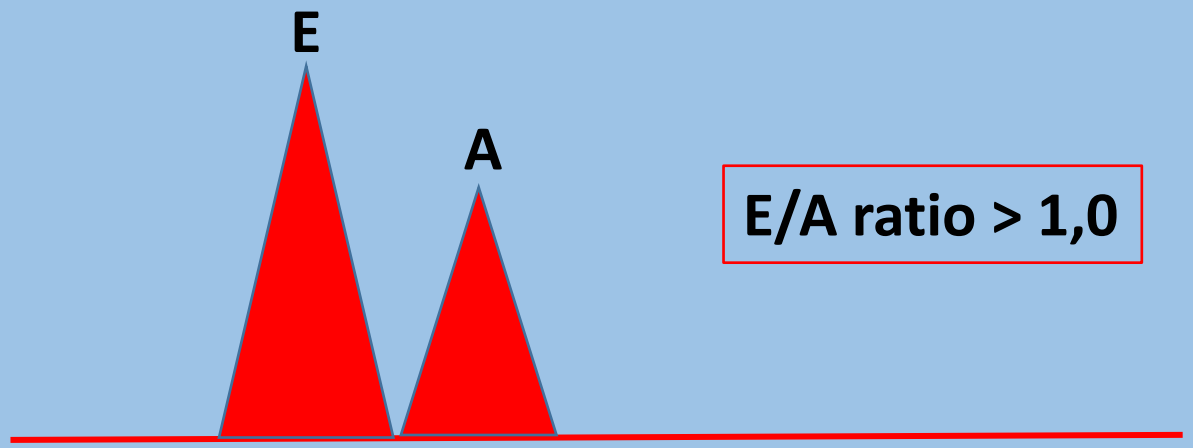
Age: 20.3 to 170.6 months (mean 69.7 months).

Sex: 52 (55.0%) males.

J Pediatr (Rio J). 2014;90(4):403-407

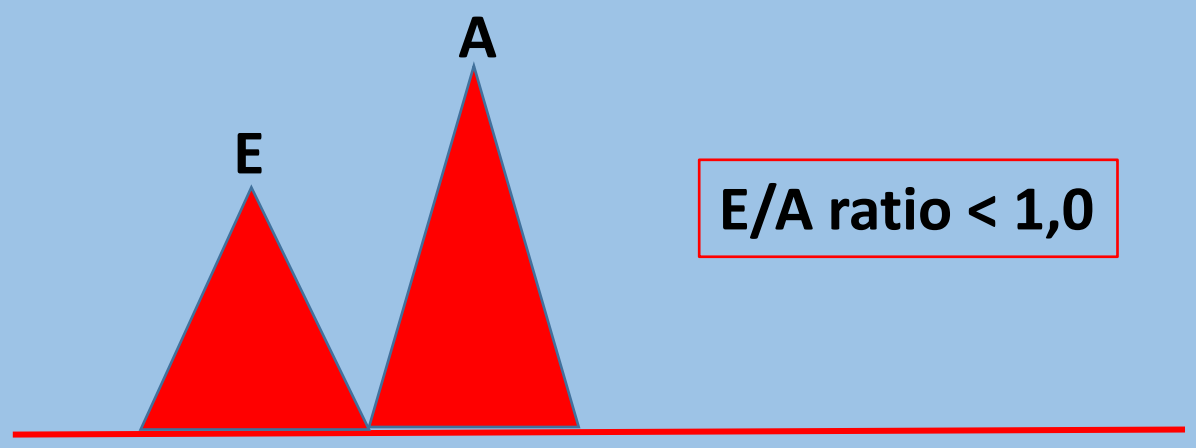
- **Two diastolic cardiac function variables were evaluated:**

Left and right ventricular filling, represented by the E/A ratio of the mitral and tricuspid Doppler waveforms.



E/A ratio > 1,0

NORMAL



E/A ratio < 1,0

ABNORMAL

J Pediatr (Rio J). 2014;90(4):403-407

- **In the left heart side, there was a predominance of the myocardial compliance impairment (28.0% and 95%CI, 18.9% to 37.1%) versus the abnormal relaxation (10.7% and 95% CI, 4.4% to 17.0%).**

J Pediatr (Rio J). 2014;90(4):403-407

- **In the right heart side, the situation was reversed, and was evidente a slight predominance of the abnormal relaxation (16.3% and 95% CI, 8.7% to 23.7%) in comparison to the myocardial compliance impairment (13.1% and 95% CI, 6.2% to 20.0%)**

J Pediatr (Rio J). 2014;90(4):403-407

- From the physiopathologic standpoint, the abnormal relaxation represents an impairment of myocardial relaxation and/or filling dynamics of ventricles and is an early and reversible stage in the scope of the diastolic dysfunction.

- However, the myocardial compliance impairment is due to a more aggressive injury of the myocardium, sometimes with fibrosis, and may not be reversible in some instances.

J Pediatr (Rio J). 2014;90(4):403-407

Therefore, it appears that the left myocardium is more susceptible to the aggression, regardless the causal agent, or it is affected early during the disease progression.

Why differences in the type of diastolic dysfunction between the left and right ventricles exist is a question that remains to be clarified.

J Pediatr (Rio J). 2014;90(4):403-407

The exploratory procedures (factorial analysis and multiple correspondence analysis) to evaluate correlations between variables did not show evidence of any association, despite some suggestions from the table of frequency analysis.

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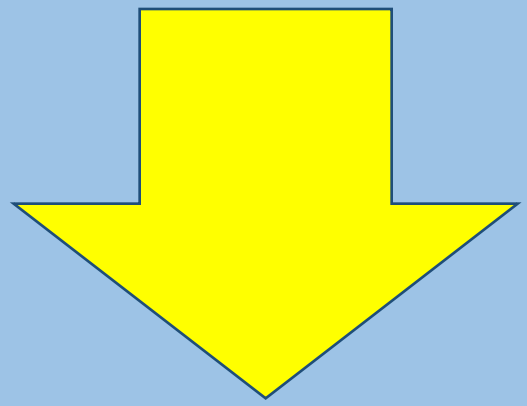

Thus, the findings of biventricular diastolic dysfunction may be an expression of an isolated direct or indirect action of the HIV with no influence of any other factor, as has been suggested by other authors.

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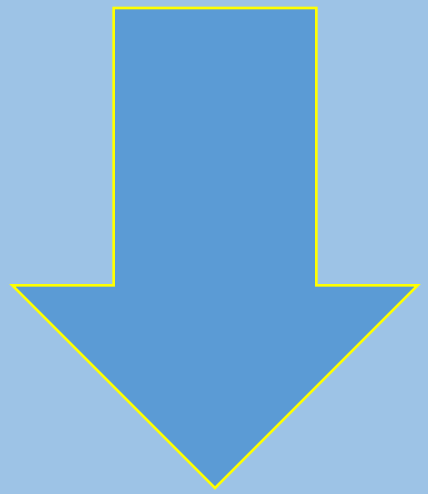

The fact that the immunologic status did not show a relationship with cardiac dysfunction is important clinically and indicates that the CD_4^+ percentage count cannot be considered an indicator of cardiac involvement.

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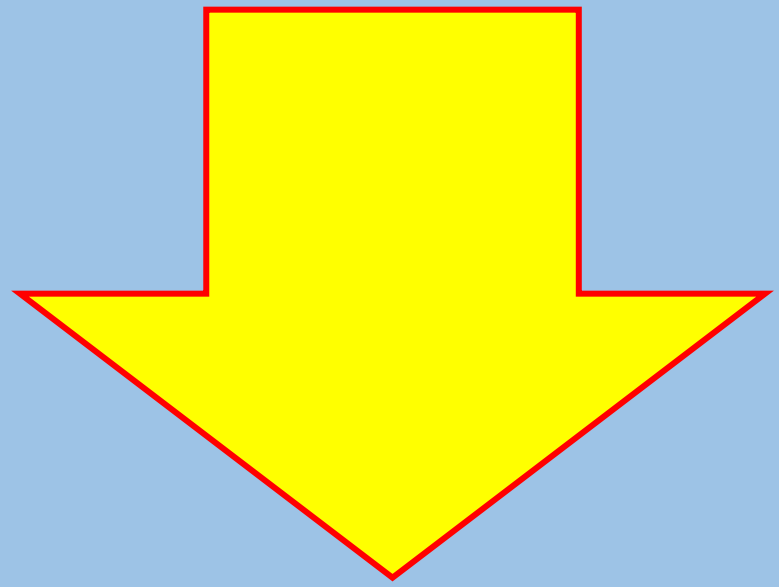

Thus, HIV-infected children should have a Doppler-echocardiographic study performed as a part of their evaluation, even when they are asymptomatic from the cardiovascular point of view.

J Pediatr (Rio J). 2014;90(4):403-407

SUMMARIZING

EVOLUTION AND PATHOGENESIS OF THE INVOLVEMENT OF THE CARDIOVASCULAR SYSTEM IN HIV INFECTION

PHASE I

Phase of diastolic dysfunction (inversion of the E/A ratio and prolongation of the isovolumetric relaxation time) with normal systolic parameter (Fractional Shortening > 27% (EF >50%)

Potentially reversible

Need chocardiographic follow-up every six months

Adapted from: Cardiovascular disease in AIDS.Springer Milan.2009, pp 181-189

PHASE II

Phase of reversible systolic dysfunction (increase of thickness of interventricular septum, increase of end-diastolic diameter, optimal thickness/radium ratio), with a Fractional Shortening > 27% (EF >50%)

Potentially reversible but duration unpredictable.

Improvement of the echocardiographic parameters with ACE-1 inhibitors.
Immunomodulant therapy (eg. iv immunoglobulin) may be helpful in case of myocarditis and viral myocardial infection.
In this phase the use of AZT may worsen the clinical evolution of cardiomyopathy (possibly for impairment of the Krebs cycle).

Need echocardiographic folow-up every six months.

Adapted from:Cardiovascular disease in AIDS.Springer Milan.2009, pp 181-189

PHASE III

Phase of irreversible systolic dysfunction (increase of both end-diastolic and end-systolic diameter, flattening of the interventricular septum without systolic increase, difuse left ventricular hypokinesia) with a Fractional Shortening < 27% (EF <40%)

Non reversible.

In this phase individual variables (including HAART) may accelerate the negative outcome of cardiomyiopathy.

The state of immunodeficiency may enhance the negative inotropic effects of local cytokines, justifying the reduced response to inotropic agents.

Adapted from:Cardiovascular disease in AIDS.Springer Milan.2009, pp 181-189

Prevention!

= screening

THANK YOU SO MUCH FOR YOUR ATTENTION!

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