J Pediatr (Rio J). 2015;91(1):93–97

Jornal de Pediatria
www.jped.com.br

ORIGINAL ARTICLE

Prevalence of myocarditis in pediatric intensive care unit cases presenting with other system involvement☆,☆☆

Hanaa Ibrahim Rady*, **Hanan Zekri***

Department of Pediatrics, Faculty of Medicine, Cairo University, Cairo, Egypt

Received 5 December 2013; accepted 28 May 2014
Available online 27 September 2014

KEYWORDS
Myocarditis;
Cardiac enzymes;
Troponin;
Children;
Pediatric intensive care unit

Abstract
Objective: To assess children with myocarditis, the frequency of various presenting symptoms, and the accuracy of different investigations in the diagnosis.
Methods: This was an observational study of 63 patients admitted to PICU with non-cardiac diagnosis. Cardiac enzymes, chest-X ray, echocardiography, and electrocardiogram were performed to diagnose myocarditis among those patients.
Results: There were 16 cases of definite myocarditis. The age distribution was non-normal, with median of 5.5 months (3.25–21). Of the 16 patients who were diagnosed with myocarditis, 62.5% were originally diagnosed as having respiratory problems, and there were more females than males. Among the present cases, the accuracy of cardiac enzymes (cardiac troponin T [cTn] and creatine phosphokinase MB [CKMB]) in the diagnosis of myocarditis was only 63.5%, while the accuracy of low fractional shortening and of chest-X ray cardiomegaly was 85.7 and 80.9%; respectively. Cardiac troponin folds 2.02 had positive predictive value of 100%, negative predictive value of 88.7%, specificity of 100%, sensitivity of 62.5%, and accuracy of 90.5%.
Conclusions: Children with myocarditis present with symptoms that can be mistaken for other types of illnesses. When clinical suspicion of myocarditis exists, chest-X ray and echocardiography are sufficient as screening tests. Cardiac troponins confirm the diagnosis in screened cases, with specificity of 100%.

☆ Please cite this article as: Rady HI, Zekri H. Prevalence of myocarditis in pediatric intensive care unit cases presenting with other system involvement. J Pediatr (Rio J). 2015;91:93–7.
☆☆ The study was conducted on PICU, New Children's Hospital, Cairo University, Cairo, Egypt.
* Corresponding authors.
E-mail: hanaaarady@gmail.com (H.I. Rady), dr_ksadek@yahoo.com (H. Zekri).

http://dx.doi.org/10.1016/j.jped.2014.05.011
0021-7557/

PALAVRAS-CHAVE
Miocardite;
Enzimas cardíacas;
Troponina;
Crianças;
Unidade de terapia intensiva pediátrica

Prevalência de miocardite em casos pediátricos na unidade de terapia intensiva, com envolvimento de outros sistemas

Resumo

Objetivo: Determinar as crianças com miocardite, a frequência de vários sintomas apresentados e a precisão de diferentes investigações no diagnóstico.

Métodos: Estudo observacional de 63 pacientes internados na UTIP com diagnóstico de problemas não cardíacos. Os exames de enzimas cardíacas, raio-X do tórax, ecocardiograma e eletrocardiograma (ECG) foram realizados para diagnosticar miocardite dentre os pacientes.

Resultados: Houve 16 casos de miocardite definida. A distribuição etária não foi normal, com média de 5,5 meses (3,25-21). Dos 16 pacientes diagnosticados com miocardite, 62,5% foram originalmente diagnosticados como com problemas respiratórios, e a mulheres estavam em maior número que os homens. Dentre nossos casos, a precisão das enzimas cardíacas (cTn e CKMB) no diagnóstico da miocardite foi de apenas 63,5%, apesar de a precisão da baixa fração de encurtamento (FS) e do raio-X de tórax revelando cardiomegalia ter sido 85,7% e 80,9%; respectivamente. A Troponina Cardíaca em 2,02 vezes apresentou valor preditivo positivo = 100%, valor preditivo negativo = 88,7%, especificidade = 100%, sensibilidade = 62,5% e precisão = 90,5%.

Conclusões: As crianças com miocardite apresentam sintomas que podem ser confundidos com outros tipos de doenças. Quando há suspeita clínica de miocardite, raio-X de tórax e ecocardiografia são testes de rastreamento suficientes. As Troponinas Cardíacas confirmam o diagnóstico em casos examinados, com especificidade de 100%.

Introduction

Myocarditis is an inflammatory condition of the myocardium characterized by leukocyte infiltration and subsequent fibrosis and necrosis.[1–4] However, because children with myocarditis may be asymptomatic, the true incidence is unknown,[5–7] with an estimate of around 0.05%.[8–10]

It is a potentially life-threatening condition,[9] causing significant morbidity and mortality with long-term sequelae, including congestive heart failure (CHF) and cardiomyopathy.[4,9] Since the mortality rates for infants and children with myocarditis may be as high as 75 and 25%, respectively, and early initiation of therapy is potentially beneficial, prompt diagnosis is imperative.[11,12]

Myocarditis in children is a challenging diagnosis to make.[10] They have a wide range of non-specific signs and symptoms, overlapping with more common disorders such as respiratory distress and gastrointestinal disease.[10,13,14] Most cases of myocarditis are preceded by a viral or flu-like illness,[15] but bacteria, fungi, protozoa, parasites, and rickettsiae are also causative agents.[16] The use of a variety of invasive and non-invasive methods is usually mandatory, mainly based on history and clinical features.[17] It is clearly important to have a high degree of suspicion to diagnose myocarditis.[18]

Historically, the gold standard for the diagnosis of acute myocarditis required an endomyocardial biopsy according to the Dallas criteria.[19,20] More recently ancillary diagnostic modalities have been used to help make the diagnosis less invasive and more rapid. The use of laboratory testing (cardiac troponin T, I [cTnT and cTnI, respectively] and creatine phosphokinase MB [CKMB]), echocardiography, and cardiac magnetic resonance imaging (MRI) can make the diagnosis in the absence of invasive biopsy.[21]

High-dose intravenous immunoglobulin has been proven to improve the recovery of the left ventricular function, with a tendency to present better survival rate in acute myocarditis. Considering the cost of this regimen, the accuracy of the diagnosis is essential, especially in developing countries in which the high cost of healthcare is a concern.[20]

This study aimed to determine the prevalence of myocarditis in association with other systems involved in critically ill cases and to test the use of cardiac enzymes (cTnT, cTnI, and CKMB), chest X-ray (CXR), and echocardiogram for screening of those cases.

Methods

This was an observational study, in which all children admitted to Cairo university Hospital Pediatric Intensive Care Unit (PICU) were enrolled based on the following inclusion criteria:

- All patients presenting with respiratory distress;
- Symptoms and signs of heart failure;
- Any infectious lesions, either focal or septicemia;
- Multiple organ system failure.

The exclusion criteria were children with known cardiac lesions, either congenital or acquired, and presenting with heart failure.

On admission, children were subjected to full history and clinical examination: assessment of the degree of