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Case report ■

Pulse Dose of Metil-Prednisolon as a Life-Saving Treatment Option in a 14-year-old Boy with Fulminant Myocarditis - Case Report

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SUMMARY

To date, there are still no relevant clinical practice guidelines addressing the initial treatment approach in children with myocarditis. On the other hand, only few non-randomized clinical studies and case reports suggest the beneficial effects of corticosteroids in seriously ill children with acute myocarditis. We report on a case of a 14-year-old boy with fulminant myocardits who was treated with high doses of corticosteroids. Continuous clinical deterioration and nonresponsivness to conventional therapy of our patient, in contrast to his marked clinical improvement occurring promptly after intravenous bolus of methylprednisolone, strongly point out to the beneficial effect of methylprednisolon in children with fulminant myocarditis.

Key words: **fulminant myocarditis, corticosteroids, children**

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INTRODUCTION

In spite of the fact that fulminant myocarditis in children generally caries favorable long-term prognosis, there are still no relevant clinical practice guidelines addressing the initial treatment approach in this age group (1).

To date, only few non-randomized clinical studies and case reports have pointed to the beneficial effects of corticosteroids in children with acute or fulminant myocarditis.

However, due to different institutional treatment policies, corticosteroid usage as the potential treatment option in pediatric patients with myocarditis still remains debated (2).

We report a case of a 14-year-old boy with fulminant myocarditis, who was successfully treated with high intravenous dose of methylprednisolon.

CASE REPORT

The 14-year-old boy was admitted to our institution on the 16th of June, 2007 because of cough, shortness of breath and cold sweating. His past medical history was unremarkable and his social history revealed a detail that he had been climbing the mountain just a week before.

Four days later, he complained of sore throat and diagnosed to have upper respiratory tract viral infection. On the admission day, he felt dyspnea as well as exhaustion and after a reexamination he was immediately referred to our institution.

On admission, he was afebrile, pale, with peripheral cyanosis, cold and clammy extremities with oxygen saturation on room air of 60%. He was also orthopnoeic with respiratory rate of 57/min, hypotensive, blood pressure was 95/50mmHg and alert.

The cardiac examination revealed tachycardia (HR 144/min) with gallop rhythm and weak and muffled heart sounds. On pulmonary auscultation, coarse crackles were heard in the lower portions of both lungs. Further examination of systems indicated a palpable and rounded liver edge, 2 cm below the right costal margin.

After initial patient assessment and admission to emergency department, blood was taken for a standard hematological, biochemical and urinary tests, blood gases and cardio specific enzymes.

The first laboratory results showed elevated values of: cardiac troponin I (5,66 ng/ml), cardiac derived isoenzyme fraction of creatine kinase (72 U/l) and α - hydroxybutyrate dehydrogenase (489 U/l). The value of creatine kinase was 546 U/l and the value of lactate dehydrogenase was 916 U/l. ASOT titer was below 200 IJ/ml. Arterial blood gas analysis showed mixed respiratory and metabolic acidosis with elevated lactate level pH 7,24 HCO3 13,7 BE -12,5 pCO2 32 mmHg p02 34mmHg, O2 sat=61%, Lactate 8,8 mmol/l.

Other blood analyses revealed high values of C-reactive protein (93 g/ml), leukocytosis, Le = 45,4 with neutrophilia Seg 93,9 % and hyperglycemia (17mmol/l) and azotemia (creatinin = 117mmol/l, Urea = 11,2 mmol/l).

Having taken into consideration the results of these analyses, we also performed the additional examinations: chest roentgenogram (CXT) revealed significant cardiomegaly, ECG showed non-specific anterolateral repolarisation changes and echocardiographic examination showed increased left ventricular endiastolic diameter (LVIDd 64 mm) with decreased global contractility FS=(19-20 %) EF=40% and slight interventricular septal thickness (Figure 1). The ECG revealed generalized nonspecific repolarization changes (Figure 2).

He was immediately started on the treatment with: inotropic support (Dopamine and Dobutamine) with successive dose increase from 5-15 mcg/kg /tt. The patient also received standard anticongestive therapy (Lasix 1mg/kg qid, Captopril qid) as well as oxygen via face mask 6 l/min.

After a short period of clinical improvement, on the second admission day the patient's condition deteriorated rapidly. Blood pressure failed to 85/45 mmHg, O_2sat level decreased abruptly to 51%, and he become mentally confused. Due to such condition, we decided to introduce slow bolus of methil-prednisolone (8 mg/kg/hour) in our treatment protocol.

After one hour, O_2sat level as well blood pressure started to raise steadily, averagely 2-4% per hour, reaching normal values of 96% within the following 10 hours.

Blood pressure showed similar trend reaching the value of 110/56 mmHg, round about the same time as normal O_2sat level.

The echocardiogram performed the next day showed normal endiastolic diameter (LVIDd 53 mm) and normal fractional shortening (FS 38%) (Figure 3).

The patient general condition also improved significantly. He had respiratory rate of 36 and heart rate of 110 bpm. On the 5th day after admission to intensive care unit he remained clinically well and was discharged to cardiology unit. At a final discharged from hospital the boy was taking a daily dose of Captopril and no other specific cardiac medication. The treatment was well tolerated and the drug was tapered off two months later. Four further echocardiogarphic examinations were performed during a two-year follow - up, showing normal left ventricle function as well as the chamber size.

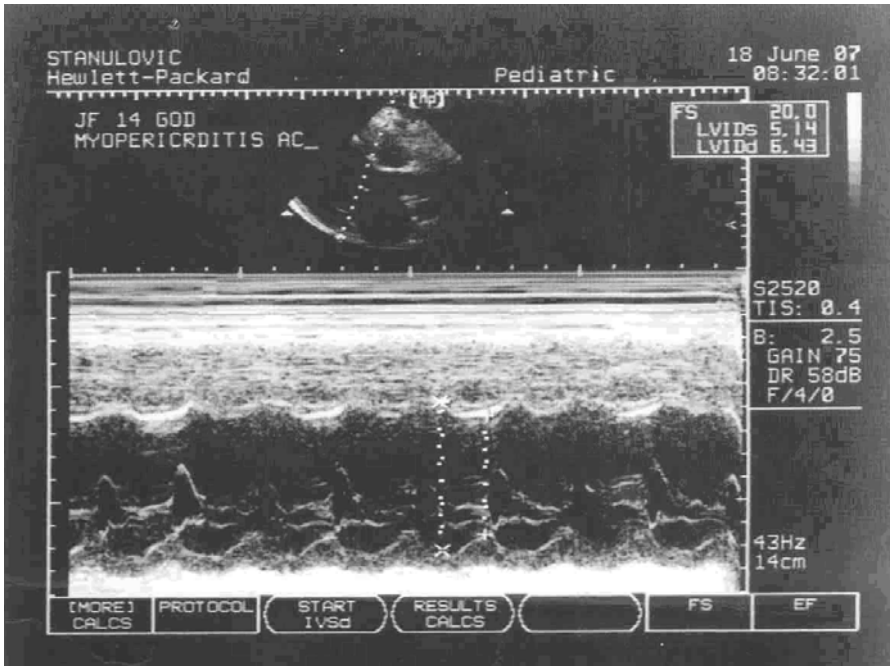

Figure 1. *Figure 1 presents increased left ventricular endiastolic diameter, decreased global contractility as well as slight interventricular septal thickness*

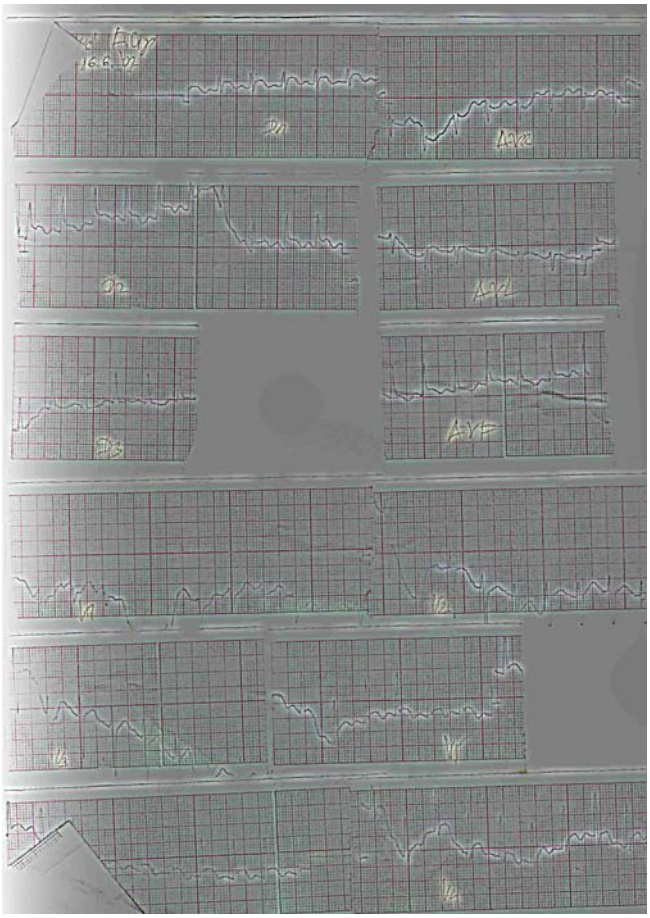

Figure 2. *Figure 2 reveals generalized nonspecific repolarization abnormalities*

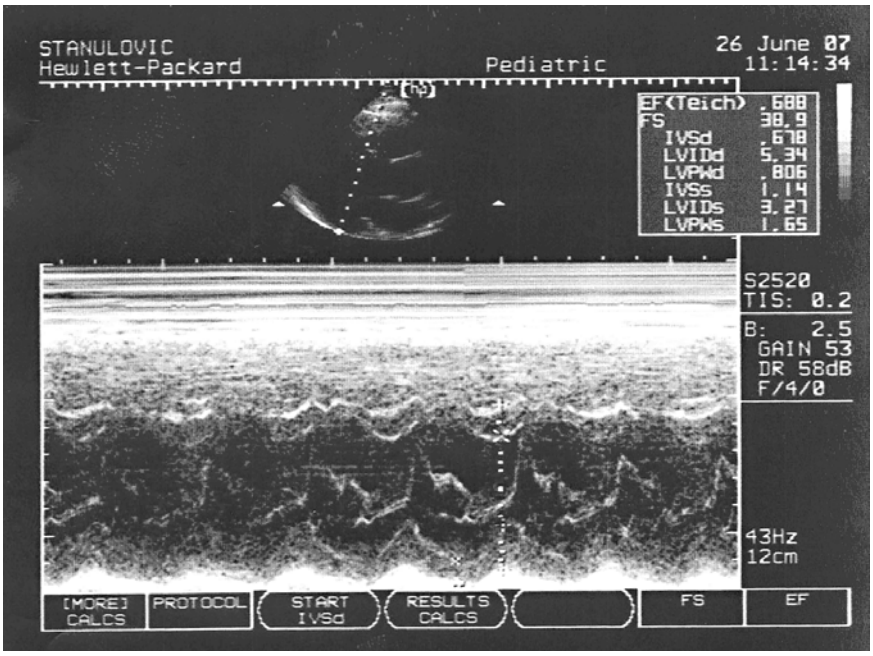

Figure 3. *Figure 3 shows normal left ventricular endiastolic diameter as well as normal fractional shortening just one day after methilprednisolone infusion*

DISCUSSION

In the acute phase of myocarditis, current practice is to support the patient to the degree needed with inotropes, afterload reduction, mechanical ventilation, or extracorporeal membrane oxygenation (ECMO) as the condition warrants (3).

To date, only few non-randomized clinical studies and case reports have reported on beneficial effects of immunosuppressive or antiviral treatment in seriously ill children with acute myocarditis (2). Other trials have suggested only temporary, limited or even detrimental effects of steroids (1). The only randomized trial evaluating 111 adult patients, with biopsy-proven myocarditis, randomized to optional conventional treatment versus immunosuppressive regimen showed no differences between both groups in terms of left ventricle ejection fraction and survival (4). However, this study included patients with symptom duration as long as two years, bringing into question the extrapolation of its results to the pediatric population with shorter symptom duration.

Nevertheless, up to date only few reports have specifically focused on corticosteroid treatment potential in treating acute fulminant myocarditis in children. Such studies have unanimously documented successful outcome of acute fulminant myocarditis with immunomodulative and/or corticosteroid treatment, but without detailed description of its clinical picture and timing of patient clinical improvement (5). In addition, immunomodulative and/or corticosteroid dosage as well as treatment regimen differed significantly between these studies.

Continuous clinical deterioration and nonresponsivness to conventional therapy of our patient, in contrast to his marked clinical improvement occurring promptly after intravenous bolus of methylprednisolone, strongly point out to the beneficial effect of methyl-prednisolon in our patient with fulminant myocarditis.

Moreels et al. have recently reported similar dramatic and rapid improvement in the days following the administration of corticoids on top of dobutamine and classic treatment (6). To our knowledge, both case reports stress for the first time such a prompt and dramatic clinical response to high dose of intravenous corticosteroids in children with fulminant myocarditis, strongly suggesting its favorable effect in this clinical entity.

Until recently, the main clinician concern related to the use of immunosuppressive treatment in children with acute myocarditis was the fear of enhancing early virus replication in acute phase of myocardial inflammation.

According to the basic research models as well as clinical-pathologic and immunological studies, acute or fulminant form of myocarditis coincide with the peak myocardial T lymphocytes infiltration which occurs fairly late, 7 to 14 days after virus infection, making this fear unjustified (7).

Taking into consideration serious short - term complications related to invasive treatment options such as extracorporeal membrane oxygenation or intraaortic balloon, counterpulsation in patients with fulminate form of myocarditis, corticosteroid treatment seem very promising or even life-saving treatment option (8).

Rapid clinical improvement following high doses of corticosteroids in children with fulminate myocarditis could potentially be considered as a clinical marker in differentiating anomalous left coronary artery from the pulmonary trunk (ALCAPA) and other forms of dilatated cardiomyopathy from myocarditis (9).

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PULSNA DOZA METILPREDNIZOLONA KAO SPASONOSNO REŠENJE KOD ČETRNAESTOGODIŠNJEG DEČAKA SA FULMINANTNIM MIOKARDITISOM - PRIKAZ SLUČAJA

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Sažetak

Činjenica je da danas još uvek ne postoje zvanični terapijski vodiči niti konsenzus u vezi sa terapijom miokarditisa kod dece. Sa druge strane, samo nekoliko nerandomiziranih studija i prikaza slučajeva ukazuju na povoljan efekat kortikosteroida kod ozbiljno bolesne dece sa miokarditisom. U radu je prikazan slučaj četrnaestogodišnjeg dečaka sa fulminantnim miokarditisom koji je uspešno izlečen visokim dozama kortikosteroida. Kontinuirano kliničko pogoršanje i odsustvo odgovora na primenjenu konvencionalnu terapiju kod našeg bolesnika, nasuprot brzom kliničkom oporavku nakon ordinirane visoke doze kortikosteroida, ukazuje na brz i povoljan efekat metilprednizolana kod dece sa fulminantnim miokarditisom.

***Ključne reči*: fulminantni miokarditis, kortikosteroidi, deca**