Case report

ACUTE MYOCARDITIS THERAPY OF A CHILD PATIENT ADMITTED; A CASE REPORT

Sababa Firdous Matin

Riphah Institute of Pharmaceutical Sciences, Riphah International University, G-7/4 ,7th Avenue Islamabad, Pakistan

ABSTRACT :

Myocarditis is an inflammation of the myocardium followed by necrosis and/or degeneration of myocytes [1]; caused by a viral [2] or bacterial infection [3]. Thus we have aimed this case of a six years old child (boy) presented in a local hospital, Rawalpindi, Pakistan. He has the complaints of high grade fever**,** vomiting, lower abdominal pain, anorexia, lethargy, respiratory depression with nasal flaring and body aches. The physician prescribed injection Ceftrioxone 750mg IV (intravenous) b.i.d (twice daily), syrup Disprol DS (double strength) t.i.d (thrice time a day), gel Dektarin T.D.S t.i.d, syrup Artem (Artemether and Lumefantrine) 5ml p.o (oral) b.i.d. Physician recommend ECG, CRP (C-reactive protein) and cardiac enzymes. On basis of diagnosis the physician prescribed drugs for acute myocarditis were Tab Digoxin 0.25 1/4 b.i.d, Tab Renitec 5mg 1/4 o.d (once daily), Tab Spiromide 20mg 1/4+1/4 b.i.d. along with previous therapy. Certain queries and inaccuracies noted during the treatment so interactions and dosage were needed to adjusted properly to optimize the regimens. A combination of ACE inhibitors and spironolactone should be addressed with close monitoring in patients with renal insufficiency, worsening heart failure, dehydration and with medications that may cause hyperkalemia. Moreover; dose adjustment needed in concomitant conventional acute myocarditis along with frequent monitoring of electrolytes and renal parameters.

Key Words. Acute Myocarditis, PICU , Hyperkalemia , Monitoring ,Dose Adjustment

---

Corresponding Author; Sababa Firdous Matin ,Riphah Institute Of Pharmaceutical Sciences,Riphah International University, G-7/4 ,7th Avenue ,Islamabad,Pakistan Email: sweetsababa@hotmail.com

INTRODUCTION

Myocarditis is defined as inflammation of the myocardium followed by necrosis and/or degeneration of myocytes.typically caused by a viral infection[1],[2],[3]The inflammation can be diffuse or focal and is usually due to an infection. Although myocarditis severe enough to be recognized is rare, it is the most common cause of heart failure in otherwise healthy children. In both children and adults, most cases are subclinical; thus, the true incidence of myocarditis in

children is unknown[.2],[4], [5] Adenovirus and Ebstein-Barr virus Coxsackievirus types A and B (especially type B) have been considered the most common viruses that cause myocarditis.Its signs and symptoms include Chest pain , Palpitation, Fever . Symptoms in infants and toddlers tend to be more non-specific with generalized malaise, poor appetite,fatigueability, abdominal pain, chronic cough. Later stages of the illness will present with respiratory symptoms with increased work of breathing and is often mistaken for asthma.

Lieberman f classified myocarditis as follows : Fulminant myocarditis, Acute myocarditis Chronic active myocarditis ,Chronic persistent myocarditis [6]

Myocarditis appears to be more common in children than in adults.[6] Its true incidence, however, is unknown; it is thought that subclinical cases ("silent" myocarditis) occur much more often than do severe cases. Many cases are unrecognized because of the wide range of signs and symptoms and, in some patients, the complete lack of clinical findings.[6],[7]In a postmortem study of children who died without a history suggestive of myocarditis, researchers found evidence of active or healed myocarditis in 17 of 138 cases (12.3%).[6],[8] Of the 17cases, 15 occurred in children who died suddenly. In postmortem studies in adults, myocardial inflammation occurred in 1% to 9%.[6] Occurrence of myocarditis can be affected by viral epidemics.[5],[11] An outbreak of coxsackievirus B in Europe in 1965 correlated with cardiac dysfunction in 5% of infected patients. Incidences were as high as 12% that same year in Scotland, Finland, and Austria.[9] Seasonal viral distributions have been recognized for decades (influenza prevalent during winter months; poliovirus and coxsackievirus A and B typically isolated during summer and fall). Myocarditis has been a prominent finding during epidemics of influenza; thus, occurrence may be seasonal[5]

Age plays a marked role in prevalence. During the neonatal period, myocarditis is usually abrupt, severe, and often fatal, with mortality as high as 75%.[9],[10] Infants infected with coxsackievirus B during the first year of life and children have a high incidence of myocarditis with mortality rate of 10-25%. Myocarditis has been linked to sudden infant death syndrome, because inflammatory infiltrates have been found on autopsies of some victims. Incidence increases again during late childhood and adolescence; the myocarditis usually has a delayed onset and patients recover.[5]

Male predominance has been noted with coxsackievirus B heart disease, particularly in adolescents and adults. In these age groups, two-thirds to three-quarters of patients with myocarditis are male.[5] Male predominance has also been reported with coxsackievirus A myocarditis and poliomyelitis. Whether or not differences between the sexes occur in other viral infections is unknown.[5]

There is an observation that acute myocardial dilatation and dysfunction most likely due to myocarditis is very common in Pakistan and an important cause of heart failure in children. A prospective observational study on children admitted to a single center with heart failure from January 1997 to September 1997. The diagnosis was based on clinical manifestations, ECG, chest X-ray and echocardiography. The diagnosis of congenital heart defects (CHID) was

confirmed on echocardiography. The diagnosis of myocarditis was clinical with verification of myocardial dilatation and dysfunction on echocardiography.Fifty patients with clinical presentation of heart failure were studied, excluding neonates. Patients were arbitrarily divided into three age groups as 0.1-1 year, 1-3 years and 3-5 years. Acute myocarditis was the most common cause present in 24 (48%) patients. Sixteen patients CHID (32%), 11 (22%) with ventricular septal defect, 3 (6%) transposition of great arteries, one total anomalous pulmonary venous drainage and one patent ductus arteriosus. Seven (14%) were diagnosed as dilated cardiomyopathy and 2 (4%) children had severe anemia (b - thalassemia & ALL). One child had constrictive pericarditis most likely secondary to tuberculosis. None of the patients had rheumatic heart disease. Of 24 patients with acute myocarditis, 9 died (37.5%), 6 within 48 hours of admission. Overall mortality was 26% (13 patients). Conclusions: Acute myocarditis is the commonest cause of heart failure in infants and children under 5 years of age and carries a high mortality. [12]

CASE REPORT

A 6 yrs old child (boy) was presented in PICUof local hospital ,Rawalpindi ,pakistan with chief complaints of high frade fever(for last 7 days that is associated with chills ,sweats in the evening **),**vomitting (for last 7 days 3-4 episodes /day) , lower abdominal pain (for last 4 days which was severe and radiating) ,anorexia , lethargy , respiratory depression with nasal flaring and body aches .his dietary intake was reduced to 200kcal /day .child is lying on bed with markedly decrease in physical activities His physical examination shows pulse rate 120, temparature 103.5F ,respiration rate 37/min , Heart rate 140/min ,and chest bilateral clear CVS S1+S2 +ejection systolic mumer .His medical showed Lower segment caesarean section (LSCS) at hospital and upto date vaccination profile . The patient belongs to middle socioeconomic class.

On the basis of medical examination (primary diagnosis) physician prescribed injection ceftrioxone 750mg IV (intravenous) B.D (two times a day) , syrup Disprol DS (double strength) TDS(thrice a day) ,gel Dektarin T.D.S (thrice a day) ,peads solution 400ml IV T.D.S ,syrup Artem (Artemether and Lumefantrine) 5ml po (per oral) B.D .Physician also advised ECG (electrocardiography), Echocardiography, CRP(C-reactive protein) ,cardiac enzymes ..On Day 3rd of therapy patient still had been suffering from abdominal pain (central +suprapibic area) ,fever 103F mild pain in chest ,lethargic although vomitting is settled .Vital signs shows RR 30 , BP 90/60 ,pulse 84/min ,HR(heart rate) 150/min, chest bilateral clear ,CVS S1 +S2+0 .Results of the tests advised by physician 3 days ago were : ECG reports show ST segment and T wave abnormality ,prolong Qt interval sinus tacycardia (HR 150) , Echocardiography results show impaired left ventricular function with LV dilation , cardiac enzymes and CRP shows increase in C reactive protiens and elevated levels of troponin C .All these clinical findings showed definite case of acute viral myocarditis On the basis of final diagnosis the physician prescribed drugs for acute myocarditis treatments including Tab digoxin 0.25 1/4 BD , Tab Renitec 5mg 1/4 OD , Tab spiromide 20mg 1/4+1/4 B.D along with the previous therapy .On 6th day of treatment fever reduced to 98 .4F ,mild pain in abdomen ,fatigue , tingling sensation and diarrhea but no more respiratory distress with vitals of RR 20/min ,HR 90/min ,pulse 100/min CVS S1+S2 but

pottasium levels are slightly higher than normal i.e 5.8meq/L.patient was discharged with prescibed medicines with complete follow up was advised

The regimen of Ceftrioxone IV (intravenous) , syrup Disprol DS (double strength) ,gel Dektarin ,peads solution IV ,syrup Artem (Artemether and Lumefantrine) ,Tab digoxin are according to the specifications [13].But renitec (enalapril) and spiromide(spironolactone+ furosemide) are usually not recommended in children (pharmaguide) Although it is usually present in treatment regimen of acute myocarditis.Through different internet sources Tab Renitec, Tab spiromide doses are prescribed accordingly

Renitec shows marked interactions with Spiromide (Concomitant use of angiotensin converting enzyme (ACE) inhibitors and potassium-sparing diuretics may increase the risk of hyperkalemia) so proper monitoring of pottasium levels are required.Renitec also show interaction with Digoxin (it may decrease the renal clearance of digoxin therby increasing plasma digoxin levels) . Spiromide increases the half-life of Digoxin (resulting in possible digitalis toxicity). The dose of digitalis should be adjusted accordingly. As the patient symptoms include vomitting ,muscle pain ,lethargy (due to with or predisposed to electrolyte abnormalities) so therapy with potassium-sparing diuretics should be administered cautiously .

The concomittant use of ACE inhibitor(enalapril) and Spiromide may cause hyperkalemia although mild to moderate in patient without renal impairement is observed in lab reports of patients with mild increase in pottasium levels after the use of therapy and symptoms including lethargy ,fatigue ,mild abdomen pain ,tingling sensation.

DISCUSSION

The case report under discussion is substantiated by *McLellan* et al., [14] who reported that the combination of spironolactone and an angiotensin-converting enzyme inhibitor has the potential to cause lethal hyperkalemia, particularly in patients with other risk factors for potassium concentration elevation, such as renal impairment, diabetes mellitus and potassium supplementation. Hyperkalemia with severe cardiac dysrhythmia in two such high risk cases is described. With the increased use of angiotensin-converting enzyme inhibitors in both the cardiac and diabetic patient groups, where use of diuretics may also be indicated, extreme caution is urged to avoid the risk of severe drug or disease interaction

Seguchi et al(1992) [15] reported that the effect of enalapril, an inhibitor of angiotensin converting enzyme, was studied in 35 infants and children with congestive heart failure Adverse effects were noted in only one infant with postoperative mitral regurgitation who developed renal failure with oliguria, increase of blood urea nitrogen and serum creatinine. Renal function improved dramatically after discontinuation of enalapril. Hyperkalemia (>5mEq/ 1) was observed in four patients, three of whom were receiving spironolactone

Berry et al (2001) [16] In patients with chronic heart failure, spironolactone added to conventional treatment may lead to serious and, occasionally, fatal hyperkalaemia. In some cases this seems to happen because spironolactone causes diarrhoea. Four cases involving men with

New York Heart Association functional class III heart failure are presented. As these cases revealed, close monitoring of blood chemistry is mandatory after starting spironolactone, and patients should be advised to stop spironolactone immediately if diarrhoea develops.

CONCLUSION

A combination of ACE inhibitors and spironolactone should be considered with caution and monitored closely in patients with renal insufficiency, worsening heart failure, a risk for dehydration, and in combination with other medications that may cause hyperkalemia. proper dose-adjustment of the concomitant conventional acute myocarditis regime should be considered. Care should be given to the frequent monitoring of electrolytes and renal parameters.

REFERENCES

1. Aretz HT, Billingham ME, Edwards WD, et al. Myocarditis: a histopathologic definition and classification. Am J Cardiovasc Pathol. 1987;1(1):3–14.[Medline]

2. Batra AS, Lewis AB. Acute myocarditis. Curr Opin Pediatr. 2001;13(3):234–239.[Medline]

3. Leonard EG. Viral myocarditis. Pediatr Infect Dis J. 2004;23(7):665–666.[Medline

4. Levi D, Alejos J. Diagnosis and treatment of pediatric viral myocarditis. Curr Opin Cardiol. 2001;16:77–83.[Medline]

5. Woodruff JF. Viral myocarditis. Am J Pathol. 1980;101(2):427–484

6. Feldman AM, McNamara D. Myocarditis. N Engl J Med. Nov 9 2000;343(19):1388-98. [Medline].

7. Calabrese F, Rigo E, Milanesi O, et al. Molecular diagnosis of myocarditis and dilated cardiomyopathyin children: clinicopathologic features and prognostic implications. *Diagn Mol Pathol.* 2002;11(4):212-221.

8. Lee KJ, McCrindle BW, Bohn DJ, et al. Clinical outcomes of acute myocarditis in childhood. *Heart.* 1999;82(2):226-233.

9. Friedman RA. Myocarditis. In: Garson A, Bricher JT, McNamara DG, eds. The Science and Practice of Pediatric Cardiology. Philadelphia, PA: Lea & Febiger; 1990: 1577–1589.

10. Park MK, Troxler RG. Pediatric Cardiology for Practitioners. 4th ed. St Louis, MO: Mosby; 2002:289–290.

11. Pres S, Lipkind RS. Acute myocarditis in infants: initial presentation. Clin Pediatr. 1990;29(2):73–76.

12. Acute Myocarditis - the commonest cause of cardiac failure in children Pak Paed J Jun 2003;27(2):63-7. Department of Paediatrics, King Edward Medical College/Mayo Hospital, Lahore

13. British National Formulary (BNF) 2007, BMJ publishing group Ltd and RPS publishing 2007. ed.54. ISSN:0260-535X

14. *CS McLellan, AR Morton (1998)* , Spironolactone and enalapril: A potentially fatal combination ,*The Canadian journal of clinical pharmacology* ,Volume 5 Issue 4: 225-228

15. *Makoto Nakazawa, and Kazuo Momma (1992)* Department of Pediatric Cardiology, The Heart Institute of Japan, Tokyo Women‘s Medical College, Effect of enalapril on infants and children with congestive heart failure, *Cambridge Journal ,*Volume 2 Issue 1:14-19

16. *C Berry, J J V McMurray (2001)* Serious adverse events experienced by patients with chronic heart failure taking spironolactone, ,Volume 86 Issue 4