Case Reports

Management of severe measles related pneumonia, acute respiratory distress syndrome and pleural effusion with intravenous methyl prednisolone, immunoglobulin and oral vitamin A

***H J D Liyanage[1], M A M Faizal[2], K P P Kanankearachchi[3]**

Sri Lanka Journal of Child Health, 2016; **45**(3): 215-217
DOI: http://dx.doi.org/10.4038/sljch.v45i3.7949
(Keywords: Measles pneumonia, methyl prednisolone, immunoglobulin, Vitamin A)

Introduction

Measles still remains as one of the major causes of childhood morbidity and mortality in developing countries[1]. In 2013, it was responsible for 2% of total deaths in children under five years of age[2]. Measles related pneumonia (MRP) is the commonest cause of death in children with measles[3]. It may be associated with acute respiratory distress syndrome (ARDS)[4] and pleural effusion (PE)[5]. We describe a case of severe measles related pneumonia with bilateral pleural effusion and ARDS in a 10 month old girl, successfully treated with high dose of methyl prednisolone, vitamin A and intravenous (IV) immunoglobulin during the outbreak in 2013.

Case report

A ten month old girl who was not vaccinated against measles presented to the Sirimavo Bandaranaike Specialized Children's hospital with five days history of high fever, irritability, cough, runny nose, bilateral conjunctivitis and one episode of febrile convulsion. On the third day of the illness a maculopapular rash appeared on the face and neck. On admission, child was drowsy and tachypnoeic with a respiratory rate of 50/min. Initial full blood count showed a white cell count of 5,300/cu mm with 32% lymphocytes and 60% neutrophils. Her platelet count was 315,000/cu mm with an erythrocyte sedimentation rate (ESR) of 30 mm in the first hour. Child was managed with IV cefuroxime, IV cloxacillin and oral erythromycin with a presumptive diagnosis of MRP with bacterial lower respiratory tract infection. Over the next 48 hours, child's condition deteriorated with increasing respiratory distress, increased work of breathing and hypoxia. Then the patient was intubated and transferred to the medical intensive care unit (MICU) on 7th day of the illness. Physical examination on admission to MICU revealed generalized maculopapular rash, pulse rate of 167/min and blood pressure of 80/50 mmHg. Chest examination revealed bilaterally reduced breath sounds with dull percussion note. Supine chest radiograph showed bilateral opacities with pleural effusion (Figure 1) which was confirmed by ultrasound scan of the chest.

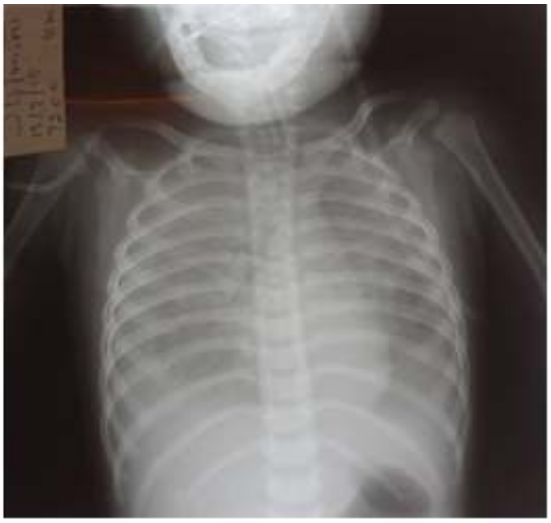

Figure 1: ***Chest x-ray showing bilateral opacities with pleural effusion***

There was no cardiac cause for pleural effusion and 2-dimensional echocardiogram showed a small ostium secundum atrial septal defect (ASD). Patient

[1]*Medical Officer and Postgraduate Trainee in Molecular Medicine,* [2]*Consultant Paediatric Intensivist, Medical Intensive Care Unit, Sirimavo Bandaranaike Specialized Children's Hospital, Peradeniya, Sri Lanka,* [3]*Registrar in Paediatrics, General Hospital, Jaffna, Sri Lanka*
**Correspondence:* hasithajanakantha@gmail.com
(Received on 20 January 2015: Accepted after revision on 20 February 2015)
The authors declare that there are no conflicts of interest
Personal funding was used for this project.

underwent mechanical ventilation with a positive end expiratory pressure (PEEP) of 8 and peak inspiratory pressure (PIP) of 22. Arterial blood gas with FiO_2 of 80% revealed pH of 7.36, pCO_2 of 42.2 mmHg, pO_2 of 56.4 mmHg and PaO_2/FiO_2 ratio was 70.5 and patient was managed as ARDS. Pleural effusions were tapped bilaterally and 250cc of pleural fluid was drained. Pleural fluid analysis revealed protein of 255.7mg/dl, sugar 130mg/dl, pus cells 3-4/ high power field and red cells 1-2/high power field. Pleural fluid gram stain revealed occasional polymorphs, paucity of bacterial organisms and no acid fast bacilli with acid fast stain. Pleural fluid culture yielded no growth. Polymerase chain reaction for tuberculosis DNA (TB PCR) of the pleural fluid was negative. Her C reactive protein was normal (1.8 mg/L). Child was treated with IV vancomycin, IV meropenem, oral clarithromycin and Oseltamivir (Tamiflu) while awaiting investigation reports. Blood cultures, cold agglutinin, mycoplasma antibody and real time PCR for influenza A and Influenza B were negative. The enzyme-linked immunosorbent assay (ELISA) for measles specific IgM antibody was positive and serum immunoglobulin concentrations were within normal limits. With no improvement of initial supportive therapy, two doses of oral vitamin A 100,000 IU with IV methyl prednisolone 30mg/kg/day and IV immunoglobulin 0.5g/kg/day were started and continued for three consecutive days. After initiation of new regime, patient's chest radiograph and clinical examination of lungs were markedly improved as shown in Figure 2.

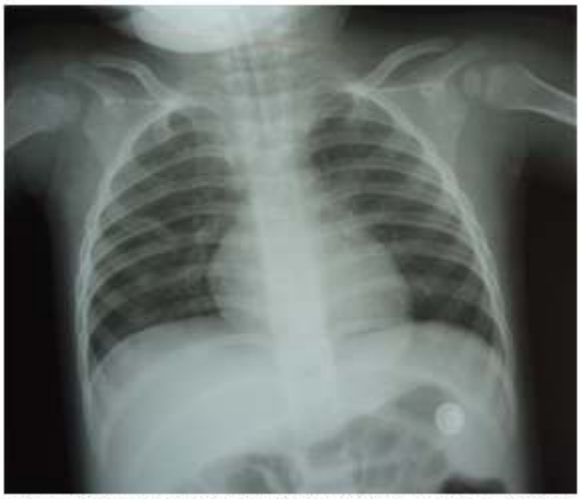

Figure 2: *Chest x-ray after initiation of new regime*

Mechanical ventilation was continued for another 5 days and then she was weaned off from the ventilator. She was extubated after 7 days of ventilation and discharged after 12 days of MICU stay.

Discussion

The high mortality rate associated with MRP may be due to its immunosuppressive effects, multisystem involvement and secondary bacterial infection[3]. Irrespective of recent advancements in medicine, there are still no management guidelines except supportive treatment for MRP. Although there is no established treatment protocol, intravenous methyl prednisolone showed some positive results in adults but not in children[6].

Corticosteroids such as IV methyl prednisolone have proven to reduce inflammation in many diseases. Methyl prednisolone induces transcription of many genes which produces anti-inflammatory proteins and switch off genes responsible for activation of inflammatory process[7]. A randomized controlled trial in USA revealed that methyl prednisolone administration during *early severe* ARDS is associated with significant improvement in pulmonary and non-pulmonary organ dysfunction, which in turn reduces the duration of mechanical ventilation[8].

Vitamin A has been used for decades against measles and showed to have beneficial effects[9]. Furthermore vitamin A deficiency is known to cause many infectious diseases and measles itself reduces the serum vitamin A levels[10]. Current recommendation is to give two doses of Vitamin A to all children with measles[3].

Intravenous immunoglobulins have been effectively used for the post exposure prevention of measles pneumonia but it's effectiveness for the treatment of MRP is not proven[3]. Because of high mortality, there are some recommendations that hospitalized patients with severe measles may receive a trial of IV Immunoglobulins[3]. As measles itself causes depression of immune system intravenous immunoglobulin may have a positive effect on measles pneumonia.

With this supportive evidence we initiated treatment with IV methyl prednisolone, oral vitamin A and IV immunoglobulins. After initiation of the treatment, patient's condition significantly improved both clinically and radiographically as shown in Figures 1 and 2. In conclusion, this patient was successfully treated with intravenous methyl prednisolone, vitamin A, immunoglobulin treatment with pleural tap and ventilator support. Rapid response to this treatment should be further investigated as a treatment regime for measles related pneumonia.

References

1. Hussey GD, Clements CJ. Clinical problems in measles case management. *Annals of Tropical Paediatrics* 1996; **16**: 307-17. PMid:8985528

2. World Health Organization. Geneva: Global health observatory; 2014. Causes of child mortality; Available from: http://www.who.int/gho/child_health/mortality/causes/en/

3. Duke T, Mgone CS. Measles: not just another viral exanthem. *Lancet* 2003; **361**: 763-73. http://dx.doi.org/10.1016/S01406736(03)12661-X

4. Liu Y-J, Tang X-J, Liu C-J, Yang R-Y. Clinical analysis of 32 children with measles complicated with severe pneumonia and acute respiratory distress syndrome. *Journal of Applied Clinical Paediatrics* 2007; **22;** Available from: http://en.cnki.com.cn/Article_en/CJFDTOTAL-SYQK200722021.htm

5. Weber I, Bouaziz JD, Wolkenstein P, Bagot M. Respiratory distress with radiographic pleural effusion during measles virus infection. *Journal of European Academy of Dermatology and Venereology* 2010; **24**: 113-4. http://dx.doi.org/10.1111/j.14683083.2009.03379.x PMid: 19682179

6. Rupp ME, Schwarts ML, Bechard DE. Measles pneumonia: Treatment of a near fatal case with corticosteroids and vitamin A. *Chest* 1993; **103**: 1625-26. http://dx.doi.org/10.1378/chest.103.5.1625 PMid: 8486065

7. Adcock IM, Lane SJ. Mechanisms of steroid action and resistance in inflammation: Corticosteroid-insensitive asthma – molecular mechanisms. *Journal of Endocrinology* 2003; **178**: 347-55. http://dx.doi.org/10.1677/joe.0.1780347

8. Meduri GU, Golden E, Freire AX, Taylor E, Zaman M, Carson SJ, et al. Methylprednisolone infusion in early severe ARDS: results of a randomized controlled trial. *Chest* 2007; **131**: 954-63. http://dx.doi.org/10.1378/chest.06-2100 PMid: 17426195

9. Gremillian DH, Crawford GE. Measles pneumonia in young adults: an analysis of 106 cases. *American Journal of Medicine* 1981; **71**: 539-42. http://dx.doi.org/10.1016/00029343(81)90203-5

10. Keusch GT. Vitamin A supplements – too good not to be true. *New England Journal of Medicine* 1990; **323**: 985-7. http://dx.doi.org/10.1056/NEJM199010043231408 PMid: 2119483