ORIGINAL ARTICLE

Management of Dengue Shock Syndrome A Prospective Study

by

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Abstract

Since dengue hemorrhagic fever (DHF) was first reported 20 years ago, the only serious variant of the disease, dengue shock syndrome (DSS), still continues to cause a relatively high mortality. An effective yet simple management of DSS which can be carried out in every hospital is certainly necessary if the dead toll is to be reduced. Prospective study of a simple procedure in managing DSS patients in Bhayangkara Police Hospital Kediri is reported. Depends on the severity of the disease, for DHF grade III: 30 ml/kg bw Lactated - Ringer solution was given at free rate. This is followed by 20 ml/kg bw of synthetic plasma expander (Expafusin) in a rate of thrice the body weight and continued with lactated-ringer and 5% dextrose in 1/2 Saline alternately with a rate of twice the body weight per minute for the remaining first 24 hours. For DHF grade IV, the same fluids were given, except for the amount and the infusion rate. Drugs administered and medical care were all the same for both groups. A close observation, a critical assessment, and an accurate as well as a rapid action are very important factors. Totally there were 115 patients of which 8 died. The mortality rate was 7%. A better management and/or treatment has to be developed to further reduce the mortality.

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Introduction

Since 20 years ago, when dengue hemorrhagic fever (DHF) was first reported by Kho et al. (1969) [1], followed by Partana et al. (1970) [2], its only serious variant, dengue shock syndrome (DSS), will continue to cause considerable number of mortality. A proper, effective yet simple procedure of management of DSS, which can be carried out in every hospital, is necessary if the dead toll is to be reduced.

In this paper, experiences in managing DSS patients conducted in the Pediatric Department, Bhayangkara Police Hospital Kediri, East Java, Indonesia is reported.

Materials and methods

All DSS patients admitted to the Pediatric Department, Bhayangkara Police Hospital Kediri, from March 1, 1987 until December 31, 1989, were subjected to this prospective study.

They were classified according to the WHO grading of DHF (WHO, 1986):

DHF grade III : circulatory failure manifested by rapid and weak pulse, narrowing of pulse pressure (20 mmHg or less) or hypotension, with the presence of cold clammy skin and restlessness.

DHF grade IV : those with profound shock with undetectable blood pressure and pulse.

Diagnosis of DSS was established by obtaining the history prior to shock : fever of unknown origin for 3 – 5 days, hemorrhagic phenomen or other bleeding tendencies, loss of appetite, naussea and/or vomiting, upper gastric pain, supported by hemoconcentration and moderate or marked thrombocytopenia. As soon as the severity was determined, they were treated/managed accordingly.

DHF grade III : ivfd of lactated-Ringer solution 30 ml/kg bw, free rate; continued with 20 ml/kg bw of plasma expander (Expafusin, Pfrimmer) at a rate of 3 times the body weight per minute (10 ml/kg bw/hour); followed by lactated-Ringer and 1/2 Saline in 5% dextrose alternately at a rate of twice the body weight per minute for the remaining of first 24 hours. On the following day, the same solution was administered at the same rate or reduced conforming to the patient's condition, including the laboratory findings.

DHF grade IV : ivfd of lactated-Ringer solution 30 ml/kg bw, free rate, continued with 20 ml/kg bw of Expafusin at a rate of thrice the body weight per minute (10 ml/kg bw/hour), and followed with the same rate of lactated-Ringer solution and ½ Saline in 5% dextrose alternately for the remaining first 24 hours. The rate was then maintained or even reduced, depending on the patient's condition.

Broadspectrum antibiotics (amoxicillin 50 mg/kg bw/day) was given intravenously to all patients for 3 days. Intravenous corticosteroid (hydrocortisone sodium succinate 25-50 mg/kg bw/day) was given for the first 24-48 hours only.

All patients were examined for hemoglobin, hematocrit and platelet as soon as admitted. Subsequent examinations were done every 4-8 hours or as frequent as necessary. Blood grouping and matching were carried out as routine examination. A bag of fresh whole blood was always made available. Filter paper disk for serological examination was also taken immediately after admission, and repeated prior to leaving the hospital. They were sent to the Regional Clinical Laboratory at Surabaya for HI test. Radiographic examination of the chest was made for all patients. Platelet concentrate 3-5 units were given to those who showed bleeding signs with platelets count less than 100.000 per ml. Other supportive treatment for Grade IV patients was the administration of oxygen whenever necessary. Vital signs e.g. the pulse, blood pressure, respiratory rate, body temperature were monitored and recorded every ½ – 6 hourly, depending on the progress of the disease. Urine production was measured and noted. A balance sheet was prepared, recording the type of fluid given, the rate and the amount of fluid administered to evaluate the loss and replacement. All patients were assessed by the author himself several times a day as necessary.

Results

Since March 1, 1987 until December 31, 1989, there were totally 115 patients involved in this study. All were serologically confirmed except those who died. All showed pleural effusion of the right lung on radiologic evaluation. None of the 34 grade III patients died, where as 8 among 81 grade IV died, where 5 of them succumbed in less than 24 hours after admission. The overall mortality rate was 7%.

Discussion

The use of lactated-Ringer solution in DSS was reported by Sumarmo [3,4]. He found that shock could be overcome by administering it as a sole solution. Hendarto stated that an isotonic crystalloid solution, lactated--Ringer, can be used to replace the loss of extracellular fluid as in cases of DSS [5]. Rowe and Aranyo even stressed the advantage of giving lactated-Ringer solution in shock cases [6]. However, the drawback of this solution in shock treatment is that it will rapidly leave the intravascular system into the extravascular space [7]. In this study, synthetic plasma expander (Expafusin, Pfrimmer) was given following the lactated-Ringer solution. This is because synthetic plasma expander will improve as well as maintain the intravascular volume [5]. Reasonably it is expected to prevent the possibility of second or recurrent shock which in the author's experience would be most difficult to manage. Latief et al (1985) also stated that the management will be most difficult if there is a second/recurrent or prolonged shock [8]. However, in the WHO publication, it is written that plasma expander is given in case of continuous or profound shock [9]. Nevertheless, in this study, no second or recurrent shock was encountered in spite of the fact that plasma expander is failed to salvage those with profound shock. It is therefore, in the author's opinion, very reasonably justified to use synthetic plasma expander following the administration of lactated-Ringer solution in DSS.

The purpose of giving 5% dextrose in ½ saline solution is to supply energy requirement, since most of the patient

showed loss of appetite several days before shock.

The rate of fluid given is based on WHO recommendation that initial intravenous fluid therapy should be started at the rate of 20 ml/kg bw, and run as rapid as possible [9]. Due to the fact that shock has to be overcome within the shortest possible time, with an adequate amount of fluid [10], and that the exact durations of shock prior to treatment were mostly unknown, in this study 30 ml/kg bw was given as initial shock therapy.

The rate of plasma expander for continued or profound shock according to WHO [9] is 10-20 ml/kg bw/hour, which according Hendarto [5] is 0.25 ml/kg bw/minute. In this study, the rate is limited to 10 ml/kg bw/hour, since it is meant only to sustain the intravascular volume. The amount given (20 ml/kg) however, is a little higher than that of WHO (1986) which is 10-15 ml/kg bw.

The rate of fluid that follows 5% dextrose in ½ saline and lactated-Ringer alternately is similar to that recommended by WHO [9] and Sumarmo [3,4] 10 ml/kg bw/hour. For grade III in this study however, less amount was given (5 ml - 7½ ml/kg/hour). It is assumed that continued plasma loss in 50-100 ml/kg bw/day, depending upon the severity of the disease. This addition to the average basal fluid requirement (100 ml/kg bw/day) leads to the total amount of 150-200 ml/kg bw/day.

Since infectious diseases still prevail in Indonesia, and that in shock patients secondary infections will likely to complicate the condition, antibiotics are given in this study.

Although the beneficial effect of corticosteroids is still undefined, giving it only for 1-2 days is considerably warranted. This is supported by Sumarmo (1988, 1989) [3,4] that the administration hydrocortisone to DSS is correct and useful, and is not contraindicated since according to Shambi et al (1965) and Schumer and Sperling steroids can improve the cardiac output, stabilizing the membrane and the endothelial system, decrease peripheral resistance and improve microcirculation [10,11].

Oxygen therapy was given to cyanotic grade IV patients only. Notwithstanding that, a very close observation, a critical assessment of the clinical as well as laboratory findings and prompt, accurate action, are of utmost importance; particularly in the first 2-3 days of hospitalization.

Comparing to those management proposed by Rampengan [12,13], Muzief and Rampengan [14], Atmodjo [15] and others, the method in this study is much simpler that can certainly be applied in every hospital throughout Indonesia. Further more the mortality is justrifiably low (7%).

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