

Etiological, Clinical and Mortality Profile of Shock in Children at PICU of Southern Rajasthan Hospital.

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Abstract

Pediatric Intensive Care Unit (PICU) plays a very important role in the care of critically-ill children who are at risk for organ dysfunction. Worldwide the most common causes of morbidity and mortality in children is sepsis particularly in developing countries. Especially in children there is high rate of mortality in septic shock may be as high as 50%. In septic shock, outcome is worse when associated with co-morbidities. The clinical syndrome of shock, a clinical state characterized by inadequate tissue perfusion, is one of the most dramatic, dynamic and life-threatening problems faced by the physician in the critical care setting. Shock is defined as an acute syndrome in which the circulatory system is not able to supply adequate amount of nutrients and oxygen for vital organs. In children Shock accounts for more morbidity and mortality worldwide than any other disease, especially when shock is accompanied by need of mechanical ventilation. **Aim:** The main objective of this study is to know clinical profile and outcome of shock in children. **Material and method:** Children with the different age group between 1 to 15 years old age admitted with the clinical evidence of shock in the pediatric emergency. From all the patients' detailed clinical history were taken with the help of their relatives or parents. For the identification of shock in the patients, there must be present of at least one of the following parameters i.e., tachycardia and/or hypotension along with signs of systemic hypoperfusion. From all the patients laboratory investigation were done like blood culture, C-reactive protein, liver function tests, urine routine and culture, stool routine and culture, calcium, urine electrolytes, etc. were done. **Result:** Out of total patients 20, 17 and 13 were in age group 1-5 years, 5-10 years and 10-15 years respectively. In this study maximum male gender were predominate to female with the ratio 1.5:1 and the mean age were 5.8 ± 3.4 years. Congenital heart disease (54.2%) was the most common underlying etiology in cardiogenic shock followed by cardiomyopathy (24.5%) and heart rate abnormalities (21.3%). In hypovolemic shock, 87.9% patients were in compensated stage of septic shock. **Conclusion:** Especially in children Shock is a major cause of morbidity and mortality. Hypovolemic shock is the commonest form of shock in children which required mechanical ventilation. In septic shock severe pneumonia was the commonest illness. Hence, Diagnosis and management of shock in reimburse stage bring better forecast than in uncompensated shock irrespective of the age.

Keywords: PICU, Hypovolemia, Cardiogenic, Shock, Outcome

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Introduction

Pediatric Intensive Care Unit (PICU) plays a very important role in the care of critically-ill children who are at risk for organ dysfunction[1]. Worldwide the most common causes of morbidity and mortality in children is sepsis particularly in developing countries [2]. According to World Health Organization (WHO), worldwide there are mainly four causes of death in children are severe Pneumonia (1.9 million deaths/ year), severe diarrhea (1.6 million/year),

severe malaria (1.1 million/year), severe measles (5,50,000 deaths/ year). Therefore WHO used term severe when children develop acidosis or hypotension or both[3]. Especially in children there is high rate of mortality in septic shock may be as high as 50%. In septic shock, outcome is worse when associated with co-morbidities[4]. The clinical syndrome of shock, a clinical state characterized by inadequate tissue perfusion, is one of the most dramatic, dynamic and life-threatening problems faced by the physician in the critical care setting[5]. Shock is defined as an acute syndrome in which the circulatory system is not able to supply adequate amount of nutrients and oxygen for vital organs[6]. Because of inadequate production of ATP for the support and function of the cell then it revert to anaerobic metabolism, causing acute energy failure[7] which results in the cell being unable to maintain homeostasis, accumulation

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of intracellular sodium, accumulation of cytosolic calcium, disruption of ionic pumps, efflux of potassium and eventual cell death. More no of cell death results in multi-organ dysfunction. In children Shock accounts for more morbidity and mortality worldwide than any other disease, especially when shock is accompanied by need of mechanical ventilation[8,9]. The main objective of this study is to know clinical profile and outcome of shock in children.

Material and method

This is a prospective study carried out in pediatric intensive care unit (PICU) at Ananta institute of medical science & research centre Rajsamand, Rajasthan. Total 50 pediatric patients were included in this study during the period of 1 year. Children with the different age group between 1 to 15 years old age admitted with the clinical evidence of shock in the pediatric emergency. From all the patients' detailed clinical history were taken with the help of their relatives or parents. For the identification of shock in the patients, there must be present of at least one of the following parameters i.e., tachycardia and/or hypo-tension along with signs of systemic hypo-perfusion[10]. According to the presence of

hypo-tension Patients were classified into compensated or decompensated shock. With the presence of hypotension and cold extremities Cold septic shock was identified. On the basis of history and physical examination Shock was then classified functionally into hypovolemic, cardiogenic, septic and distributive [11,12]. From all the patients laboratory investigation were done like blood culture, C-reactive protein, liver function tests, urine routine and culture, stool routine and culture, calcium, urine electrolytes, etc. were done.

Result

In this study total 50 patients with shock admission in the hospital were included in the study period. Out of total patients 20, 17 and 13 were in age group 1-5 years, 5-10 years and 10- 15 years respectively. In this study maximum male gender were predominate to female with the ratio 1.5:1 and the mean age were 5.8 ± 3.4 years. Various types of shock with age wise distribution were shown in table no 1 below.

Table 1: Showing Age Wise Distribution with various types of Shock

Age(yrs)	1-5	5-10	10-15	Total
Total cases of shock	20	17	13	50
Hypovolemic shock	9	7	7	23
Septic shock	6	5	3	14
Cardiogenic shock	5	4	2	11
Distributive shock	0	1	1	2

Nearly 64% of cases were in compensated stage of shock, which was not significantly related to age. Dehydration following diarrhea and vomiting was most common underlying etiology in hypovolemic shock. Congenital heart disease (54.2%) was the most common underlying

etiology in cardiogenic shock followed by cardiomyopathy (24.5%) and heart rate abnormalities (21.3%). In hypovolemic shock, 87.9% patients were in compensated stage of septic shock. As per the stage of shock and outcome is shown in table no: 2 below.

Table 2: Showing the various Stage and Outcome of types of Shock

Types of shock	Compensated stage	Decompensated	Survival (%)*
Hypovolemic	18	5	22(95.7)
Septic	5	9	6(42.9)
Cardiogenic	7	4	4(36.4)
Distributive	2	0	2(100)
Total	32	18	34(68)

*Survival is calculated after excluding patients who left against medical advice

Discussion

In worldwide shock is a major cause of morbidity and mortality in critically ill children. 4.6% is The frequency of shock noted in pediatric intensive care. Hypovolemic shock was the most commonly encountered shock followed by Septic shock. Many researches in developed countries showed that about 2% shock occurs in all hospitalized infants, children and adults. Depending on the etiology and clinical scenario mortality varies[13] in developing countries There is sparse data about the incidence of shock.

Many studies in India have reported frequency of 4.3%, and 9% in another studied which corresponds to this study[14,15]. In this study children under 5years of age were majorities which are consistent with the previous studies[16]. Due to diarrhea and vomiting Hypovolemic shock was the most common type of shock in this study which is similar to the different studied of Perkin RM et al[17], Singhi S et al[18] and Chang P et al[19]. Cardiogenic shock during childhood represents a diagnostic and therapeutic challenge because of its multitude etiologies[20]. In cardiogenic shock cardiomyopathies,

congenital heart diseases and Heart rate abnormalities are the common causes. This is traditionalism to the fact that in compensated stage, vital organ perfusion is maintained by intrinsic mechanism with early detection and management of shock that increases rate of survival before hypotension develop[21,22]. High mortality was observed in septic shock in this study which is similar to the other studied of Pollack MM et al[23]. though the mortality rates have declined over the past several decades to less than 20% as studied showed by Kutko MC et al[24]. Management of shock in children requiring mechanical ventilation requires good infrastructure, trained staff and protocol-based management.

Conclusion

Especially in children Shock is a major cause of morbidity and mortality. Hypovolemic shock is the commonest form of shock in children which required mechanical ventilation. In septic shock severe pneumonia was the commonest illness. Therefore larger prospective study in developing countries is advisable. Hence, Diagnosis and management of shock in reimburse stage bring better forecast than in uncompensated shock irrespective of the age.

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