

A clinical study of prediction of outcome of the children with shock admitted in pediatric ICU

¹Dr. Sharath Babu, M.D, Department of Pediatrics, JLN Medical College, Ajmer, Rajasthan, India

²Dr. Anil Kumar Jain, Department of Pediatrics, JLN Medical College, Ajmer, Rajasthan, India

³Dr. Chethan C.S, Department of Pediatrics, JLN Medical College, Ajmer, Rajasthan, India

Corresponding Author: Dr. Anil Kumar Jain, Department of Pediatrics, JLN Medical College, Ajmer, Rajasthan, India

Citation this Article: Dr. Sharath Babu, Dr. Anil Kumar Jain, Dr. Chethan C.S, “A clinical study of prediction of outcome of the children with shock admitted in pediatric ICU”, IJMSIR- August - 2021, Vol – 6, Issue - 4, P. No. 193 – 197.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: 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.

Material and Methods. A hospital based prospective observational study A Clinical Study Of Prediction Of Outcome Of The Children With Shock Admitted In Pediatric ICU was conducted at in childrens admitted at Dept. of pediatrics, JLN Hospital Ajmer, Rajasthan.

Results: mean age of survived patients was 43.83 months with majority of patients were in age group ≤ 12 months (40.67%). The mean age of patients who did not survive was 42.97 months with majority were in age group of ≤ 12 months (53.33%). There was no significant statistical difference in mean age of patients in survived and nonsurvived groups (P- value=0.92). most common presenting complaint was obvious Focus (72.03%) followed by fever (61.80%), vomiting (58.43%), Breathlessness (40.61%) and convulsion (32.45%). Other complaints include Diarrhoea (23.60%) and Rashes (14.61%). Mean Duration of

shock in patients was 31.66 hours. Mean Duration of shock in survived patients was 3.68 Hours and in non-survived patients was 59.65 Hours. The difference was statistically significant among survived and non-survived (Pvalue< 0.0001).

Conclusion: Shock is a major cause of morbidity and mortality in children especially below 5yrs of age. Septic shock is the commonest form of shock in children who developed shock. Sepsis was the commonest illness causing shock.

Keywords: Shock, MODS, Outcome of shock, children.

Introduction

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 setting¹. Shock is an acute syndrome in which the circulatory system is unable to provide adequate oxygen and nutrients to meet the metabolic demands of vital organs.² Due to the inadequate ATP production to support function, the cell reverts to anaerobic metabolism, causing acute energy failure.³ This

energy failure results in the cell being unable to maintain homeostasis, the disruption of ionic pumps, accumulation of intracellular sodium, efflux of potassium, accumulation of cytosolic calcium and eventual cell death. Shock is one of the commonest pediatric emergencies⁴. It is a major cause of morbidity and mortality. In developed countries like US, 37% of children in emergency department would be in shock. Of these shock cases, majority would be due to sepsis (57%), then hypovolemia (24%), distributive (14%) and cardiogenic (5%). Types of shock are, septic shock, Hypovolemic shock, Obstructive shock, Cardiogenic shock, Distributive shock. Regardless of the type of shock, the final common pathway is inadequate tissue perfusion and oxygen supply to meet cellular demands. Delayed recognition and treatment result in progression from compensated reversible shock to uncompensated irreversible shock with widespread multiple system organ failure to death.

Materials and methods

Source of data: The conducted study is a hospital based prospective observational study to be conducted at IPD patients who presents with Shock from June 2019 to May 2020 at Dept. of Paediatrics J.L.N Hospital, Ajmer, Rajasthan.

Inclusion Criteria

All children in this age group who were admitted with shock was analysed. The diagnosis of shock was made clinically based on the findings like tachycardia, weak or absent distal pulses, a gap between the core peripheral temperature and capillary refill time. Tachycardia was defined as Heart rate:⁷⁻⁸

1. 2 months to 2 years > 160 bpm
2. 2 to 8 years >110 bpm
3. Above 8 years > 90 bpm.

Weak distal pulses are made by comparing dorsalis pedis and femoral pulses. Normal femoral pulse are denoted as +++ and dorsalis pulse as ++ . Bounding and weak dorsalis pulses are denoted as +++ and + respectively. Core- peripheral temperature gap were demonstrated by placing the dorsal aspect of one hand over the abdomen while the dorsal aspect of the other hand will be used to compare temperature over lower aspect of the body with that of the abdomen. Capillary refill time being prolonged is a sign of poor peripheral perfusion. It is demonstrated by blanching the skin over sternum in <1yr. Of age and blanching the nail bed in children >1yr, Normal time taken for refill is less than 3 seconds while in shock it is more than 3 seconds; in warm septic shock it is seen as flash refill. Pulse Pressure (PP) was classified as Normal , wide and narrow. Normal PP is 30 - 40 mm Hg, wide PP is > 40 mm Hg, narrow PP is < 20 mm Hg The parameters like heart rate, blood Pressure (systolic, diastolic and pulse Pressure) may vary depending upon the etiology and severity of the shock.

A total of 100 children with shock were included in the study, Out of which 11 children were excluded later on as they were referred/LAMA

Exclusion Criteria

Neonates with shock, children with shock treated outside and details unavailable were excluded in the study. Children will be recruited for the study after informed consent from parents or care givers at the time of admission.

Method

Detailed history including age, gender, fever, convulsions, breathlessness, rashes, vomiting, diarrhea, duration of onset of illness , pre Hospitalisation and pre Hospital management were collected. Following this children were subjected for

a detailed clinical examination. Clinical features at the time of admission were recorded. The parameters included temperature, heart rate, respiratory rate, capillary refill time, sensorium and blood pressure. The sensorium of the child were classified as A (Alert) , V (Verbal) , P (Pain Responsive) and U (Unresponsive) as per the PEMC guidelines rather than the GCS. Based on the clinical findings and history from the mother / guardian, shock were classified as hypovolemic , septic, cardiogenic and anaphylactic. Based on the blood pressure, severity of shock were classified as compensated [Normal systolic blood pressure: SBP- $\{(2 \times \text{age}) + 70\}$] or decompensated (systolic blood pressure less than the expected for that age). Following the clinical examination all children were subjected to the investigations as per the unit protocol. The investigation included total counts, peripheral smear, urea, creatinine, serum sodium, potassium, SGOT, SGPT, CRP, blood culture, chest X-ray and ECHO.

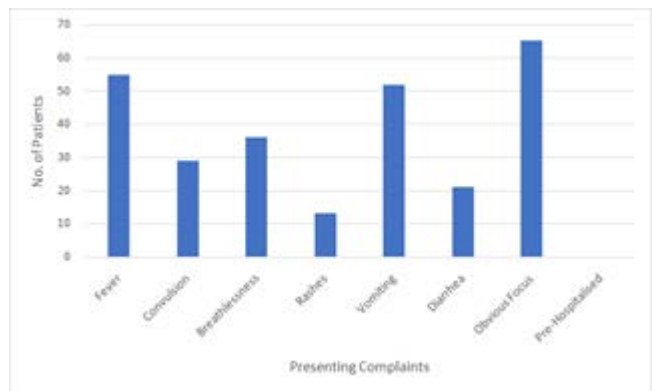
Statistical Analysis

A pre structured pre tested proforma was used for Data collection. All collected data were pooled and entered on to a excel spreadsheet and analysed using SPSS (version=16.0). Continuous variable were expressed as mean (SD) and compared with student’s t-test. Difference between proportion derived from categorical data we compared with chi square test. For all the p-values of less than 0.05 was considered significant.

Results

Table 1: Distribution of cases according to presenting complaints

Presenting Complaints	Survived Patients (N=59)		Non-Survived Patients (N=30)		P-Value
	No. of Patients	Percentage	No. of Patients	Percentage	
Fever	35	59.32	20	66.67	0.5
Convulsion	16	27.12	13	43.33	0.12
Breathlessness	22	37.29	14	46.67	0.39
Rashes	11	18.64	2	6.67	0.1
Vomiting	34	57.63	18	60	0.82
Diarrhea	15	25.42	6	20	0.37
Obvious Focus	48	81.36	17	56.67	0.01
Pre-Hospitalised	0	0	0	0	-

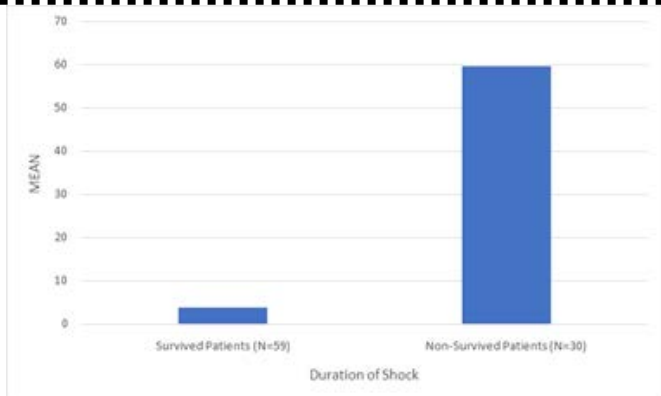


Graph 1

The most common presenting complaint was Obvious Focus (72.03%) followed by fever (61.80%), vomiting (58.43%), Breathlessness (40.61%) and convulsion (32.45%). Other complaints includes Diarrhoea (23.60%) and Rashes (14.61%).

Table 2: Distribution of cases according to duration of shock

Duration of Shock	Survived Patients (N=59)		Non-Survived Patients (N=30)		P-Value
	MEAN	SD	MEAN	SD	
Shock	3.68	11.48	59.65	39.09	<0.01

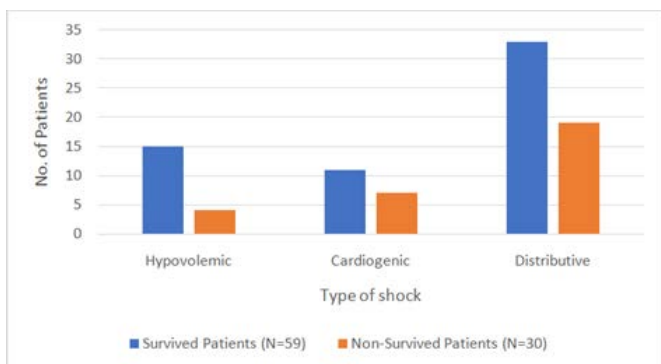


Graph 2

Mean Duration of shock in survived patients was 3.68 and in non-survived patients was 59.65. The difference was statistically significant among survived and non-survived (P-value<0.0001)

Table 3: Distribution of cases according to type of shock

Type of shock	Survived Patients (N=59)		Non-Survived Patients (N=30)		P-Value
	No. of Patients	Percentage	No. of Patients	Percentage	
Hypovolemic	15	25.42	4	13.33	0.19
Cardiogenic	11	18.64	7	23.33	0.6
Distributive	33	55.93	19	63.33	0.5
Total	59		30		



Graph 3

In majority of patients had distributive type of shock (58.43%) followed by 20.2% had Cardiogenic and 21.35% hypovolemic shock. & There were

statistically no significant difference in Type of shock among survived and non-survived patients (P-value>0.05).

Discussion

In our study we found that mean age of patients was 43.4 months with majority (44.94%) of cases were upto 12 months followed by 24.72% patients in 61-132 months groups. And the mean age of survived patients was 43.83 months with majority of patients were in age group ≤12 months (40.67%). The mean age of patients who did not survive was 42.97 months with majority were in age group of ≤12 months (53.33%). There was no significant statistical difference in mean age of patients in survived and non-survived groups (P-value=0.92). There were no significant difference in proportion of male and female among survival and non-survival (P-value>0.05). and the most common presenting complaint was obvious Focus (72.03%) followed by fever (61.80%), vomiting (58.43%), Breathlessness (40.61%) and convulsion (32.45%). Other complaints includes Diarrhoea (23.60%) and Rashes (14.61%). Complaints of Obvious Focus was significantly different between survival and non-survival patients (P-value=0.01). Other presenting complaints were not significantly different among survival and non-survival (P-value>0.05). There was statistically significant difference in requirement of ventilation among survived and non-survived patients (P-value<0.0001). Mean ICU stay of patients was found to be 106.1 hours. The most common etiology was found to be sepsis (26.97%) followed by Diarreah/vomiting (15.73%), Pneumonia (11.24%). Other etiological factor includes Acute vomiting, Bee Sting, ACHD, Empyema, Encephalitis, IDDM /DKA, Meningitis, Peritonitis, Post diphtheritic myocarditis, RHD, TBM, Urosepsis, Viral myocarditis. Most

common complication was found to be MODS (8.99%) followed by renal failure(7.87%), DIC (4.49%) and hypokalemia (4.49%). Other complication includes Coagulopathy, ARDS and Myocarditis.

Conclusion

Shock is a major cause of morbidity and mortality in children especially below 5yrs of age. Septic shock is the commonest form of shock in children who developed shock. Sepsis was the commonest illness causing shock, followed by Diarrhea/Vomiting. Fever was the most common presenting symptom followed by vomiting and convulsions.. Distributive/Septic shock was the commonest type of shock followed by hypovolemic, cardiogenic and anaphylactic shock. Identifying the obvious causation of the illness early in the course of disease and its treatment leads to good outcome as shown by duration of shock being one of the significant parameter to decide on the outcome. According to this study, prolonged pre hospital illness and lack of pre hospital stabilization were significantly associated with mortality. Hence in order to reduce mortality, it is essential to pick up children with shock earlier and to refer them with initial stabilization and a good transport care.

References

1. McConnell MS, Perkin RM. Shock states. In: Zimmerman JJ, Fuhrman BP, editors. Textbook of Pediatric Critical Care, 2nd ed. St. Louis: Mosby;1998:293-306.
2. Bell LM: Life threatening emergencies, Shock. In: Textbook of Pediatric Emergency Medicine 4th ed. Fleisher GR, Ludwig S (Ed.), Lippincott Williams &Wilkins, PA, USA;2000:47-55.
3. Carcillo JA, Han K, Lin J, Orr R. Goal-directed management of pediatric shock in the emergency

department. Clin Pediatric Emergency Med. 2007 Sep 1;8(3):165-75.

4. Tobin JR, Wetzel RC. Shock and multiorgan system failure. In: Rogers MC, ed. Textbook of Pediatric Intensive Ravikant M. Care, 3rd ed. Baltimore: Williams &Wilkins, 196: 555-605.