



Prevalence of Shock and its Outcome in Children Admitted in A Tertiary Care Centre

KEYWORDS

Shock, children, critical illness, oxygen delivery, sepsis

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ABSTRACT *Introduction: Shock is a syndrome that results from inadequate oxygen delivery to meet metabolic demands. Sequelae of shock are metabolic acidosis, organ dysfunction and death.*

Aim: To study the prevalence of pediatric shock in children admitted to Intensive care unit and to identify possible etiology and the response to treatment.

Methods: Child from 1 month and 12 years admitted to Pediatrics ward with the suspicion of shock are assessed by using the rapid cardiopulmonary assessment and diagnosed as suffering from shock. Children are classified based on severity as compensated and de compensated shock and upon their etiology as hypovolemic ,cardiogenic ,anaphylactic shock or obstructive shock ,septic ,distributive shock.

Results: Among the 57 cases studied septic (19.3%) was the major type among infants and 28.1% among the total group. Hypovolemic shock was seen in 15.85 of cases and distributive in 22.8% of cases cardiogenic shock was seen in 12.2%. Children who were managed only with crystalloids were 11(19.3%)and 28(49.2%) of shock required inotropic support In addition to crystalloids. 8 children required initiation of adrenaline infusion after fluid resuscitation directly as they were in post resuscitative stabilization phase .8 children went on to catecholamine resistant requiring epinephrine infusion.

Conclusion: Shock constitutes a significant percentage of diagnosis in critically ill children. Infants Septic shock accounts for majority of decompensated shock and poor outcome to management.

INTRODUCTION

Shock is clinically diagnosed altered physiological status defined as a complex state of circulatory dysfunction that results in inadequate delivery of oxygen and metabolic substrates to the tissues.¹ Clinical manifestations are due to decreased perfusion to tissues, the compensatory mechanisms that are triggered by the decreased perfusion and the inadequate removal of metabolic wastes. Shock accounts for 2% of children admitted to Pediatric casualty worldwide as per most western literature and Nelson text book of Pediatrics.² About 10 million children die of shock every year in the world. Highest mortality is observed in fewer than 5 children in developing countries.³ Progression and perpetuation of shock from the state leads to multi organ failure and death as aptly described by Ayse Aklan Aritan et al.⁴ This irreversible shock as the name implies is the point of no return when mortality rate is high irrespective of interventions. Thus it is necessary to recognize and implement early intervention at the stage of tissue hypoperfusion.

AIM

To study the prevalence of pediatric shock in children admitted to Intensive care unit and to identify possible etiology and the response to treatment.

MATERIALS AND METHODS

Observation study was conducted in Department of Pediatrics in Tirunelveli Medical College Hospital. Ethics committee approval and informed consent from the child parents were obtained. Child from 1 month and 12 years admitted to Pediatrics ward with the suspicion of shock are assessed by using the rapid cardiopulmonary assessment and diagnosed as suffering from shock. Possible etiology, type and severity of shock would be arrived at using a tar-

geted history, clinical examination and relevant laboratory investigations were recorded. The children are managed as per the Pediatric Advanced life-support guidelines for shock with modifications for individual cases as necessary. The outcome of treatment is studied. Children are classified based on severity as compensated or decompensated shock and based upon their etiology as Hypovolemic, cardiogenic, septic, Distributive, Anaphylactic or Obstructive. Exclusion criteria: Neonates are excluded from the study

Results

The total number of Pediatric shock cases was 57. Among them 32 (56%) were male and 25 (43.9%) were females. Nearly half 47.3% were infants; mean age of study population was 12 months.

Table : 1 Age and sex wise classification of trials.

Age Group	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
<12 months	15	46.9 %	12	48.0 %	27	47.3 %
1 – 5 years	5	15.6 %	7	28.0 %	12	21.1 %
5.1 – 10 years	8	25.0 %	4	16.0 %	12	21.1 %
>10.1 years	4	12.5 %	2	8.0 %	6	10.5 %
Total	32	100.00 %	25	100.00 %	57	100.00 %

Table : 2 Sex wise distribution of Pediatric shock cases

Sex	Total children admitted in ward / PICU	Total children admitted with shock	Percentage	Prevalence
Male	1189	32	2.7 %	26.9/1000
Female	846	25	3.0 %	29.8/1000
Total	2035	57	2.8 %	28/1000

The above table explains the prevalence as 28 / 1000 patients. In male it was 26.9/1000 and in females it was 29.8/1000. Among the 57 children diagnosed to have shock the following were the pattern of clinical findings observed.

Table 3 Clinical Findings

Clinical finding	Number	Percentage
Unstable airway / Bradypnea	19	33.3 %
Effortless tachypnea	24	42.1 %
Respiratory distress	23	40.4 %
Tachycardia	42	73.7 %
Relative / Absolute bradycardia	15	26.3 %
CRT Prolonged	52	91.2 %
Flash refill	5	8.8 %
Blood pressure low	33	57.9 %
liver span increased	24	42.1 %
Altered Mental Status (A/V/P/U)	57	100 %
Urinary output (>1ml/kg/hr)	31 (Out of 38)	81.6 %

All children who had unstable airway or bradypnea, were having decompensated shock and except one among them all expired despite prompt airway management. Respiratory distress noticed in 23 (40.4%) of children and all of them had either cardiogenic, septic shock or a combination of both. Capillary refill time was prolonged in 52 (91.2%) of children and the remainder 5 (8.8%) had flash refill and managed as warm septic shock. Decompensated shock as evidenced by low blood pressure was seen in 57.9% children. All of them had altered mental status. Urinary output was monitored in 38 children of which 31 (81.6%) had oliguria. Based on severity 2 types of shock were recognized – Compensated and Decompensated.

Table 4 : Age wise distribution of severity of shock

Age	Compensated		Decompensated		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
<12 months	10	17.5 %	17	29.8 %	27	47.3 %
1 year – 5 years	5	8.8 %	7	12.3 %	12	21.1 %
5.1 years – 10 years	5	8.8 %	7	12.3 %	12	21.1 %
>10.1 years	4	7.0 %	2	3.5 %	6	10.5 %
Total	24	42.1 %	33	57.9 %	57	100.0 %

Infants were affected more by decompensated shock 17 (29.8%) than the other age group. Decompensated shock was seen in 33 (57.9%) children which though was greater than in compensated 24 (42%).

Table 5 : Percentage distribution of causes – Etiology wise.

Etiology	<12mo		1-5yrs		5-10		>10yrs		Total	
	No	%	No	%	No	%	No	%	No	%
Septic	11	19.3 %	4	7.0 %	0	0.0 %	1	1.8 %	16	28.1 %
Cardio-genic	1	1.8 %	0	0.0 %	4	7.0 %	2	3.5 %	7	12.2 %
Hypovolemic	4	7.0 %	1	1.8 %	3	5.3 %	1	1.8 %	9	15.8 %

Septic/ Cardio-genic	7	12.3 %	2	3.5 %	1	1.8 %	0	0.0 %	10	17.5 %
Distributive	4	7.0%	5	8.8 %	2	3.6 %	2	3.6 %	13	22.8 %
Anaphylactic	0	0.0 %	0	0.0 %	1	1.8 %	0	0.0 %	1	1.8 %
Neuro-genic	0	0.0%	0	0.0 %	1	1.8 %	0	0.0 %	1	1.8 %
Total	27	47.4 %	12	21.1 %	12	21.1 %	6	10.5 %	57	100 %

Among the 57 cases studied septic (19.3%) was the major type among infants and 28.1% among the total group. This did not include the Septic / Cardiogenic type which accounted for 17.5% of cases. Hypovolemic was seen in 15.8% of cases and distributive in 22.8% of case. Cardiogenic shock was seen in 12.2%. Children with shock admitted to our PICU were managed as per PALS guidelines. Airway management, oxygen administration was done for all children. Some children received only crystalloid, others required crystalloids and Inotropes. Some others also required Catecholamine support. Children with specific etiology as scorpion sting, DKA, sepsis Bee sting anaphylaxis, Dengue shock syndrome were managed specifically according to their etiology. Percentage distribution of management modalities among compensated Decompensated groups. Children who were managed only with crystalloids were 11 (19.3%) and (49.2%) 28 of children with shock required inotropic support in addition to crystalloids. 8 children (14%) required initiation of Adrenaline infusion after fluid resuscitation directly as they were in post resuscitative stabilization phase. 8 children (14%) went on to become catecholamine resistant requiring Epinephrine infusion. 19 children with shock were intubated which worked up to 33.3% of total children with shock. Among the 19 intubated children 18 (94.7%) were decompensated and 1(5.3%) child had compensated shock. Only one among the 19 children survived. Renal function tests were done only in 50 children and liver function tests were done only in 45 children during the study due to difficulty in obtaining blood sample due to severity of shock while presentation and shorter duration of stay in the hospital. Of the 50 children whose renal function test was available, 23 have elevated values – 17 from the decompensated category and 6 from the compensated. Of the 45 children whose liver function test was available, 16 have elevated values -11 from the decompensated category and 5 from the compensated category. Death and improvement following management of shock were the two variables measured in study. Among the septic shock category 8 improved and 8 died. Among cardiogenic shock 6 improved and 1 died. Both there were not statistically significant. Where as in hypovolemic shock 8 improved and 1 died and the difference was statistically significant in children who had both septic + cardiogenic shock only 1 survived and 9 died which was also significant statistically.

DISCUSSION

Most Western literature as well as Frankel LR, Mathers LH; Shock – In Nelson Textbook of pediatrics 17th edition publish that approximately 2% of all hospitalized children are diagnosed with shock.² In this study 57 cases of shock were registered out of the 2035 pediatric cases admitted during the study period, which works up to 2.8%. 47.3% (n=27) of the total shock cases were infants while in the study by Daljit Singh et al infants made up to 39.8% of total cases (n=39). 57.9% (n=33) cases of shock were decompensated while presentation to this hospital in while only 40% (n=39) cases were decompensated in the study conducted by Daljit Singh et al.⁵ In our study Children

presented to the hospital in a more severe degree of shock. 63.6% (n=21) of the 33 compensated shock cases died and 16.7% (n=4) of the 24 compensated shock cases died on out study while the percentage of death among the two groups as 67% and 2% respectively in the Punjab Study by Daljith Singh et al. Outcome of Pediatric Shock – 22 cases, were studied of which 50% (n=11) was due septic shock as compared to 45.6% (n=26) in our study. 7 were due to hypovolemia and 4 were due to carcinogenic shock. End points of management were achieved with isotonic fluids alone in 9 (15.8%) of cases with compensated shock and 2 (3.5%) of cases with decompensated shock. These two children who had received more than 80ml/kg of isotonic fluids were hospitalized with severe diarrheal dehydration. Liver function tests were elevated in 28.1% (16 out of 45) of children with shock and no significant difference was found between the compensated and decompensated groups. Renal function tests were elevated in 40.4% (23 out of 50) of children with shock and a significant difference was noticed with more children from the decompensated category having increased values. Death occurred in 43.9% (n=25) of 57 cases of shock when compared to 26.4% (n=31) of 98 cases in the Punjab study by Daljit Singh et al statistically significant improvement among etiological classification was seen with children in the Hypovolemic group and significant no of deaths occurred in the group which had features of both septic and cardiogenic shock.⁵

CONCLUSION

Shock constitutes a significant percentage of diagnosis in critically ill children. Infants are affected by shock and have severe degree of shock at diagnosis than more than any other age group in the study. No difference in prevalence or severity of shock at presentation between the two sexes was noticed. Septic shock accounts for majority of decompensated shock and poor outcome to management. Infancy decompensated shock, septic shock and those requiring ventilator support were the factors influencing the outcome of management.

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