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Original Research Paper

CLINICAL OUTCOME OF VARIOUS TYPES OF SHOCK IN CHILDREN IN A TERTIARY CARE HOSPITAL

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ABSTRACT:

BACKGROUND: Shock is a common pediatric emergency, the time period between the onset of shock and that for initiation of treatment is an important factor that determines the outcome. Constant observation with timely monitoring of necessary clinical and laboratory parameters, determine and guide the therapeutic intervention which defines the outcome. **OBJECTIVE:** This study is done to find out the various causes of shock and assess the outcome concerning the clinical and monitoring parameters. **RESULTS**: Children presenting with shock constitute 1.3%. Septic shock constitutes about 2/3rds of the cases with 65.5%. Septic shock is a combination of hypovolemic & distributive types of physiology. Followed by cardiogenic shock with 17.3%, hypovolemic shock with 16.3%. **CONCLUSION**: Shock is a major paediatric emergency due to varied etiologies and its early diagnosis along with prompt goal directed treatment in the phase of compensated shock will avoid decompensation and thus improve the outcome.

KEYWORDS: Cardiogenic shock, Distributive shock, Hypovolemic Shock, Septic shock, Outcome

INTRODUCTION:

Shock is an acute syndrome that is characterized by perfusion and oxygenation mismatch at the cellular level. Body is unable to meet the metabolic and biochemical demands of organs. It is a common paediatric emergency. It is classified with respect to the causative factors into Early, prompt and aggressive management of children is beneficial, as early restoration of the body's haemostasis to normal levels, underlies better immediate outcome. The time period between the onset of shock and that for initiation of treatment is an important factor that determines the outcome. Constant observation with timely monitoring of necessary clinical and laboratory parameters, determine and guide the therapeutic intervention which defines the outcome.

PATIENTS AND METHODS:

This was a prospective observational study of 104 consecutive children admitted with shock in the paediatric ward of Government General Hospital, Tertiary care hospital, Kakinada, for 18 months from 1st January 2020 to 30th June2021.

INCLUSION CRITERIA:

1. Children were aged 1month – 12 years.
2. Inpatient children diagnosed with shock.
3. Children with written and informed consent from parents.

EXCLUSION CRITERIA:

1. Children were less than 1month and more than 12 years of age.
2. Death within 24 hours of admission.
3. Children whose parents refused written and informed consent.

Statistical Analysis :

Data were analysed by using excel 2010 and represented as tables and diagrams. Significance was tested by applying appropriate tests wherever necessary. Ethics committee approval was taken.

Profile of clinical type of shock:

Septic shock constitutes about 2/3rds of the cases with 65.5%. Septic shock is a combination of hypovolemic & distributive types of physiology. Followed by cardiogenic shock with 17.3%. followed by hypovolemic shock with 16.3%.

Clinical type	Number	Percentage
hypovolemic	17	16.3%
cardiogenic	18	17.3%
Distributive - anaphylactic	1	0.9%
Septic shock	68	65.5%

OBSERVATION AND RESULTS:

Mortality versus the type of shock:

type	survived		Not- survived	
Hypovolemic(17)	16	94.1%	1	5.9%
Cardiogenic (18)	3	16.6%	15	83.4%
Septic (68)	34	50%	34	50%
Anaphylactic (1)	1	100%	-	

The highest proportion of survivors is for a hypovolemic shock with 94.11% reflecting the importance of initial fluid bolus & subsequent reassessment of shock. Only 1 case of drug rash with anaphylactic shock was reported & the patient survived. Septic shock has an equal number of survivors & non-survivors, with a mortality of 50%. The total number of cases with cardiogenic shock was 18 out of which 3 survived with a survival rate of 16.6%. Hence hypovolemic shock has a better prognosis amongst all the clinical types of shock. The mortality rate is highest for cardiogenic shock and least for hypovolemic shock. With a chi-square value 21.1659 and p-value 0.000025 . <0.05 significant association was reported.

Distribution of severity of shock:

Type	number	Percentage
Compensated	44	42.3%
decompensated	60	57.7%

Of the total admissions, cases of decompensated shock constitute 57.7% and those of compensated shock constitute 42.3% respectively.

Distribution of severity according to clinical type:

	Type	compensated		decompensated		
	Hypovolemic (17)	17	100%	-	-	
	Cardiogenic (18)	4	22.2%	14	77.8%	
	Septic (68)	24	35.2%	44	64.8%	
	Anaphylactic (1)	1	100%	-	-	

Almost all cases of hypovolemic shock presented in compensated stage with normal blood pressure at the time of diagnosis. A case of anaphylactic shock presented in the compensated stage. Of the total 68 cases of septic shock, 24

presented in compensated stage, which constitute 35.2% of the total 68cases. 44 cases of septic shock presented in decompensated stage, constituting 64.8% of the total.

Distribution of outcome according to the severity:

Type	Not- survived		survived	
Compensated (44)	2	4.5%	42	95.5%
Decompensated (60)	48	80%	12	20%

The survival rate among cases presenting in a state of compensated shock is 95.5% and the survival rate in cases presenting with decompensated shock is 20%. With chi-square value 57.8954, p-value =0.00001, <0.05 , significant association was reported.

DISCUSSION:

Shock is one of the major causes of morbidity and mortality in critically ill children in paediatric intensive care units. In our study 1.3% of total admissions presented with shock. The frequency of shock in PICU is 4.6%, according to previous studies i.e Daliji et al[1] and 4.3%[2]. The mortality rates vary depending upon the etiology and the clinical scenario in developing countries.

CATEGORIZATION OF SHOCK:

In our study, the clinical type of shock was categorized as hypovolemic, cardiogenic, distributive, and septic shock at the time of diagnosis. Mixed type of shock constituted 54% (56/104). Out of which, 54 cases were hypovolemic and distributive combined & 2 cases of hypovolemic and cardiogenic combined. Septic shock constituted about 2/3rds of the cases - 65.5% (68/104). This is due to septic shock being a combination of a hypovolemic and distributive type of physiology. However, this is contrary to the previous studies which showed that hypovolemic shock is the most common type of shock among children. Chang P et al [3] reported that hypovolemic shock constituted 32% (7/22) of the cases.

SEVERITY OF SHOCK:

Of the total 104 admissions, decompensated shock constituted a high proportion of 57.7% (60/104). This reflects the importance of early recognition of shock and urgent referral to a higher center. Jagrwal et al [5] in their study reported that the proportion of cases presenting in a compensated stage of shock constituted about 64%.

SEVERITY OF SHOCK ACCORDING TO THE TYPE:

In the distribution of severity according to the clinical type, our study revealed that 100% cases of hypovolemic shock presented in compensated stage with normal blood pressure. 77.8% (14/18) of cardiogenic shock cases presented in decompensated stage, followed by 64.8% (44/68) decompensated stage for septic shock. 1 case of anaphylactic shock presented in compensated stage and survived. Jagrwal et al [5], in their study, reported 78.2% of patients were in a compensated stage of hypovolemic shock, about 64.2% in decompensated phase of septic shock, 36.3% cases were in a decompensated phase of cardiogenic shock. In the above study [5], 2 cases of distributive shock were reported, both of which presented in a compensated stag

VASOPRESSORS AND INOTROPES:

Fluid resuscitation is followed by the usage of vasopressors or inotropes in septic shock as a vasopressor, if first used may worsen organ perfusion if the patient has inadequate intravascular volume. Vasoactive agents are started preferably within 60minutes of resuscitation.[6].The Inotrope of choice used in the current study was adrenaline for cold shock and nor adrenaline for warm shock. Dobutamine was added if the cardiogenic shock was suspected and Milrinone was added as per need. The latest SSC guidelines in children recommended epinephrine or norepinephrine as first-line inotropes rather than dopamine in septic shock. In Weiss SL, Peters[4] et al early administration of epinephrine increased the survival rate in comparison to dopamine [6]. Dopamine and Dobutamine are drugs that increase myocardial contractility, with dopamine being preferred in hypotension.[6].Higher dosages of Dobutamine can cause tachycardia and exacerbate cardiac ischemia. Dopamine also can cause tachycardia and arrhythmias.[6]. Vasopressin is a rescue therapy in patients with a vasodilatory type of shock not responding to high-dose catechol amines[6]. Inotropes are titrated monitoring the clinical signs. Advanced hemodynamic

monitoring is done wherever feasible. The target means arterial pressure is between 5^{th} - 50^{th} percentiles for age.[4]. Advanced hemodynamic monitoring is required as blood pressure does not directly give the measure of cardiac output. Cardiac index between3.3 - 6 L/min/m2 had better prognosis. [7]. In our study blood pressure recording was done using a sphygmomanometer. It guided the administration of fluid bolus and choice of nor-adrenaline and vasopressin in the management of shock. It was also liable for observer error since it was measured non- invasively. This is a limitation of the study.

CONCLUSIONS:

- A total of 104 cases who met the clinical definition of shock among 8000 patients admitted to the paediatric intensive care unit during the study period were studied. They constituted 1.3% of total admissions.
- The overall survival rate among patients is 51.9%.
- Septic shock constitutes about 2/3rds of the cases with 65.5%.
- The survival rate for hypovolemic shock is 94.11% reflecting the importance of initial fluid bolus. The survival rate for cardiogenic shock was 16.6% and for septic shock was 50%.
- With chi-square value 21.1659 and p-value 0.000025 <0.05 significant association was reported between the type of shock and its outcome. Hence timely intervention in cases of septic shock improved its outcome.
- Decompensated shock cases constituted 57.7% of the total admissions with a survival rate of 20%. The survival rate among cases of compensated shock is 95.5%.p value =0.00001 , <0.05 , significant association was reported between the severity of shock and its outcome.
- This indicates the importance of early referral of cases to a higher center
- Fluid responsive shock cases were 18.26%. Fluid non-responsive and inotrope responsive shock cases were (73.07%). 4.8% cases needed only inotrope (4.8%).

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