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Assessment of patients presenting in shock at emergency department in a tertiary care teaching hospital

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ABSTRACT

Introductions: Clinical profile of patient presenting with shock is important in early recognition and intervention to improve outcome especially in resource limited setup. This study is designed with an objective to evaluate history, clinical findings, laboratory findings and provisional diagnosis of patient presenting with shock.

Methods: This was a cross sectional observational study conducted at Patan Hospital emergency department from September to November 2014. All consecutive patients presenting with shock were included. Patient's demography (age, sex), provisional diagnosis, major findings (blood pressure, lactate, total count, fluid given, stay in emergency), requirement of inotropes and improvement were analyzed.

Results: In three months period, 38 patients presented with shock to the emergency. Out of them 21 (55.3 %) were female and 17 (44.7%) were male. Commonest presenting complain was fever and shortness of breath 12 (31.6%), diarrhea 6 (13.4%) and shortness of breath 5 (13.2%). Septic shock was seen in 17 (44.7%), hypovolemic in 10 (26.3%), cardiogenic 7 (18.4%) and unclassified 4 (10.5%). Mean duration of stay in emergency was 100.6 minutes. Mean fluid given in emergency was 2328.9 milliliters.

Conclusions: Sepsis was an important cause of shock in the emergency department. Pneumonia was common cause of sepsis and chronic obstructive pulmonary disease was common underlying condition.

Keywords: emergency, lactate, shock

INTRODUCTIONS

Shock is a state of acute circulatory failure leading to decreased organ perfusion, with inadequate delivery of oxygenated blood to tissue and resulting to end organ dysfunction.¹ Diagnosis of shock is based on clinical, hemodynamic and biochemical signs.² An important part of treatment is early recognition and intervention based on clinical evidence, designed to improve outcome.³ So, it is necessary to know the common type of shock presenting to emergency. This study was designed to evaluate history, clinical findings, laboratory findings and provisional diagnosis of patient presenting with shock.

METHODS

This cross sectional observational study was conducted at emergency department of Patan Hospital, Patan Academy of Health Sciences (PAHS), Lalitpur, Nepal from September to November 2014. All consecutive patients presenting with shock were included in this study. Shock was defined by presence of any of the following features at presentation or at any point of time during stay in emergency: systolic blood pressure (SBP) less than 90 mmHg or mean arterial pressure (MAP) less than 70 mmHg, tachycardia more than 90 beats per minute, cold clammy skin, urine output less than 0.5ml/hour, altered mental status, serum lactate level more than 1.5mmol/l.² Shock with signs of infection like fever and identified source of infection was classified under septic shock, shock with decreased cardiac pumping as evident with bedside echocardiography along with clinical finding was classified under cardiogenic shock, with history of volume loss as hypovolemic and mixed type as unclassified shock.^{4,5}

Pediatric patients aged less than 14 years were excluded from the study. Patient's demographic profile, comorbid conditions and drug history was recorded. Patients were monitored throughout the emergency stay.

Patient's blood pressure, pulse were monitored every 15 minutes. Serum lactate, total count were recorded at initial evaluation. Provisional diagnosis written at emergency was also recorded. Data was recorded in excel sheet and analyzed with SPSS 20.0. Ethical approval was taken from institutional review committee of PAHS.

RESULTS

During the study period 38 patients, female 21 (55.3%) and male 17 (44.7%) presented with shock at the emergency department. Age ranged from 20 to 106 years, mean 56.5 years. Presenting complain of fever and shortness of breath was seen in 12 (31.6%) and diarrhea in 6 (13.4%). Co-morbid condition of chronic obstructive pulmonary disease (COPD) was present in 9 (23.7%) and 16 (42.1%) did not have comorbidity. Smoker were 13 (34.2%) and 31 (81.6%) were taking long term medication. Mean pulse, mean arterial pressure, systolic and diastolic blood pressure improved after resuscitation in emergency, Figure 1, Table 1-3.

Septic shock was seen in 17 (44.7%), hypovolemic in 10 (26.3%), cardiogenic in 7 (18.4%) and unclassified in 4 (10.5%), Table 2, Figure 1. Pneumonia was present in 12 patient out of 17 patients with septic shock. Mean duration of stay in emergency was 100.6 minutes, range 30 to 225 minutes. Mean fluid given in emergency was 2328.9 milliliters, range 1000 to 5000 milliliters. Mean lactate was 4.5 mg/dl, range 2 to 12.5 mg/dl, Table 2,

All patients got antibiotics except two with hypovolemic shock. Inotrope was needed in four patients with hypovolemic shock and three with septic shock. Total 26 (68.4%) Patients were admitted to medical ward, 9 (23.7%) in ICU. Out of nine patient who went to ICU, four had hypovolemic shock. Five patients did not improve despite inotrope therapy, three were hypovolemic shock and two septic shock.

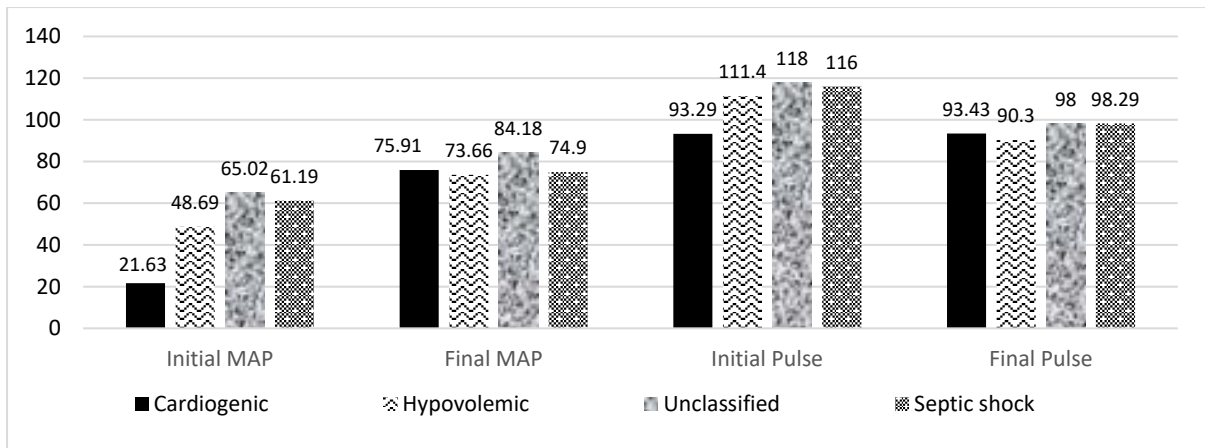


Figure 1. Changes in various types of shock during course of treatment in emergency (n=38)

Table 1. Mean Pulse and blood pressure of patient (n=38) presenting in shock at emergency

| | Initial Vitals | | | | Final Vitals | | | |
|----------------|----------------|------|------|------|--------------|------|------|------|
| | Pulse | SBP | DBP | MAP | Pulse | SBP | DBP | MAP |
| Mean | 110.8 | 65.6 | 43.6 | 51.0 | 95.2 | 96.6 | 65.2 | 75.7 |
| Minimum | NP | NP | NP | NP | 75 | 70 | 50 | 57 |
| Maximum | 165 | 90 | 60 | 70 | 130 | 130 | 90 | 103 |

Note: SBP=systolic blood pressure, DBP= diastolic blood pressure, MAP=mean arterial blood pressure, NP=not palpable

Table 2. Findings in different type of shock among patients presenting at emergency (n=38)

| | Mean Lactate Mg/dl | Mean Total count | Mean Fluid given | Mean Stay minutes |
|---------------------|-----------------------|------------------|------------------|-------------------|
| Cardiogenic | 4.443 | 8.229 | 1500.00 | 98.57 |
| Hypovolemic | 4.400 | 14.933 | 3450.00 | 120.00 |
| Unclassified | 6.775 | 15.275 | 1625.00 | 78.75 |
| Septic shock | 4.135 | 7.159 | 2176.47 | 95.29 |

Table 3. Improvement of patient of patient presenting in shock at emergency (n=38)

| Improvement | Mean MAP - mmHg* | | Mean Lactate Mg/dl | Mean Fluid milliliters | Mean Stay minutes |
|-------------|------------------|-------|-----------------------|---------------------------|----------------------|
| | Initial | Final | | | |
| Yes | Not recordable | 103 | 4.4 | 4450 | 94 |
| No | Nor recordable | 70 | 6.7 | 3450 | 100.6 |

*P = 0.04

DISCUSSIONS

The most common presenting symptoms of patients with shock at any point in emergency had fever (31.6%) and shortness of breath (31.6%). Pneumonia and underlying COPD (23.7%) was common cause of shock. Emergency department audit⁶ from Nepal in 2011 reported COPD as third most common presentation at emergency and mortality review⁷ in 2011 showed shortness of breath (28.3%) as common presenting complaint.

Septic shock was most common in our study. Fever and shortness of breath was common presentation. This is consistent with earlier finding in 2011. Thus we need to develop strong measures to be taken in terms of education and protocol development to manage septic shock presenting in emergency department. Many emergency department patients with severe sepsis do not meet diagnostic criteria during arrival.⁸ So, in this study also the incidence of septic shock might have been more than what recorded. It is possible that unclassified shock was in fact the septic shock.

Maximum volume resuscitation (mean = 3450 milliliters) was done in hypovolemic shock and lowest volume resuscitation (mean = 1500 milliliters) was done in cardiogenic shock. Inotrope was needed in four patients with hypovolemic shock and three with septic shock. There was improvement in pulse, blood pressure and mean arterial pressure after resuscitation, Table 1, 3. Three out of four patients with hypovolemic shock did not receive inotrope therapy. One was cholera patient with massive volume loss. Similarly, two patients with septic shock did not improve despite inotrope therapy. The possible cause might be inadequate fluid resuscitation (mean 2328.9 milliliters). It is well established fact that treatment of shock includes correction of cause of shock and hemodynamic stabilization, primarily through fluid infusion and administration of vasoactive agents.² Inotropes should always be started when patient is well volume resuscitated.⁹

It is important to identify and appropriately start inotropes to decrease morbidity in resource limited setup like ours.

Mean lactate was highest in unclassified shock (6.7 mg/dl) and lowest in septic shock (4.1 mg/dl). Patients with higher lactate level did not improve even with inotrope therapy. A study done by Song Young Houg states that one of the potential risk factors for progression to tissue hypo perfusion is intermediate serum lactate (2-4 mmol/l) and aggressive fluid resuscitation is needed in them.¹⁰ So, this can be an important tool for management of shock specially when shock is unclassified.

Mean duration of stay was 100.6 minutes, hypovolemic shock patients stayed longer (mean = 120 minutes) while unclassified stayed shortest (mean = 78.75 minutes). Patients who stayed longer were unresponsive to the therapy given in the emergency. Prolong stay of patients with shock in ER have high morbidity and mortality.¹¹

CONCLUSIONS

This study has identified that sepsis was common cause of shock presenting to the emergency and preparation needs to be made accordingly to manage these patients in resources limited setup like ours. Fluid management needs to be reinforced to decrease morbidity. Our findings are limited to a particular setup of tertiary care teaching hospital and bigger study with varied conditions, possibly a multi-center study is needed to find the baseline parameters that can be generalized to reduce morbidity and mortality in patients presenting in shock in the emergency department.

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