

Chapter 6

APPROACH TO PATIENT IN SHOCK

Learning Objectives:

- Be able to categorize types of shock
- Identify patient is shock
- Demonstrate shock treatment
- End points of resuscitation

INTRODUCTION

Shock is circulatory insufficiency that creates an imbalance between tissue oxygen supply and oxygen demand leading to impaired tissue perfusion. Due to which anaerobic metabolism occurs at the tissue leading to formation of lactic acid, level of which correlates with prognosis of critically ill patients. Shock is classified upon different hemodynamic profile. Different categories of shock are hypovolemic shock, distributive shock, cardiogenic shock, and extra cardiac obstructive shock. Whether shock results from hemorrhage, sepsis, or cardiac failure, mortality rates exceed 20 %.

EMERGENCY DIAGNOSIS OF SHOCK PATIENT

Clinical features: Know the cause of shock, ask for the history of cardiovascular disease, episode of chest pain, symptoms of heart failure, fever, bleeding abdominal pain, missed period in females, exposure to allergen. Assess the general appearance of the patients with features of tissue hypo perfusion to vital organs. Features like altered mental status, chest pain, shortness of breath, decreased urine output, cold and clammy skin, weak and thread pulse and hypotension. Shock is usually associated with systemic arterial hypotension with SBP < 90 mm Hg. Shock index=Heart rate/SBP (normal=0.5-0.7) is elevated in presence of volume loss and left ventricular dysfunction.

Empiric Criteria for Diagnosis of Circulatory Shock

- Ill appearance or altered mental status
- Heart rate > 100/min.
- Respiratory rate > 22/min or PaCO₂ < 32 mm Hg.
- Arterial base deficit of <-5 mEq/L or lactate > 4 mMol/L.
- Urine output < 0.5 ml/kg/hr.
- Arterial hypotension for > 20 minutes duration.

Pre-shock (warm shock or compensated shock):

Rapid compensation for diminished tissue perfusion by homeostatic mechanisms.

Shock: Compensatory mechanisms become overwhelmed and signs and symptoms of organ dysfunction appear- tachycardia, dyspnea, restlessness, diaphoresis, metabolic acidosis, oliguria, cool clammy skin.

End-organ dysfunction: Irreversible organ damage, no urine output (anuria and acute renal failure), acidemia, decreases the cardiac output, coma and patient death.

Laboratory evaluation: Panel of blood test CBC, grouping and cross matching, coagulation and biochemistry test, Urine analysis and pregnancy test.

Imaging like ECG, chest x-Ray, ultrasound & CT scan can help in the diagnosis of cause of shock.

Treatment:

- ✓ **Establish airway:** Assuring a patent airway. Control the airway by endotracheal intubation for airway protection and ventilation. Injection Ketamine will be choice for induction agent as it has minimal effect on hemodynamic effect.
- ✓ **Controlling the work of breathing:** Control of breathing is required when tachypnoea accompanies shock. Trial of non-invasive ventilation (BIPAP/CPAP) can avoid endotracheal

intubation. Endotracheal intubation and rest to respiratory muscles should be done to prevent severe hypoxia and respiratory arrest. Target oxygen saturation to > 93 % and PaCO₂ of 35-40 mm Hg.

- ✓ **Optimising circulation:** Establish intravenous access through large bore IV catheter, Fluid resuscitation with isotonic crystalloid given rapidly of 20-30 ml/kg. If no response bolus of fluid is repeated. O positive or negative blood transfusion for haemorrhagic shock till the availability of cross matched blood. Vasopressor agent are used if there is inadequate response with fluid resuscitation. Vasoactive agent of choice is Noradrenalin (2-12 mcg/min), Dopamine (0.5-25 mcg/kg/min), Adrenalin (2-10 mcg/min), Dobutamine (2-20 mcg/kg/min). Rapidly restore MAP to 65 mm Hg and SBP to 90 mm Hg. Stress dose steroid for suspected adrenalin insufficiency.
- ✓ **Assuring adequate oxygen delivery:** Transfuse packed red cells if haemoglobin < 10gm/dl and add on dobutamine infusion to improve tissue perfusion.
- ✓ **End point of resuscitation:** Optimize HR, BP, SpO₂. Target Urine output of > 0.5 ml/kg/hr, CVP of 8-12 mm Hg, MAP of 65-90 mm Hg, Scvo₂ of > 70 mm Hg.

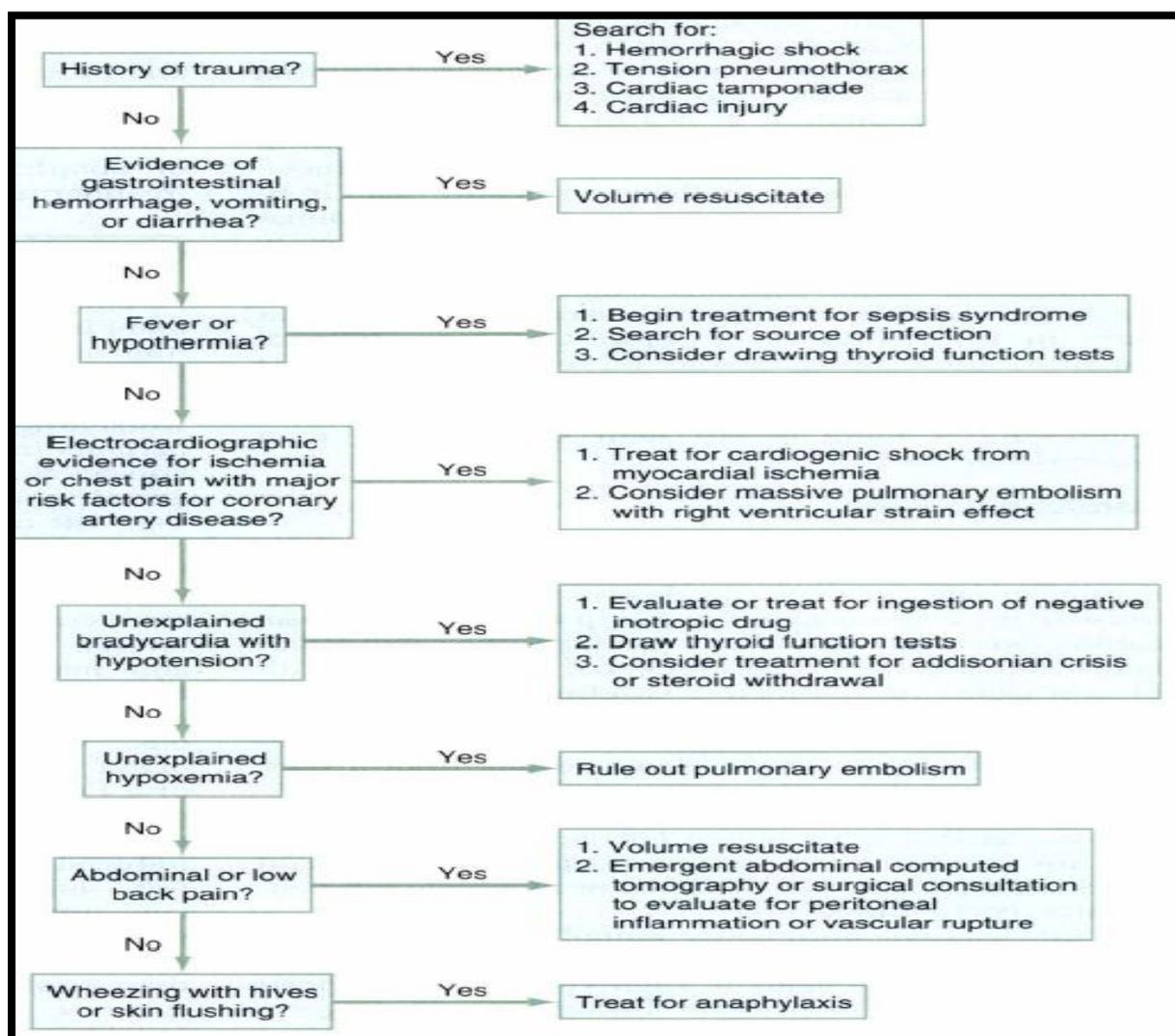


Figure 6.1 General Approach to Patient in Shock.

Table 6.1 Treatment of specific shock

Haemorrhagic shock	<ul style="list-style-type: none"> • Ensure adequate ventilation/oxygenation • Provide immediate control of haemorrhage when possible (e.g., traction for long bone fractures, direct pressure) • Initiate judicious infusion of RL (10-20 mL/kg) or 5% hydroxyethyl starch (5 mL/kg) • With evidence of poor organ perfusion and 30-minute anticipated delay to haemorrhage control, begin packed RBC infusion (5-10 mL/kg) • With suspected central nervous system trauma or GCS score <9, immediate PRBC transfusion may be preferable as initial resuscitation fluid • Treat severe acidosis (pH < 6.8) with THAM • Treat coincident dysrhythmias (e.g., atrial fibrillation with synchronized cardioversion)
Cardiogenic Shock	<ul style="list-style-type: none"> • Ameliorate increased work of breathing; provide oxygen and positive end-expiratory pressure (PEEP) for pulmonary edema • Begin inotropic support; dobutamine (5 ug/kg/min) is common empiric agent • Seek to reverse the insult (e.g., initiate thrombolysis, arrange percutaneous transluminal angioplasty, or administer charcoal for drug overdose) • Consider intra-aortic balloon pump counter pulsation for refractory shock
Septic Shock	<ul style="list-style-type: none"> • Ensure adequate oxygenation; remove work of breathing • Administer 20 mL/kg of crystalloid or 5 mL/kg of colloid, and titrate infusion to adequate urine output • Begin antimicrobial therapy; attempt surgical drainage or debridement • If volume restoration fails to improve organ perfusion, begin vasopressor support; initial choice includes dopamine, infused at 5-15 ug/kg/min or norepinephrine infused at 0.1-1 ug/kg/min
Anaphylactic Shock	<ul style="list-style-type: none"> • Control airway and ventilation • Administer 10-20 mL/kg of crystalloid • Test an IV bolus of epinephrine (50-100 ug) then mix 5 mg epinephrine in Normal Saline. Begin infusion at 10 cc/hr and titrate to arterial blood response • Administer 5-10 mg/kg of hydrocortisone or 1-2 mg/kg of methylprednisolone

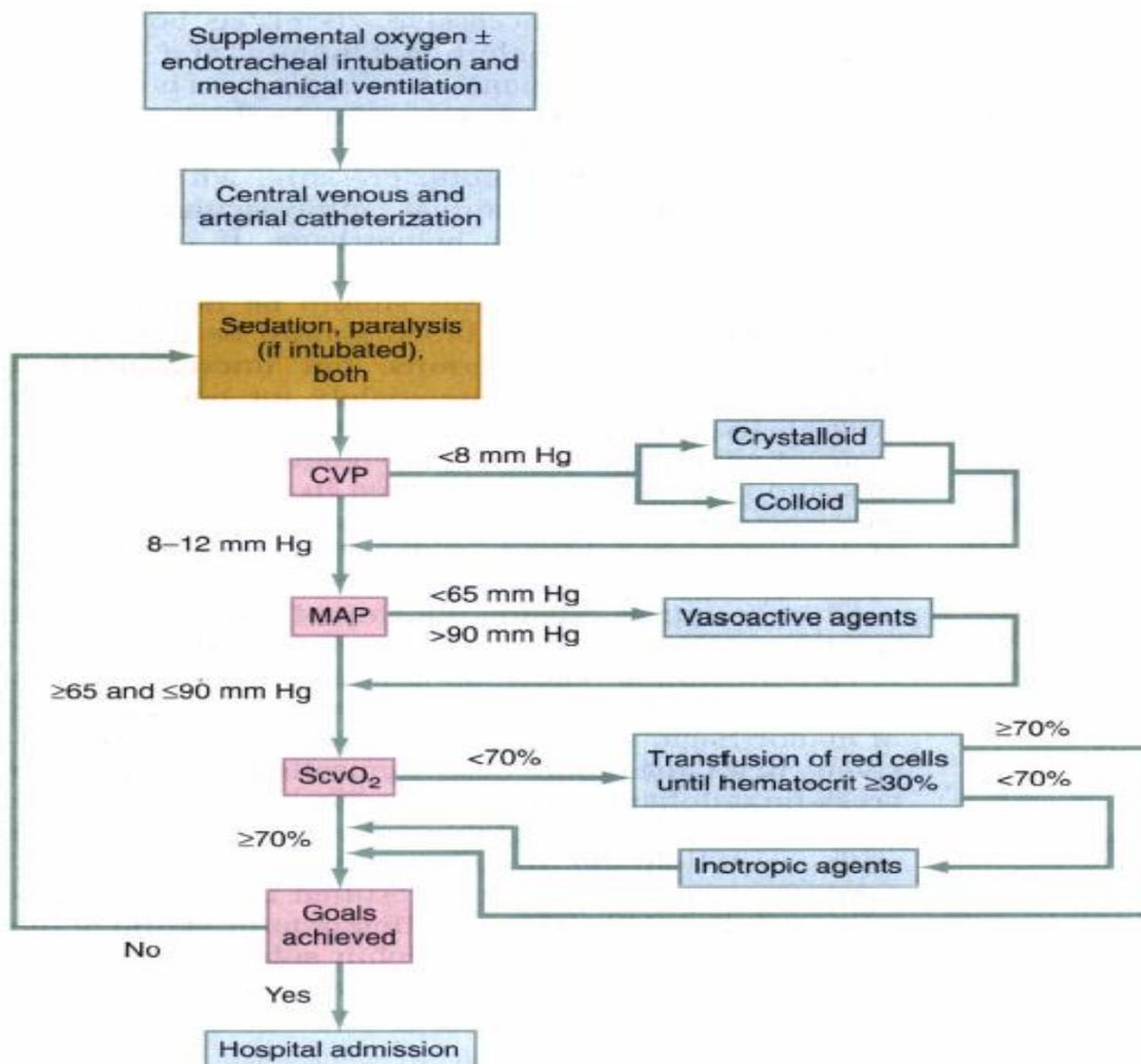


Figure 6.2 Septic Shock-Goal Directed Therapy.

Point of Care Ultrasound

When the critically ill patient comes to ER, it becomes very important to make a bedside assessment of shock by the ER doctor. Waiting for senior to arrive and initiate the treatment of shock may be too late in many occasions. For this reason, all health care provider taking care of these critically ill patient should be trained in Point of care ultrasound (POCUS).

Shock Ultrasound Protocol:

Rapid Ultrasound in Shock (RUSH Exam) RUSH exam or similar exams has been endorsed by ACEP and Critical Care societies in the diagnosis and resuscitation of critically ill patients. RUSH exam involves looking for “The Pump”, “The Tank”, “The Pipes”.

Table 6.2 RUSH Protocol Summary

RUSH exam	Hypovolemic shock	Cardiogenic shock	Obstructive shock	Distributive shock
Pump	Hypercontractile heart Small heart size	Hypo contractile heart Dilated heart size	Pericardial effusion, RV strain Hypercontractile heart	Hypercontractile heart (early sepsis) hypo contractile heart (late sepsis)
Tank	Flat IVC Flat IJV Peritoneal fluid Pleural fluid	Distended IVC Distended IJV Lung rockets Pleural effusion, ascites	Distended IVC Distended IJV Absent lung sliding (PTX)	Normal/small IVC Normal/small IJV Pleural fluid (empyema) Peritoneal fluid (peritonitis)
Pipes	AAA Aortic dissection	Normal	DVT	Normal

References

1. Tintinalle's Emergency Medicine, A Comprehensive Study Guide.
2. Diagnosis and management of Shock in Emergency department, Emergency Medicine Practise, An Evidenced Based Approach to Emergency Medicine, EBMEDICINE.NET.
3. Obstructive Shock, The Open Paediatric Medicine Journal, 2013, Open Access.
4. P. Perera, T. Mailhot, D. Riley, and D. Mandavia, "The RUSH exam: rapid Ultrasound in SHock in the evaluation of the critically ill patient," Ultrasound Clinics, vol. 7, no. 2, pp. 255–278, 2012.