Principles of care for the patient in shock (pediatrics)

Shock is defined as a syndrome with inadequate tissue oxygenation. Therapeutic efforts therefore try to establish a balance between the supply and the actual need for oxygen. Oxygen consumption is reduced by intubation, mechanical ventilation, sedation, myorelaxation, control of hyperpyrexia. On the other hand the oxygen supply is increased by oxygen therapy with either non-invasive or invasive airway management.

- CVP 5 to 10 cm H_2O
- PAWP 7 to 15 cm H_2O
- age-appropriate values MAP and PerP
- CI 3 to 6 l/min/m^2
- $SvcO_2$ > 70 %
- O_2ER < 30 %
- minimization of myocardial damage – physiological standards of AST, troponin, CK-MB, ECG, echokardiography
- adequate airiness of the lungs
- lactate < 2 mmol/l

Organ dysfunction criteria:

Cardiovascular system	Respiratory system	CNS
decreased BP < 5th percentile for age or sBP < 2 SD despite bolus volume expansion > 40 mL/kg/1 hr. or he need for inotropic support to maintain BP within the physiological range or two of the following criteria: otherwise unexplained MAC with BE -5 mmol/l; lactate increase > 4 mmol/l; capillary return > 5 seconds; peripheral and central temperature difference of > 3 degrees C.	PFi < 300 in the absence of cyanotic heart disease or pre-existing lung disease or pCO_2 > 65 torr or > 20 torr compared to the patient's normal value or need FiO_2 > 0.50 to maintain SaO_2 > 92% or the need for non-elective non-invasive or invasive ventilation PFi < 300	the GCS < 11 p. or acute decrease of theGCS > 3 p.

Organ dysfunction criteria II.:

Hematopoiesis	Kidneys	Liver
thrombocytes < 80,000 or a decrease of > 50% from the highest value recorded in the last 3 days (for patients with chronic hematological or oncological diseases) or INR > 2	an increase in S-creatinine > 2x over the upper limit or a double increase in the value compared to the normal value of the given patient or oligoanuria < 0,5 ml/kg/hod.	total bilirubin > 4 mg/dl (does not apply to newborns) ALT increase > 2x over the upper limit

It is necessary to think about the possible **complications of shock conditions:**

- ARDS
- DIC
- acute renal failure
- acute liver failure
- myocardial ischemia
- edema of CNS
- rhabdomyolysis
- pancreatitis
- sepsis
- metabolic disorders

The aforementioned complications are a sign of the development of MODS (multiple organ dysfunction syndrom) and they significantly increase morbidity and mortality of the patients.

Attributes of the circulatory system and their evaluation:

right ventricular preload	▪ CVP ▪ size of liver ▪ echocardiography -> right ventricular end-diastolic volume
left ventricular preload	▪ PAWP ▪ pulmonary edema (chest X-ray , EVLWI = extravascular lung water index) ▪ echocardiography -> left ventricular end-diastolic volume
global preload parameters	▪ GEDVI ▪ ITBVI
afterload	▪ SVRI (Systemic Vascular Resistance Index) ▪ PVRI (Pulmonary vascular resistance Index) ▪ MPAP (Mean pulmonary arterial pressure) ▪ MAP
contractility	▪ maximum ventricular elastance index according to Sugi and Sagawi ▪ ejection fraction (echocardiography) ▪ GEF ▪ CFI ▪ pulse work of the left (LVSW) and right (RVSW) ventricle ▪ the steepness of the rise of the pulse curve
tissue perfusion	▪ diuresis ▪ perfusion pressure ▪ lactate ▪ gastric tonometry
cardiac output	▪ CO/CI (PiCCO x Fick's principle) ▪ echocardiography -> ejection fraction ▪ SvcO2

Links

Zdroj

- HAVRÁNEK, Jiří: *Šok*. (upraveno)

Related articles

- Shock (pediatrie)
- Shock