

Obstructive shock (pediatrics)

Pathogenesis and characteristics

Obstructive shock is characterized by obstruction of the outflow of blood from the heart (right ventricular, left ventricular, biventricular obstruction). It is caused by the inability to generate adequate CO/CI despite normal intravascular volume and myocardial function. Filling pressures are elevated, cardiac output is reduced. Obstructive shock in resuscitation care is most commonly encountered with pneumothorax, aggressive artificial pulmonary ventilation, a. pulmonalis embolization, asthmatic stasis, cardiac tamponade, and pulmonary or systemic hypertension. APV has the same effect on preload and subsequently contractility as hypovolaemia and leads to a leftward shift of the Frank-Starling curve. Obstructive shock is characterized by hypotension/hypertension, decreased CO/CI, rise in CVP and PAWP, increase in SVRI.

Etiology

- venous obstruction
- tension pneumothorax
- artificial pulmonary ventilation
- asthma bronchiale
- constrictive pericarditis
- cardiac tamponade
- coarctation of the aorta
- pulmonary embolism
- pulmonary hypertension
- aortic dissection

Cardiac tamponade

Cardiac tamponade is defined as *hemodynamically significant compression of the heart in the pericardial envelope*. The cause is transudate or exudate (*hydropericardium*), blood (*hemopericardium*), or gas in the pericardium (*pneumopericardium*).

The clinical presentation of tamponade is insidious, especially when it occurs against a background of an underlying cause such as malignancy, collagenosis, renal failure or pericarditis.

In the initial phase, the symptomatology is non-specific. When CO/CI decreases, the symptomatology is similar to congestive heart failure, but there is no evidence of congestion on lung X-ray. Physical findings suggestive of tamponade are pulsus paradoxus, narrowing of pulse pressure, a flutter murmur over the pericardium, or weakening of the oesophagus and distension of the jugular veins. The method of choice in diagnosis is echocardiography.

The symptomatology of cardiac tamponade is similar to congestive heart failure, however, there is no evidence of congestion on lung X-ray

. Template:Good Example If not addressed immediately (pericardiocentesis), electromechanical dissociation and death of the patient occurs. Pericardiocentesis is performed under echocardiographic control, blinded only as a last resort. The definitive solution, if needed, is surgical drainage of the pericardium.

Medical therapy cannot replace drainage, but may help us gain more time if pericardiocentesis or surgical drainage are not immediately available. We choose volum-expansion to maintain venoatrial gradients, and we administer inotropics, but these have little effect. Drugs such as diuretics or digoxin are contraindicated. If the patient is on UPV it is necessary to reduce PIP and PEEP.

Coarctation of the aorta

Newborns and infants with aortic coarctation or aortic arch interruption are dependent on a patent ductus arteriosus. Its closure after birth results in severe heart failure with impaired organ perfusion and the development of severe MAC. The symptomatology is often difficult to distinguish from shock states of other etiologies. The possibility of coarctation must be kept in mind for the development of shock state in infants < 4 months of age. Infusion of PGE1 (alprostadil) is lifesaving. The possibility of coarctation has to be kept in mind in the development of shock in children younger than 4 months. In these children it is always necessary to examine the pulsations of the aa. femorales!

Therapy

Treatment of the primary cause is often urgent, prioritized and specific to the provoking cause (drainage of pneumothorax, reduction of the aggressiveness of artificial lung ventilation, pericardial puncture). In some disabilities, we can advantageously influence the pressure in the a. pulmonalis by administering inhaled nitric oxide (iNO) or other dilators of the pulmonary circulation. Echocardiography is a useful diagnostic tool.

Links

Source

- HAVRÁNEK, Jiří: *Šok*. (upraveno)

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