

SEPTIC SHOCK CAUSED BY KLEBSIELLA - CASE PRESENTATION

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Abstract

Septic shock is sepsis-induced hypotension despite adequate fluid resuscitation. Sepsis is characterized by the Systemic Inflammatory Response Syndrome (SIRS) induced by infection.

The authors present a case of a male newborn, S.A., 2 weeks old, term born and of normal weight, admitted in January 2009 in the 1st Paediatric Clinic of the Emergency Clinical Hospital of Craiova, due to fever, coughing and vomiting. At admission the child presented pale teguments, with petechial elements on the face, thorax and hands, marked cyanosis around the mouth and nose and cyanosis of the nails, cold and mottled extremities, with capillary refill more than 4 sec, signs of serious dehydration with persistent skin fold and depressed prior fontanelle, ringed face, tachypnea, crepitations at thorax auscultation, HR 160-180 b/min, systolic BP 56 mmHg, delayed reactivity at painful stimulus. The laboratory findings indicated anaemia, hyperleucocytosis and positive culture for Klebsiella from the tracheo-bronchial fluids; the chest x-ray showed broncho-pneumonia. Because the respiratory distress syndrome was severe, the new-born was intubated with assisted breathing for 5 days. He needed parenteral nutrition for 5 days and then he was nourished with breast milk through nose-gastric tubule. The treatment has been performed with isotonic sodium chloride solution intravenously, broad spectrum antimicrobial agents, corticotherapy, with favourable evolution. The whole period of hospitalization lasted for 20 days, the patient being released healed.

Key words: shock, sepsis, newborn

Introduction

The shock is a syndrome of important acute circulatory deficiency, which leads to a poor tissue perfusion inadequate for cellular needs, with disruption of homeostasis mechanisms. Septic shock is a pathogenic form having in substrate intricate mechanisms (vasogenic, hypovolemic, cardiogenic) (3,8).

Septic shock is also defined as a severe sepsis with persistent hypotension, despite sufficient intake of intravenous fluids (12).

Case presentation

The authors present the case of patient S.A., male newborn two weeks age, admitted during January-February

2009 in the 1st Paediatric Clinic of the Emergency Clinical Hospital Craiova (F.O. 2684).

The patient is the second child of healthy, young parents, from a physiological pregnancy, being born at 38 weeks with weight born (WB) = 3300 g, Apgar score = 9, birth naturally, in the cranial presentation. He had physiological jaundice 3 days, good adjustment period, with discharge at the age of 4 days of maternity.

At the age of 10 days has begun to produce fever, cough, 1-2 times daily vomiting. No treatment was given. In 4th day from the beginning the overall condition was rapidly altered, has repeated bilious vomiting, hypotonia with hypo reactivity, cyanosis initially around mouth and nose, and then of the extremities, sucking refusal, symptoms which lead to the emergency internment.

On objective examination at admission has been observed: newborn with weight 3000 g, with fever 38°C, the overall condition very influenced, pale ringed face, with around mouth, nose and periorbital cyanosis, lips and nails cyanosis, pale-grained teguments, with rash on face, neck, thorax above, hands and upper abdomen, abdominal skin fold persistent, depressed prior fontanelle, tachypnea, respiratory rate (RR) = 70 breathing/min, depression of the intercostals spaces, lung staccoustic auscultation: pulmonary garrulity decreased and crepitations, heart rate (HR) = 169-196 b/min, prolonged of capillary refill over 3 sec, systolic blood pressure (BP) = 56 mmHg, belly scoop, charged tongue, food refusal, without signs of meningeal irritation (Fig. 1).

Laboratory investigations

First day of admission : core venous pressure (CVP) = 0/min, Pulse = 30 b/min; heart rate (HR) = 168 b/min; Sat O₂ = 79%, after one hour 83%; pH = 7,2 (N = 7,35 – 7,45); pCO₂ = 63,7 mmHg (N = 35 – 45); pO₂ = 38,3 mmHg (N = 75 – 100); EB = 0,9 mmol/l; standard HCO₃ = 25 mmol/l; Hb = 12,5 g/dl (hemoconcentration). The decompensated respiratory acidosis had maintained itself until the fourth day. Na = 141,4 mmol/l; K⁺ = 4,16 mmol/l; Ca⁺⁺ = 1,01 mmol/l (N = 1,13 – 1,32); Cl = 99 mmol/l (N = 98 – 106).

In the second day after admission after the intake of isotonic sodium chloride solution intravenously and glucose solution 10%, with electrolytes, hypovolemia has been corrected. Complete blood count: Hb = 9,2 g%, Ht = 27%, L = 3400/mm³, neutrophils (PMN) = 59%, LF = 30%, M = 11%, TQ = 70%, TH = 105 sec; blood sugar = 59% as the ENP with glucose.

On the third day of admission persists the decompensated respiratory acidosis: pH = 7,2, pCO₂ = 79 mmHg, pO₂ = 32,5 mmHg; standard HCO₃ = 27 mmol/l, BE = 3,6 mmol/l. The respiratory acidosis persisted until the 5th day after admission despite mechanical ventilation.

Electrolytes were in normal limits during the entire critical period, except of a mild hypocalcaemia (decreased ionized calcium). Complete blood count on 5th day of admission: Hb = 9 g%, platelets = 186000/mm³, leucocytes = 22000/mm³, PMNns = 8%, PMNs = 43%, lymphocytes = 40%, monocytes = 5%, Eo = 4%; blood smear: anisocytosis +, hypochromia +++; erythrocyte sedimentation rate (ESR) = 70/97 mm.

Through the tracheal probe adherent mucous-purulent secretions have been aspirated. Collected culture from tracheo-bronchial secretion in second day of admission, revealed Klebsiella - sensitive to Imipenem; resistant against Negram, Cefoperozone, Ampicillin.

Chest X-ray performed in 2nd day of admission showed "interstitial peribronchovascular opacities perihilar and infrahilar", and in 5th day "opacification at the left perihilar region level, caudal clearly delimited, having

alveolar focus character with underlying hypertransparency".

The patient has been intubed and mechanically ventilated until the 5th day of hospitalization, and the intravenously infusion has been maintained 7 days, in the last 3 days being fed in the same time with breast milk through nose-gastric tubule.

Treatment was performed with Meronem - 10 days, Zyvoxid 7 days, then Cefuroxime; gastric protection, corticosteroid administration. Evolution was slowly favourable: he presented a second degree coma during the first 4 days of hospitalization, hypotension (under 60/40 mmHg), HR ranged between 160-190 b/min dissociated from pulse - imperceptible at admission, then low perceptible 4 days. He was febrile for 2 days, then his temperature varied between 37°-38°C the next 5 days. From the 5th day of internment he began to react at external stimulus crying, then he began to breathe spontaneously. Tachypnea (60-70 breaths/min) has maintained until the 15th day of hospitalization. After 3 weeks he was discharged clinically healed, with normal investigations.



Figure 1 – Clinical aspect.

Discussion

Klebsiella is a Gram-negative bacillus, aerobic, Enterobacteriaceae group. It is an opportunistic microorganism in the digestive tract, behaving like a saprophyte germ or a conditioned pathogenic germ. It triggers pneumonia, often septic shock in newborns and infants, premature or with biological deficiencies (6).

In medical literature it is classified after streptococcus group B and Escherichia Colli, in neonatal

sepsis etiology, but in a study performed by C. Popescu (2007) it is indicated on the 2nd place after E. Colli (11).

Infecting in newborn can occur both by airway, from the upper respiratory tract, and hemathogen (only in newborn), with the possibility of contamination by intubation.

The diagnosis of pneumonia caused by Klebsiella is established by: clinical examination (the presence of signs of bronchopneumonia), by lung x-ray (usually with trend to

fluid collection, then the appearance of a aeric or hydroaeric cavity) and by positive culture (6). In presented case, because the original image was interstitially pneumonia and only in the 5th day was revealed the aspect of localized bacterial pneumonia, we can presume that the lungs were infected by blood. The origin of infection was digestive (newborn initially presented vomiting). Infection was initially manifested as septic shock, then it had appearance of Klebsiella pneumonia, located in the left perihilar region as a alveolar focus radiologically visible.

Septic shock can result in any bacterial infection in newborn (and especially in infections with gram-negatives and with staphylococcus). The body reacts to infection by SIRS (systemic inflammatory response syndrome) that includes fever, leucocytosis (or leucopenia - in newborn and imunodepressed), tachypnea, tachycardia (13). Bacteria are destroyed by the fagocitar system, but also by the administration of a bactericide antimicrobial therapy and are released endotoxins (in gram-negative infections, like Klebsiella sepsis). Endotoxins produce activation of proinflammatory cytokins (especially TNF α , IL-1, IL-6), which discharged in bloodstream, producing vasodilators and damaging to the capillary endothelial cells (2).

Vasodilators lead to hypotension and hypoperfusion of abdominal viscera. At the same time, the capillaries can be obstructed by proliferation of leucocytes that have invaded the area to attack bacteria and will cause further cell damages, creating area of generalized tissue ischemia,

with insufficient infusion of tissue that characterizes septic shock. It is also released from damaged vascular endothelial nitric oxide (NO) which was shown to reach high levels in sepsis, interposing the cardiovascular effects of septic shock, thus explaining generalized cyanosis in infected child. NO produces effect of vascular relaxation, resulting in so-called vasoplegia in septic shock (3).

In the analysed case, transient hypoglycaemia was present and a shift from leucopenia to leucocytosis was often recorded in neonatal sepsis. Initial hyperdynamic phase of septic shock took place at home. The patient was brought to hospital in hypodynamic stage.

Hypodynamic phase is the stage which generally characterizes shock, evidenced by hypotension, cold extremities, absent or low pulse and may occur at onset, when septic shock is accompanied by a marked decrease in effective circulating volume. It is the case of presented newborn, which issued bilious vomiting and was inapentent a few hours before admission.

Conclusions

Young age (newborn) with deficiency of humoral immunity (possessing only IgG and IgA transmitted from mother) is associated with poor response to infectious aggression, resulting high frequency of systemic infection and septic shock in this age.

Fortunately, described newborn presented favourable evolution and weight deficit recovered after healing.

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