Diagnostika sepse – klinické a laboratorní parametry

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Septic shock, most commonly a combination of distributive, hypovolemic, and cardiogenic shock, by definition, requires manifestations of decreased organ perfusion.

Roger's Textbook of Pediatric Intensive Care, 4th Edition

Klinická manifestace

- Zánětlivá triáda
  - horečka
  - tachykardie
  - teplá, zarudlá kůže
- Hypoperfuse
  - alterace vědomí
  - oligo - anurie
  - > CFT– čas tvorby koagula
  - wide pulse pressure

Warm Shock

Klinická manifestace

- Hypotenze
  - studená a opocená kůže
  - mramorování
  - tachykardie
  - cyanoza
  - hypoxemie
  - acidoza

Cold shock

….early recognition of pediatric septic shock using clinical examination, not biochemical tests

Clinical practice parameters for hemodynamic support of pediatric and neonatal septic shock: 2007 update from the American College of Critical Care Medicine

Crit Care Med. 2009 Feb;37(2):666-88

Ideální klinická diagnostika předchází

- hypotenzi
- hypotermii nebo hypertermii
- alteraci stavu vědomí
- periferní vazodilataci (warm shock), nebo vazokonstrikci s capillary refill > 2 sec (cold shock).

Kardiovaskulární systém v sepsi

- ↑ HR → ↑ mortality[1]
  kojenci HR <90/min a >160/min
  děti HR <70/min a >150/min

- hypotenze s capillary refill <3s – mortalita 5%
  hypotenze s capillary refill >3s – mortalita 33%

- ↑ SVR – absence nebo slabá periferní pulsace, chladné končetiny, prodloužený capillary refill

- úprava hemodynamických parametrů na základě terapeutických doporučení ACCM/PALS – redukcemortality o 40% [2]

[1] Pollack et al. Pediatric risk of mortality (PRISM) score. *Crit Care Med* 1988; 16:1110–1116
[2] Carcillo et al. Early shock reversal is associated with reduced childhood neurologic morbidity and mortality.*Pediatrics* 2009; 124:2 500-508

Dýchací aparát v sepsi

- tachypnoe – kompenzace metabolické acidozy
- dyspnoe, cyanoza kůže a sliznic
- intersticiální, alveolární edém
- sepsis induced lung injury (ALI, ARDS)

Suter PM The Lung in sepsis. The Sepsis Text 2002, Part 6, 609-618

CNS v sepsi

- Hippocrates (460-370 B.C.) – vztah mezi systémovým onemocněním a mozkovou dysfunkcí
- zmatenost, dezorientace, třes, myoklonus, křeče,….septická encefalopatie
- sepse ↑ riziko DMO, PMR, zrakového a sluchového postižení [1]

[1] Schlapbach LJ et al. Impact of sepsis on neurodevelopmental outcome in a Swiss National Cohort of extreme premature infants. Pediatrics 201;128:348-57

Ledviny v sepsi

- oligurie → anurie; vzestup kreatinin, urea
- modified RIFLE criteria in critically ill children with acute kidney injury[1]

[1] Akcan-Arikan A et al. (2007) Modified RIFLE criteria in critically ill children with acute kidney injury. Kidney Int 10:1028–1035

Time- and fluid-sensitive resuscitation for hemodynamic support of children in septic shock: barriers to the implementation of the American College of Critical Care Medicine/Pediatric Advanced Life Support Guidelines in a pediatric intensive care unit in a developing world

Oliveira CF et al.

Pediatr Emerg Care 2008 Dec;24 :810-5

- 90 pacientů; 83% septický šok, 17% těžká sepse
- 80 pacientů preexistující „severe chronic diseases“
- 20 ml/kg 60 min – mortalita 73%; > 40 ml/kg 33% ($p < 0.05$)

léčba do 30 min. po dg vs. léčba > 60 min. po dg.

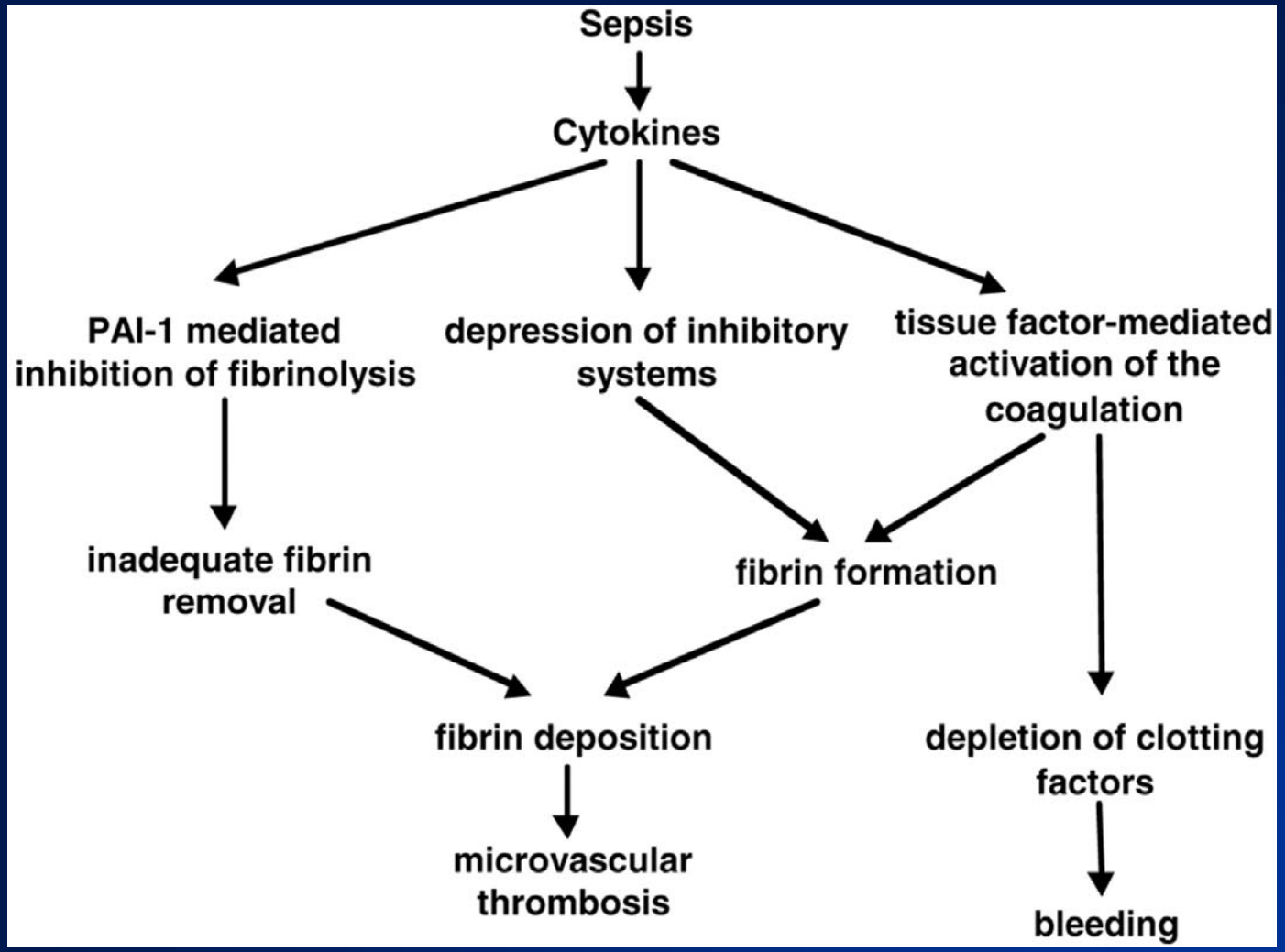
↓ mortality o 40% ($p < 0.05$)

Laboratorní parametry sepse

Specific laboratory tests
Blood, cerebrospinal fluid and urine culture
Direct visualisation of bacteria (Gram stain …..)
Detection of bacterial antigens
Polymerase chain reaction (amplification of bacterial DNA, i.e. 16S rDNA)
Haematological investigations
White blood cell counts, total and differential, platelet count
CRP, procalcitonin, ESR, serum amyloid, other acute phase reactants: haptoglobin, lactoferrin, neopterin, inter-inhibitor proteins (I Ips), lipopolysaccharide-binding protein (LBP), C5a, C5L2, immunoglobulins
Cytokines and receptors
IL-1 , IL-6, IL-8, IL-10
IL-1ra, IL-2rs
IP-10, RANTES, TNF-α, IFN-γ
G-CSF, CSF1, SCF
MIP1-a
sCD14, sICAM-1, CD11b, CD64, CD69, CD25, CD45RO, CD19, CD33, CD66b
Proteomics and genomics

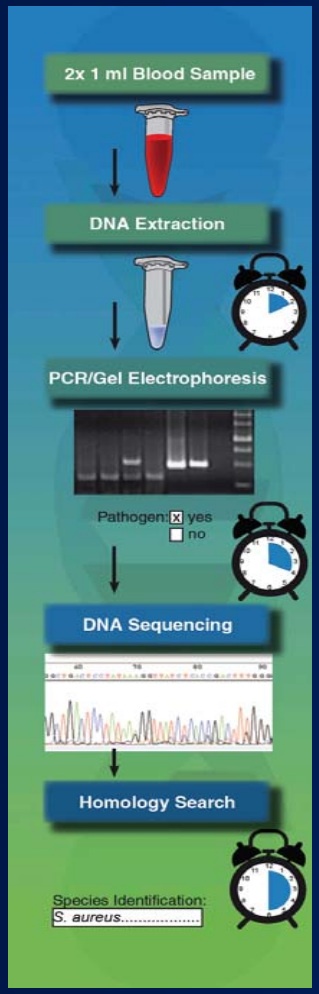
Chirico G et al. Laboratory aid to the diagnosis and therapy of infection in the neonate. Pediatr Rep. 2011 24; 3:e1

Coagulation imbalance during sepsis



Zeerleder S et al. Chest 2005;128:2864-2875

Polymerase Chain Reaction - PCR

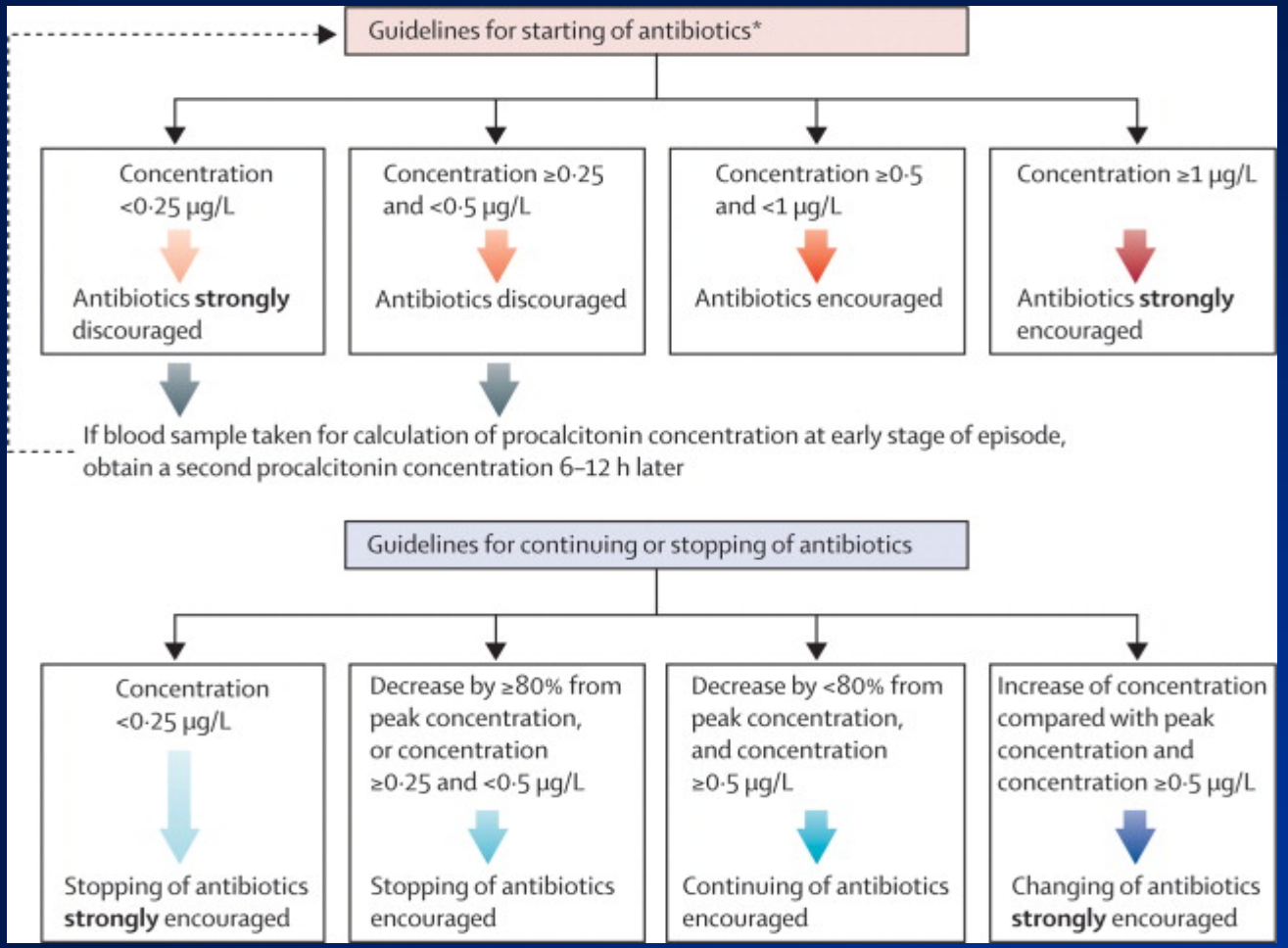


Lucignano B et al. Multiplex PCR Allows Rapid and Accurate Diagnosis of Bloodstream Infections in Newborns and Children with Suspected Sepsis. J Clin Microbiol. 2011;49 :2252-8

Millar M et al. Accuracy of bacterial DNA testing for central venous catheter-associated bloodstream infection in children with cancer. Health Technol Assess 2011 Feb;15:1-114.

Resti M et al. Community-acquired bacteremic pneumococcal pneumonia in children: diagnosis and serotyping by real-time polymerase chain reaction using blood samples. Clin Infect Dis. 2010 51:1042-9.

Procalcitonin



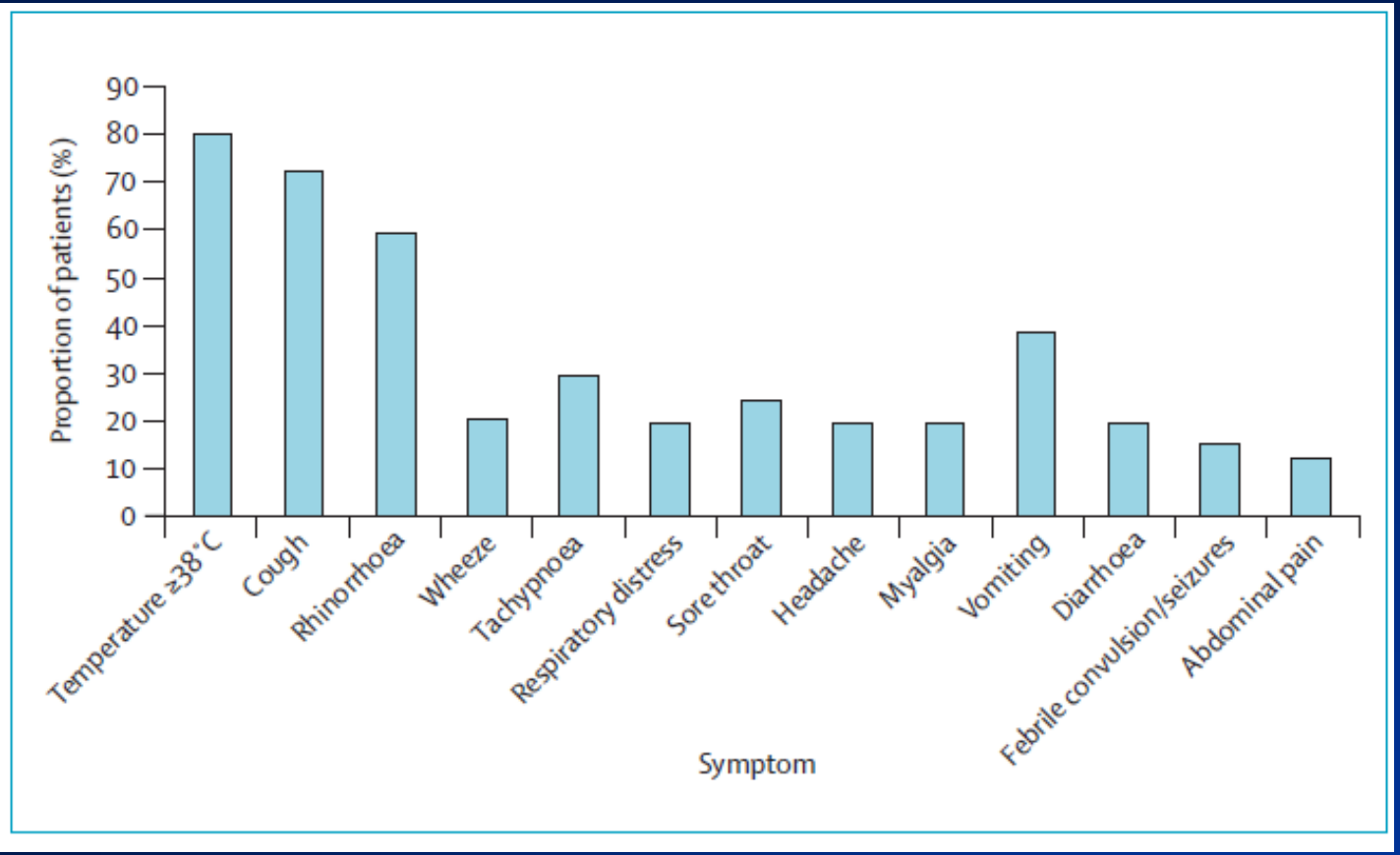
Bouadma L et al. Use of procalcitonin to reduce patients' exposure to antibiotics in intensive care units (PRORATA trial): a multicentre randomised controlled trial. Lancet 2010 6:463-74

Respiratory Syncytial Virus (RSV)

- horečka, kašel, tachypnoe, cyanoza, dušnost, chrůpky, „sepsislike presentation“
- stěr z nosohltanu, odsátí sekretu, laváž

  dg. enzymatická imunoanalýza, detekující protilátky proti RSV

H1N1 u dětí



Lister P et al. Swine-origin influenza virus H1N1, seasonal influenza virus, and critical illness in children. Lancet 2009 22;605-7

Závěr

- rychlé a správné vyhodnocení klinického stavu
- správný odběr materiálu na diagnostiku
- odpovídající terapie a monitorace

Děkuji za pozornost