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CLINICAL AND LABORATORY DIAGNOSIS OF COMMUNITY-ACQUIRED PNEUMONIA IN OUTPATIENT CARE

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REZUMAT

DIAGNOSTICUL CLINIC ȘI DE LABORATOR AMBULATORIU ÎN PNEUMONIA COMUNITARĂ

Actualitatea temei. De-a lungul ultimilor ani, odată cu îmbunătăţirea metodelor de diagnostic molecular, a introducerii în programul de vaccinare a vaccinului conjugat antipneumococic, definiţia pneumoniei comunitare a necesitat numeroase evaluări. *Material și metod*ă. Ghidurile OMS pentru ţările slab și mediu dezvoltate, precum și recomandările Societăţii Toracice din Marea Britanie și a Societăţii Americane de Boli Infecţioase au stabilit criteriile clinice și radiologice de diagnostic în pneumonia comunitară. *Rezultate.* Preocuparea societăţiilor amintite în stabilirea definiţiei de caz a pneumoniei comunitare vine din constatarea practică a excesului de diagnostic, exces care se soldează cu excesul de antibioterapie. *Concluzii*. Diagnosticul de laborator, inclusiv diagnosticul molecular, contribuie la stabilirea diagnosticului final de pneumonie comunitară.

Cuvinte cheie: pneumonie comunitară la copil, criterii clinice și radiologice, diagnostic de laborator

SUMMARY

CLINICAL AND LABORATORY AMBULATORY DIAGNOSIS IN COMMUNITY-BASED PNEUMONIA

Theme topicality. Over the years, along with the improvement of molecular diagnosis, the introduction of vaccination program of conjugate pneumoccocal vaccin, the definition of community-acquired pneumonia needs to be often evaluated. *Material and methods*. The World Health Organization guidelines for developing countries as well as those of British Thoracic Society and Infectious Disease Society of America for industrialized countries have established the clinical and radiological criteria for community-acquired pneumonia. *Results*. The concern of mentioned societies in case-definition elaboration comes from the practical finding of overdiagnosis, the excess that is solves with overuse of antibiotics. *Conclusions*. The laboratory diagnosis, molecular diagnosis, inclusively, contributes to the final diagnosis of community-acquired pneumonia. **Keywords**: community-acquired pneumonia in child, clinical and radiological criteria, laboratory diagnosis.

Introduction. Pneumonia continues to be the leading cause of death among children less than 5 years of age. With all the improvements made in pediatric practice in recent years with the aim of lowering the mortality rate, pneumonia remaines the single major cause of death in children, with the exception of neonatal period. The 2013 statistical data emphasize 900.000 deaths through pneumonia of a total of 6,3 milions of deaths in child[9]. In the last 10 years the real improvements have been made regarding pneumonia risk factors and etiology, the case definition standardizing, the preventional means regarding vaccination and, not least, the improvements of curative treatment[10,11]. These interventions varies from country to country and, generally, remain suboptimal[13].

The community-acquired pneumonia definition varies from source to source. From a pathologic point of view, pneumonia is considered an infection of lung parenchyma (infection of lower respiratory tract). By a clinical point of view, the community-acquired pneumonia is defined as the presence of characteristic signs anf symptomps in a previously healthy children and due to an infection which has been acquired outside the hospital[2,7]. Both, the British Thoracic Society and Infectious Disease Society of America agreed that thoracic radiography is not always able to support the diagnosis of pneumonia[2].

Metodology – clinical diagnosis of pneumonia. Children who suffered by community-acquired pneumonia could present different signs and stadies of illness which can create difficulties in diagnosis protocolization. Symptoms, like fever, cough, dyspnea, wheezing, thoracic and abdominal pain, lethargy, vomits, headache could also be the indicators of other diseases (sepsis, congenital

heart malformations, severe anemia, bronchial asthma) compaired with typical symptomatology observed at physical exam (tachypnea, tachycardia, hypoxia, respiratory distress – abdominal breathing, recession, nasal flaring –, rales and prolonged expiration. The frequency od these symptoms are variable, which confers complexity to diagnosis[14].

Results. The WHO giudelines admit that tachypnea is the main indicator of community-acquired pneumonia, tachypnea presence arguing the antibiotic therapy. In this context, the diagnostic prioritization reduced a lot the risk of death, despite the risk of overdiagnosis. A study[6] with 516 children diagnosed with pneumonia, using the WHO definition, and which were assessed 4 days later, showed only 35,9 % pneumonia as final diagnosis. The other children were defined as wheezing (42,8 %), respiratory mixed disease (18,6 %), and even disease of other organs, other than lung (2,7 %). The overdiagnosis leads to antibiotic overuse. In developing countries it is noted an pneumonia overdiagnosis to the detriment of bronchial asthma, with significant consequences on respiratory morbidity and mortality[6].

Disscusions. The benefit of WHO guidelines concerning pneumonia diagnosis consist in those of the most simple clinical signs use for directly optimal therapeutic approach. The industrialized countries benefit from an easy access to radiologic exam, during hospitalization, exam which highlights consolidation process, pulmonary infiltrates and air bronchograms[7]. The value of pulmonary radiography is important in excluding some complications, such as pleural effusion, cardiac failure, or pulmonary edema. The British Thoracic Society does not routinely recommend it in patients who are managed in the community.

Returning to the role of tachypnea in the delimitation of pneumonia severity, it`s association with dyspnea, hypoxia, fever, increase tachypnea sensitivity. A meta-analysis[15] of a 18 studies from developing countries identified the predictive role of radiological pneumonia in the presence of tachypnea > 50/minute at any ages, of grunting, chest in-drawing, and nasal flaring. But, the result of different studies is often heterogenous, limiting the interpretention of the signs possible to predict[4,16].

The chest radiography is considered the gold-standard of diagnosis in pneumonia. It also because the changes observed at pulmonary exam could be subjective, and the clinical definition of pneumonia is, sometimes, unspecific. In 2005, with the end of the study of conjugate pneumococcal vaccin[5], WHO was standardized the description of pulmonary radiography considering those group of children with a great probability of pneumococcal pneumonia. The term of „patent consolidation" was described as dense and heterogenous opacity which ocupied a part or a pulmonary lobe, or the whole lung. The others „infiltrates", including the liniar and heterogenous densities, peribronsic incarceration, the little and heterogeous infiltrates, are not enough to be considered as pulmonary consolidation. Also, the little areas of atelectasis need to be distinguished by pulmonary consolidation, even if this is difficult in practice. The primary patent consolidation includes the patent consolidation associated with pleural effusions and the little infiltrates as described above.

The WHO case-pulmonary X-ray definition does not intend to differentiate bacterial from viral etiology, rather to defined a subset of pulmonary cases in which the pneumococcal infection has a great probability. A big question mark is put regarding the radiological repetitiveness of pneumonia, not so much in terms of lobar density as perihilar infiltrates. Many of children with severe pulmonary disease do not presented patent consolidation. By reviewing the case-definition of presumptive bacterial pneumonia, WHO has (re)defined the alveolar consolidation, even for the radiological changes, associated with high values of C reactive protein (> 40 mg/L). This new definition had a superior sensitivity.

Although many studies have proved the efficacy of conjugate pneumococcal vaccin in prevention of bacterial pneumonia in children bigger than 16 weeks old and HIV uninfected, there are not enough evidences to prove that the conjugate pneumococcal vaccine could improve the radiological changes of pneumococcal pneumonia.

The national guidelines from industrialized countries and the WHO recommendation for depevoping countries specified that the pulmonary radiography does not required routinely effecting in case of pneumonia managed in community. The indications include the pneumonia cases which required hispitalization, severe hypoxemia and respiratory syndrome, initial antibiotic therapy failure, suspicion of comorbidities existance (tuberculosis, foreign body aspiration) or complications. Pulmonary ultrasonography will be able to represent a promosing way to pneumonia disgnosis in child.

Until that moment, the clinical features of community-acquired pneumonia are differentiate according to development status of the country the patients are coming from, according to severity degree of disease, and age, too (especially, for industrialized countries).

Thus, for children coming from industrialized countries, the clinical features of community-acquired pneumonia are the following[7,16]:

- mild and moderate pneumonia
  - in infants
    - fever < 38,5^{0}C
    - respiratory rate < 50/minut
    - mild recession
  - after infancy
    - fever < 38,5^{0}C

  - respiratory rate < 50/minut
  - mild dyspnea
- severe pneumonia
  - in infants
    - taking full feeds
    - fever > 38,5^{0}C
    - respiratory rate > 70/minut
    - moderate or severe recession
    - respiratory failure
    - tachycardia
    - capillary refill time > 2 seconds
    - intermitent apnea
    - not taking full feeds
  - after infancy
    - no vomiting
    - fever > 38,5^{0}C
    - respiratory rate > 50/minut
    - moderate or severe recession
    - tachycardia
    - capillary refill time > 2 seconds
    - not taking full feeds.

For children coming from development countries, the clinical features of community-acquired pneumonia are not differentiate according to age, and the description is made only for severe and very severe pneumonia[7,16].

Thus:

- severe pneumonia
  - tachypnea more than 50/minute, between 2-11 months
  - tachypnea more than 40/minute, between 1-5 years
  - chest indrawing
- very severe pneumonia
  - cough and difficulty of breathing, associated with
    - oxygen saturation < 90 % or central cyanosis
    - severe respiratory distress
    - general danger signs (inability to breastfeed or drink, letarghy or reduced level of of consciousness, seizures).

Laboratory diagnosis referred to inflammatory markers (especially, reactive C protein, delimited by 40 mg/L value) and molecular diagnosis. The molecular diagnosis facilities have allowed the detection of respiratory viruses (either as primary pathogens, or susceptibility for secondary infection) or bacteria, using qPCR[3]. Many of respiratory pathogens, known as a cause of pneumonia have been identified at asymptomatic children, so that their contribution on community-acquired pneumonia pathogenity remains unclear[12]. In this context, the respiratory pathogens identification, causing pneumonia, remains a continued challenge, whatever the specimens used (blood, broncho-alveolar fluid, pleural fluid)[1,8].

Conclusions. With all the actual limitations in diagnosis of community-acquired pneumonia, the appearance of the new technologies and the rapid tests perspectives are very attractive. For the clinican, the ability of a rapid diagnosis in community-acquired pneumonia and the ability to distinguish the specific etiological agent, either bacterial or viral, or both, would prove invaluable in directing the adequate use of antibiotics.

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