# III. PEDIATRICS

# PULMONARY ATELECTASIS ON INFANCY: CLINICAL AND RADIOLOGICAL EVOLUTIONAL OBSERVATIONS

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**Summary**

Pulmonary atelectasis is a rare disease in the neonatal period and infancy up to 1 year old. The confirmation is radiological by standing out the following elements: mediastinal shift – towards lesion, compensatory hyperinflation of other lobes, elevated diaphragm on the same side and variable air bronchogram. Pulmonary CT-scan brings new details.

The promoting factors are immunodeficiency, dystrophy, prematurity and anemic syndrome. Pulsoxymetry is a non-invasive method of estimating the respiratory distress syndrome.

**Keywords:** atelectasis (segmental collapse), pulsoxymetry, thymus hypertrophy

**Introduction**

Pulmonary atelectasis is a syndrome determinated by a ventilation defect on the pulmonary zone but with maintaining blood perfusion. The prime cause is the bronchial obstruction on various etiologies (tumors, adenopathy, foreign bodies). The clinical examination shows a condensate syndrome with obstruction of the bronchi.

Causes of the atelectasis:

Newborn period:

– Respiratory distress syndrome
– Pneumonia
– Meconial aspiration
– Pneumothorax, lobar emphysema, tumors
– Ascites

Infancy period until 1 year old:

– Pneumonia, recurrent aspiration syndrome, immunodeficiency, immotile cilia syndrome
– Pertussis
– Bronchopulmonary dysplasia
– Rare causes: cystic fibrosis, bronchiolites obliterans
– Intubation/ after extubation
– Tracheal/ bronchi stenosis, hypoplastic air way
– Hilar adenopathy, cysts, tumors
– Rare causes: vascular ring, congenital hard disease with enlarged of left atrium

Infancy period up to 1 year old:

– Pneumonia
– Cystic fibrosis, bronchiectasis
– Pulmonary tuberculosis
– After surgery
– Neuromuscular disease, immobility
– Foreign bodies.

Case presentation

We present the case of a child SA, female, 5 months old, coming from rural area, premature birth with birth weight 1500 g, transferred in our clinic with the diagnosis: Interstitial pneumonia. Suspect right hilar adenopathy.

We haven't data about the family or the infant medical history, the child being a social case.

In the hospital of Sanicolaul Mare the child presented: fever 39,4 ºC, productive cough, psychomotor agitation and respirator functional syndrome. Although the treatment (Zinacef, Gentamicin, Celeston), the health status didn't improve.

Weight: 5600 g, height: 61 cm, temperature: 36, 2ºC. The infant presents: alteration of health status, pale skin, nasal obstruction, productive cough. Subcostal and intercostal retraction, wheezing, tachypnea, symmetric breath sound and evidence of adventitial breaths sounds: rales and rhonchi, prevalent in the third right superior area. Normal hearth sounds, tachycardia: 140/min. Hepatomegaly and splenomegaly. No signs of meningeal irritation.

Presumptive diagnosis:

Right superior lobe unspecified pneumonia.

Biological investigation:

- Acute-phase reactants: leukemoid reaction or reactive leukocytosis

($12000/mm^3$) with neutrophilia, ESR (128 →75 mm/h), CRP (positive), increase serum $\alpha_2$ globulin fractions (15.2%).

- Anemia: decrease of hemoglobin (9.3g/dL), red cells count: $3500000/mm^3$
- Arterial blood gas: pH=7.43, $pCO_2$=32.2 mmHg, BE=-1,2 mmol/l, $HCO_3$= 21.2 mmol/l $PaO_2$ = 41 mmHg, $SaO_2$ = 78,3%
- Cultures of blood, urine, stool, nasopharyngeal are sterile
- Negative sweat test
- Negative tuberculin skin test, cultures of gastric lavage for Koch bacillus are sterile

Face and profile, anterior-posterior and lateral/lateral chest roentgenogram: mediastinum, on apical right lung with inferior delimitation by elevated horizontal scissors, with a retractile character on trachea and mediastinum towards right side. Right basal emphysema is present. This opacification and emphysema are retro tracheal and inferior.

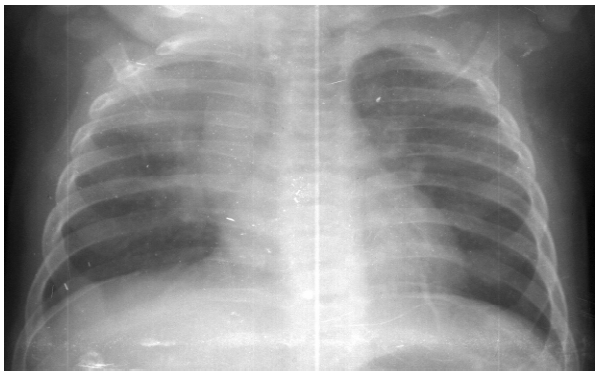

Fig. 1 Face chest roentgenogram

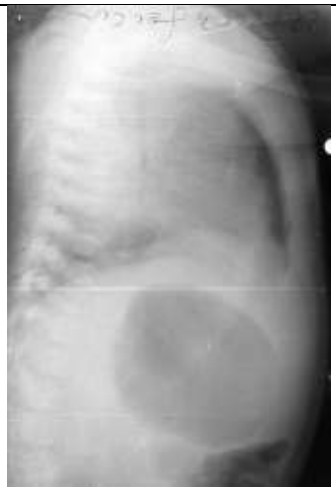

Fig. 2 Profile chest roentgenogram

Mediastinal computer tomography scanning shows: triangular opacification, inhomogeneous structures in the right superior lobe. Vertically, this image extends from apical right lung until the trachea bifurcation. Mediastinum pushes on right side.

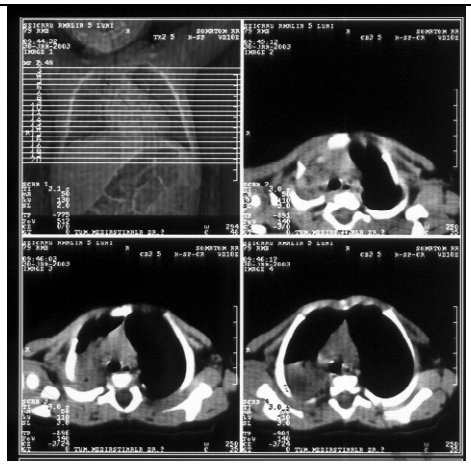

Fig. 3 Mediastinal computer tomogram

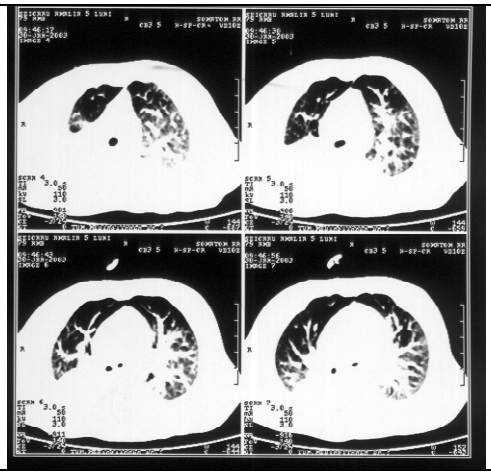

Fig. 4 Mediastinal computer tomogram

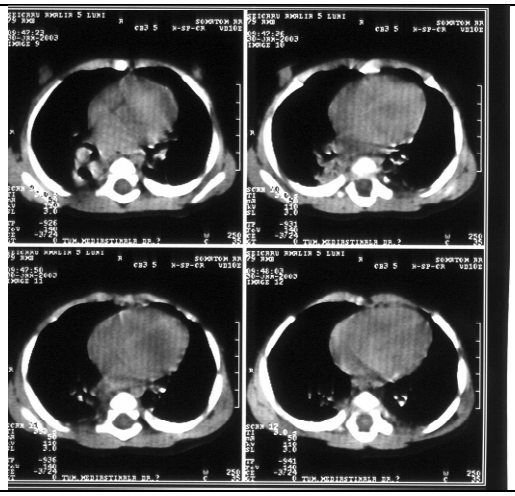

Fig. 5 Mediastinal computer tomogram

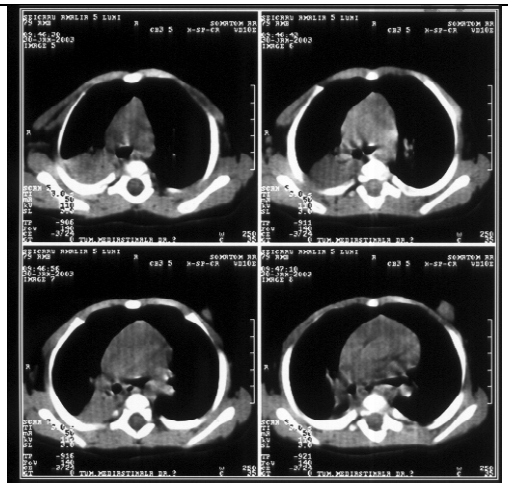

Fig. 6 Mediastinal computer tomogram

Echocardiogram: Ao = 10,1 mm; LA = 14,1 mm; RA = 15,5 mm; LV = 13,2/20,2 mm; EF = 0,67; SF = 34,78 %; RV = 13,4 mm; IVS = 3,36 mm, IAS in its integrity, PPLV =3,33mm, normal valves, no pericardial effusions

Positive diagnostic:

1. Right lung atelectasis.
2. Thymus hypertrophy
3. Intrainfectious anemia
4. Dystrophy std. II by prematurity and disease.

Differential diagnosis:

- Pulmonary abscess
- Right apical pneumonia
- Cystic fibrosis
- $\alpha_1$ antitrypsin deficiency
- Immotile cilia syndrome
- Pleurisy
- Mediastinum formation

Treatment

Curative treatment:

1. *Hygienic treatment and diet:*
   - Isolation in incubator, individual small wards
   - Change of the position in bed every 1-2 hours
   - Lateral right decubitus to 30˚
   - Ingestion of liquids was adapted to the digestive tolerance and to the degree of respiratory distress
   - Diet diversification
2. *Medical therapy:*

- Etiological: antibiotic treatment with: Ceftriaxone 0.5 g/day and Amikacin 0.08 g/day
- Pathogenic: steroidal anti-inflammatory agents: Dexamethasone 0.003 g/day, expectorant: Bromhexin 3x10 drops/day, aerosol with Fluimucil 0.5 ml and 4 ml 0.9% saline solution, Ventolin 3x1 puffs/day, respiratory kinesiteraphy
- Symptomatic: Pseudoephedrine nose drops, fever treatment
- Administration of vitamins

Evolution

The evolution was slow but favorable, during 20 days hospitalization. Respiratory and inflammatory syndrome remit.

This patient left hospital with good health status, no fever, appetent; weight increase at a steady rate, and respiratory status: symmetric breath sound and no evidence of adventitial breath sounds.

Evolution of biological investigation:

- Acute-phase reactants: white cells count: 13400/mm$^3$ with Ly = 50,9 %, Mo = 5,6%**,** Gra = 43,5%, ESR: 10 mm/h
- Correction of anemia, except treatment: hemoglobin: 10.3g/dL, red cells count: 4780000/mm$^3$
- SaO2 = 87% → 96%
- Chest roentgenogram: emphasis of the interstitial space of the lung, normal cord

The child has been transferred in Sanicolaul Mare Hospital for continuation of the treatment.

Possible complications on long term are: pulmonary bacterial infection – pleuropneumonia, pulmonary abscess, pneumothorax, pneumomediastinum and mediastinitis.

The prognostic of this patient is good and depends on the appearance of the relapse.

The particularity of the case:

The child is dystrophic, by prematurity std. II and disease: anemia, rickets. He presents pneumonia upon pulmonary distelectasis which evolved with atelectasis. The pulmonary distelectasis is characteristical for an infant with dystrophy and immunodeficiency through the thymus hypertrophy. The main elements of pathology are the ventilation-perfusion mismatch and the absence of the clinical manifestations.

**Conclusions:**

1. The face and profile chest roentgenogram, the retractile character of the process and the presence of the basal emphysema have been important to establish the positive diagnosis: Atelectasis.
2. The mediastinal computer tomography scanning has confirmed the diagnosis, and brought important information for the exclusion of the other diseases.
3. Pulsoxymetry is a non-invasive method of estimate the respiratory distress syndrome

4. We consider that the appearance of atelectasis is a complication of the pneumonia and of the bronchial obstruction with suprainfection.
5. The pulmonary suprainfection due to the pulmonary distelectasis is characteristical for an infant with immunodeficiency with dystrophy and thymus hypertrophy.
6. The antibiotics, the respiratory kinesiteraphy and the aerosol with mucolytic have determined the reversibility of the atelectatic process.

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