

Basic definitions

Apgar score

Mors praenatalis

Mors neonatalis

Pneumopatology
of the newborn

Pathology of the newborn

Basic definitions

- ▶ **Abortion**
 - ▶ Delivery
 - ▶ Fetus immaturus non vitalis
 - ▶ Fetus immaturus vitalis
 - ▶ Fetus maturus
 - ▶ Fetus permaturus
-
- ▶ dead born fetus < 1000 g
 - ▶ alive born fetus < 500 g, if survives no longer than 24 hours

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- ▶ Fetus permaturus

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-
- ▶ alive born fetus over 500 g
 - ▶ alive born fetus under 500 g, surviving more than 24 hours

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- ▶ Abortion
- ▶ Delivery
- ▶ **Fetus immaturus non vitalis**
- ▶ Fetus immaturus vitalis
- ▶ Fetus maturus
- ▶ Fetus permaturus

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-
- ▶ weight less than 1000 g
 - ▶ usual length under 38 cm
 - ▶ born before 28 week of gestation

Basic definitions

- ▶ Abortion
- ▶ Delivery
- ▶ Fetus immaturus non vitalis
- ▶ **Fetus immaturus vitalis**
- ▶ Fetus maturus
- ▶ Fetus permaturus

-
- ▶ weight 1000 – 2500
 - ▶ 29 – 38 week

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- ▶ Abortion
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 - ▶ Fetus immaturus vitalis
 - ▶ **Fetus maturus**
 - ▶ Fetus permaturus
-

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- ▶ Abortion
- ▶ Delivery
- ▶ Fetus immaturus non vitalis
- ▶ Fetus immaturus vitalis
- ▶ Fetus maturus
- ▶ **Fetus permaturus**

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-
- ▶ weight over 4000 g
 - ▶ length over 52 cm
 - ▶ born after 41 week of gestation

Hypotrophy of the fetus

- ▶ Small for date
 - ▶ Multiple pregnancy
-

- ▶ placental insufficiency
- ▶ metabolic diseases
- ▶ alcohol
- ▶ ...

Hypotrophy of the fetus

- ▶ Small for date
 - ▶ **Multiple pregnancy**
-

- ▶ physiological
- ▶ child is small, but usually quickly catches up

Apgar score

- ▶ Heart rate
- ▶ Respiration
- ▶ Muscular tone
- ▶ Reaction to nasal catether
- ▶ Color

-
- ▶ not present (0 points)
 - ▶ under 100 (1 point)
 - ▶ over 100 (2 points)

Apgar score

- ▶ Heart rate
- ▶ **Respiration**
- ▶ Muscular tone
- ▶ Reaction to nasal catether
- ▶ Color

-
- ▶ not present (0 points)
 - ▶ slow, irregular (1 point)
 - ▶ good, cry (2 points)

Apgar score

- ▶ Heart rate
- ▶ Respiration
- ▶ **Muscular tone**
- ▶ Reaction to nasal catether
- ▶ Color

-
- ▶ week (0 points)
 - ▶ extremities flexed (1 point)
 - ▶ active movements (2 points)

Apgar score

- ▶ Heart rate
- ▶ Respiration
- ▶ Muscular tone
- ▶ Reaction to nasal catether
- ▶ Color

-
- ▶ no response (0 points)
 - ▶ grimase (1 point)
 - ▶ cry (2 points)

Apgar score

- ▶ Heart rate
- ▶ Respiration
- ▶ Muscular tone
- ▶ Reaction to nasal catether
- ▶ Color

-
- ▶ general cyanosis (0 points)
 - ▶ body pink, extremities cyanotic (1 point)
 - ▶ whole newborn is pink (2 points)

Results of Apgar score

- ▶ **AS < 2**
- ▶ AS 4 – 6
- ▶ AS > 7

-
- ▶ mortality 50 %

Results of Apgar score

- ▶ AS < 2
- ▶ AS 4 – 6
- ▶ AS > 7

-
- ▶ mortality 20 %

Results of Apgar score

- ▶ AS < 2
 - ▶ AS 4 – 6
 - ▶ AS > 7
-

- ▶ almost all newborns survive

Mors praenatalis

- ▶ **No signs of life**
 - ▶ Maceration (I. – III. grade)
 - ▶ Intrauterine asphyxia
-

- ▶ no respiration, heart action, movement

Mors praenatalis

- ▶ No signs of life
 - ▶ **Maceration (I. – III. grade)**
 - ▶ Intrauterine asphyxia
-

- ▶ I.: skin
- ▶ II.: organs, brain
- ▶ III.: softening of ligaments and joints

Mors praenatalis

- ▶ No signs of life
 - ▶ Maceration (I. – III. grade)
 - ▶ **Intrauterine asphyxia**
-

- ▶ alteration of the heart rate
- ▶ petechiae, ecchymoses
- ▶ release of meconium into the amniotic fluid
- ▶ premature activation of respiration
- ▶ aspiration of amniotic fluid (lanugo, meconium bodies)

Macerace, gr. III.

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Macerace, gr. III.

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Mors neonatalis

- ▶ **Before the 28th day**
- ▶ Mechanical trauma during the delivery
- ▶ Ischemia during the delivery
- ▶ Morbus haemorrhagicus neonatorum
- ▶ Sepsis neonatorum
- ▶ Congenital malformations, genetic diseases
- ▶ Congenital tumors

-
- ▶ early newborns: up to 7th day

Mors neonatalis

- ▶ Before the 28th day
- ▶ **Mechanical trauma during the delivery**
- ▶ Ischemia during the delivery
- ▶ Morbus haemorrhagicus neonatorum
- ▶ Sepsis neonatorum
- ▶ Congenital malformations, genetic diseases
- ▶ Congenital tumors

-
- ▶ CNS hemorrhage
 - ▶ rupture of the tentorium
 - ▶ spinal column trauma
 - ▶ bone fractures
 - ▶ hematomas

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Mors neonatalis

- ▶ Before the 28th day
 - ▶ Mechanical trauma during the delivery
 - ▶ **Ischemia during the delivery**
 - ▶ Morbus haemorrhagicus neonatorum
 - ▶ Sepsis neonatorum
 - ▶ Congenital malformations, genetic diseases
 - ▶ Congenital tumors
-
- ▶ damage and bleeding into the CNS (especially in immature newborns)

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Mors neonatalis

- ▶ Before the 28th day
- ▶ Mechanical trauma during the delivery
- ▶ Ischemia during the delivery
- ▶ **Morbus haemorrhagicus neonatorum**
- ▶ Sepsis neonatorum
- ▶ Congenital malformations, genetic diseases
- ▶ Congenital tumors

-
- ▶ heemorhagic diathesis (lack of vitamin K)
 - ▶ multiple organ bleedings

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- ▶ Before the 28th day
- ▶ Mechanical trauma during the delivery
- ▶ Ischemia during the delivery
- ▶ Morbus haemorrhagicus neonatorum
- ▶ Sepsis neonatorum
- ▶ Congenital malformations, genetic diseases
- ▶ Congenital tumors

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of the newborn

-
- ▶ abruption of the placenta
 - ▶ chorioamnionitis
 - ▶ generalized infection of the mother
 - ▶ respirators, catethers (umbilical catethers)

Mors neonatalis

- ▶ Before the 28th day
- ▶ Mechanical trauma during the delivery
- ▶ Ischemia during the delivery
- ▶ Morbus haemorrhagicus neonatorum
- ▶ Sepsis neonatorum
- ▶ Congenital malformations, genetic diseases
- ▶ Congenital tumors

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Pneumopatology
of the newborn

-
- ▶ organ malformations (CNS, the heard and blood vesels, urogenital tract)

Mors neonatalis

- ▶ Before the 28th day
- ▶ Mechanical trauma during the delivery
- ▶ Ischemia during the delivery
- ▶ Morbus haemorrhagicus neonatorum
- ▶ Sepsis neonatorum
- ▶ Congenital malformations, genetic diseases
- ▶ Congenital tumors

-
- ▶ teratomas
 - ▶ Willms tumor
 - ▶ nephroblastoma
 - ▶ retinoblastoma
 - ▶ hepatoblastoma

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Pneumopatology
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Immaturity

- ▶ Lungs
 - ▶ CNS
 - ▶ Kidney
 - ▶ Intestine
-

- ▶ to 24. week: tubuloalveolar
- ▶ to 28. week: transformation to alveolar lung
- ▶ to 29. week: the lungs are fully alveolar
- ▶ further development, pneumocytes of the 1st and 2nd type, surfactant production

Immaturity

- ▶ Lungs
 - ▶ CNS
 - ▶ Kidney
 - ▶ Intestine
-

- ▶ gyrification of the brain: after 6th month
- ▶ persistency of the germinative periventricular layer

Immaturity

- ▶ Lungs
- ▶ CNS
- ▶ **Kidney**
- ▶ Intestine

-
- ▶ immature glomeruli

Immaturity

- ▶ Lungs
- ▶ CNS
- ▶ Kidney
- ▶ Intestine

Pathology of the newborn

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Pneumopatology of the newborn

Pneumopatology of the newborn

- ▶ **Hyaline membranes**
- ▶ Bronchopulmonary dysplasia
- ▶ Interstitial emphysema
- ▶ Aspiration of amniotic fluid
- ▶ Adnate bronchopneumonia
- ▶ Atelectasis

-
- ▶ immaturity of pulmonary parenchyma
 - ▶ affects immature newborns

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Pneumopatology of the newborn

- ▶ Hyaline membranes
- ▶ **Bronchopulmonary dysplasia**
- ▶ Interstitial emphysema
- ▶ Aspiration of amniotic fluid
- ▶ Adnate bronchopneumonia
- ▶ Atelectasis

-
- ▶ affects newborns, who survived the RDS with hyaline membranes
 - ▶ corresponds to reparation of pulmonary tissue

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Pneumopatology of the newborn

- ▶ Hyaline membranes
 - ▶ Bronchopulmonary dysplasia
 - ▶ **Interstitial emphysema**
 - ▶ Aspiration of amniotic fluid
 - ▶ Adnate bronchopneumonia
 - ▶ Atelectasis
-
- ▶ caused by arteficial ventilation of the newborns with atelectasis
 - ▶ gas bubbles enter the the interstitium
 - ▶ may get as far as soft tissues of the mediastinum

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Pneumopatology of the newborn

- ▶ Hyaline membranes
 - ▶ Bronchopulmonary dysplasia
 - ▶ Interstitial emphysema
 - ▶ **Aspiration of amniotic fluid**
 - ▶ Adnate bronchopneumonia
 - ▶ Atelectasis
-
- ▶ fetal asphyxia
 - ▶ premature activation of the respiratory reflex

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Pneumopatology of the newborn

- ▶ Hyaline membranes
- ▶ Bronchopulmonary dysplasia
- ▶ Interstitial emphysema
- ▶ Aspiration of amniotic fluid
- ▶ **Adnate bronchopneumonia**
- ▶ Atelectasis

-
- ▶ infection of the mother
 - ▶ amniotic fluid infection

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Pneumopatology of the newborn

- ▶ Hyaline membranes
 - ▶ Bronchopulmonary dysplasia
 - ▶ Interstitial emphysema
 - ▶ Aspiration of amniotic fluid
 - ▶ Adnate bronchopneumonia
 - ▶ **Atelectasis**
-
- ▶ not enough air within the lungs

Hyaline membrane syndrome

- ▶ **Affects immature newborns**
 - ▶ RDS, immature lung
 - ▶ Oxygen administration is necessary
 - ▶ Toxic oxygen damages alveolar lining
-

- ▶ under 2000 g

Hyaline membrane syndrome

- ▶ Affects immature newborns
 - ▶ RDS, immature lung
 - ▶ Oxygen administration is necessary
 - ▶ Toxic oxygen damages alveolar lining
-

- ▶ no surfactant (pneumocytes of the 2nd type)
- ▶ the lung collapses during the expirium
- ▶ inspiration requires increased effort

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Pneumopatology of the newborn

Hyaline membrane syndrome

- ▶ Affects immature newborns
 - ▶ RDS, immature lung
 - ▶ **Oxygen administration is necessary**
 - ▶ Toxic oxygen damages alveolar lining
-

- ▶ increased concentration of oxygen is inevitable (incubator)
- ▶ it is necessary to keep oxygen levels as low as possible
- ▶ lung damage
- ▶ retinal damage (retrolental fibroplasia)

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Hyaline membrane syndrome

- ▶ Affects immature newborns
- ▶ RDS, immature lung
- ▶ Oxygen administration is necessary
- ▶ Toxic oxygen damages alveolar lining

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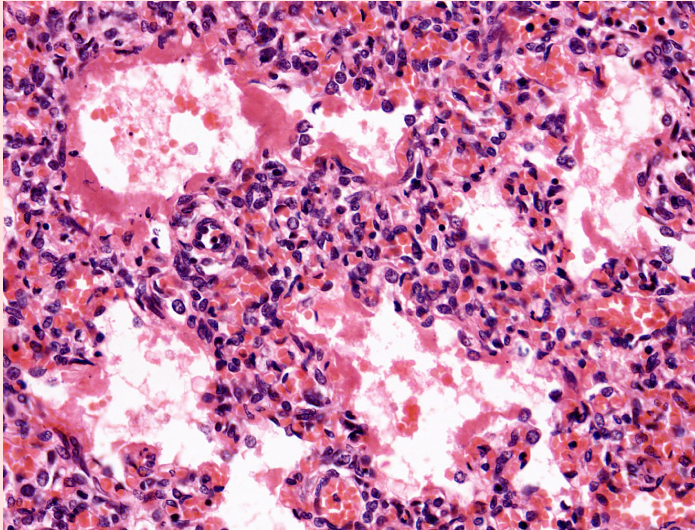
Mors praenatalis

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Pneumopatology
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-
- ▶ necrotic alveolar lining and exsudate forms hyaline membranes
 - ▶ especially ventilated alveoli are damaged
 - ▶ the condition improves in surviving patients

Hyaline membranes



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Pneumopatologia
of the newborn

Bronchopulmonary dysplasia

- ▶ **Clinical signs**
 - ▶ Pathogenesis
 - ▶ Histology
-

- ▶ immature newborns
- ▶ survived RDS, who were treated with oxygen therapy and artificial ventilation
- ▶ changes develop gradually during months
- ▶ death often within 6 months, surviving have pulmonary disease

Bronchopulmonary dysplasia

- ▶ Clinical signs
- ▶ Pathogenesis
- ▶ Histology

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of the newborn

-
- ▶ ventilated alveoli damaged by oxygen disappear (fibrosis)
 - ▶ perialveolar fibrosis develops in partially damaged alveoli
 - ▶ previously unventilated (atelectatic) alveoli develop normally (or get hyperexpanded)

Bronchopulmonary dysplasia

- ▶ Clinical signs
 - ▶ Pathogenesis
 - ▶ **Histology**
-

- ▶ the surface of the lungs is uneven
- ▶ fibrosis, irregular dilatation of alveoli (compensatory emphysema)

Bronchopulmonary dysplasia

Pathology of the newborn

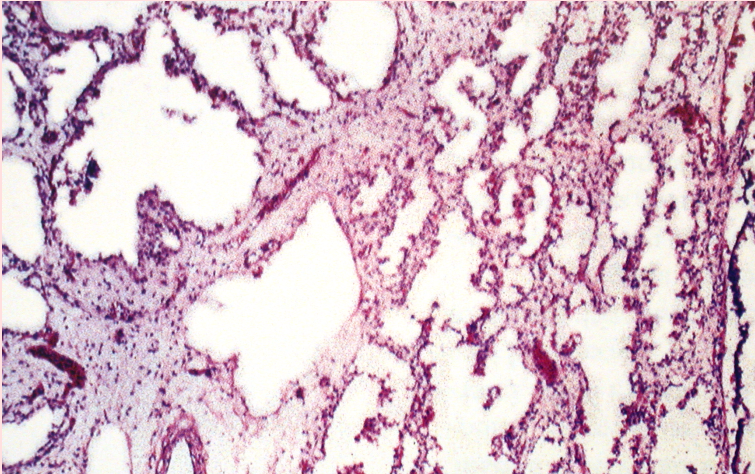
Basic definitions

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Pneumopatology of the newborn



Aspiration of the amniotic fluid

- ▶ Problem with blood supply of the fetus
 - ▶ Clinical picture
 - ▶ Histology
 - ▶ Prognosis
-

- ▶ insufficiency of the placenta
- ▶ strangulation of the umbilical cord
- ▶ large infarctions of the placenta and other placental pathology

Aspiration of the amniotic fluid

- ▶ Problem with blood supply of the fetus
 - ▶ **Clinical picture**
 - ▶ Histology
 - ▶ Prognosis
-

- ▶ alteration of fetal sounds
- ▶ stress of the fetus leads to meconium release
- ▶ activation of the respiratory reflex

Aspiration of the amniotic fluid

- ▶ Problem with blood supply of the fetus
 - ▶ Clinical picture
 - ▶ **Histology**
 - ▶ Prognosis
-

- ▶ tiny keratotic squames, lanugo, meconium bodies, amniotic cells are aspirated to bronchi and alveoli
- ▶ variable extent

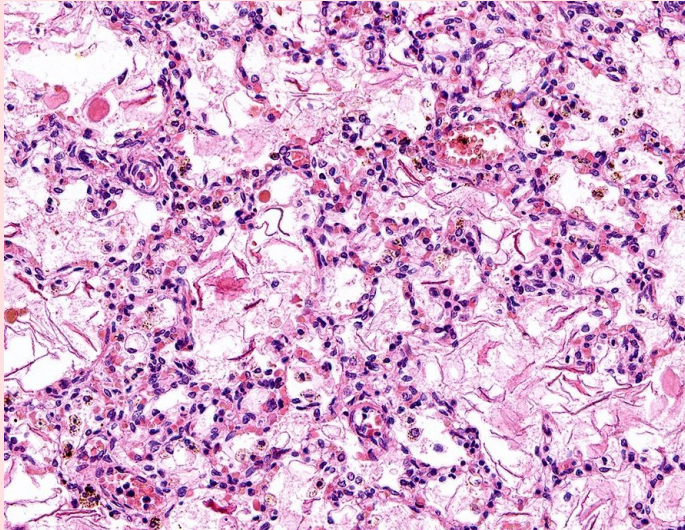
Aspiration of the amniotic fluid

- ▶ Problem with blood supply of the fetus
 - ▶ Clinical picture
 - ▶ Histology
 - ▶ **Prognosis**
-

- ▶ massive aspiration is lethal
- ▶ condition may be complicated by bronchopneumonia, especially in infected amniotic fluid

Aspiration of the amniotic fluid

Pathology of the newborn



Basic definitions

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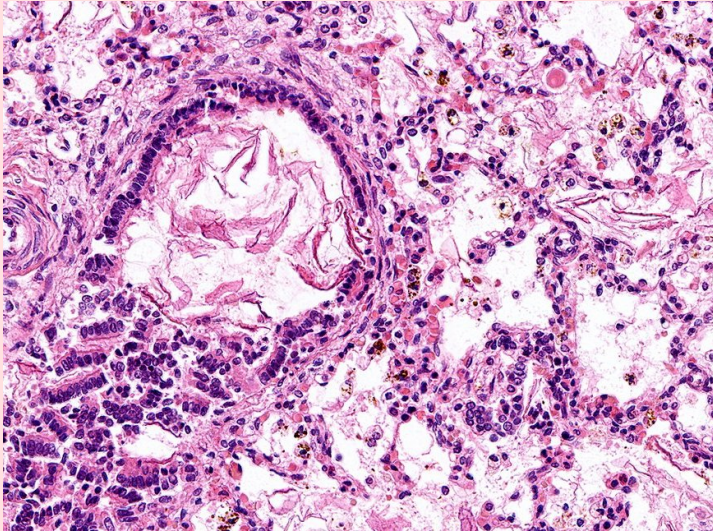
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Aspiration of the amniotic fluid

Pathology of the newborn



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Pneumopatology
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Adnate pneumonia

- ▶ Inflammation of the lung before, during and short after the delivery
- ▶ Etiology
- ▶ Prognosis

Pathology of the newborn

Basic definitions

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Pneumopatology of the newborn

Adnate pneumonia

- ▶ Inflammation of the lung before, during and short after the delivery
 - ▶ **Etiology**
 - ▶ Prognosis
-

- ▶ disease of mother (virosis. . .)
- ▶ aspiration of infected amniotic fluid
- ▶ incubator

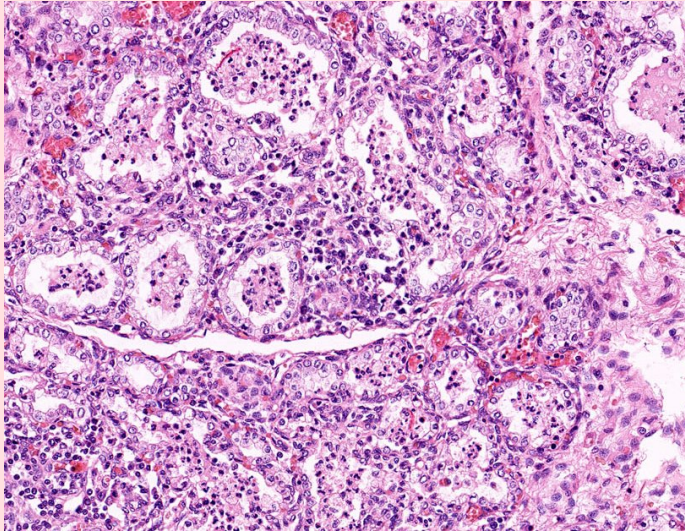
Adnate pneumonia

- ▶ Inflammation of the lung before, during and short after the delivery
 - ▶ Etiology
 - ▶ **Prognosis**
-

- ▶ serious complication of overall condition of the child

Adnate pneumonia

Pathology of the newborn



Basic definitions

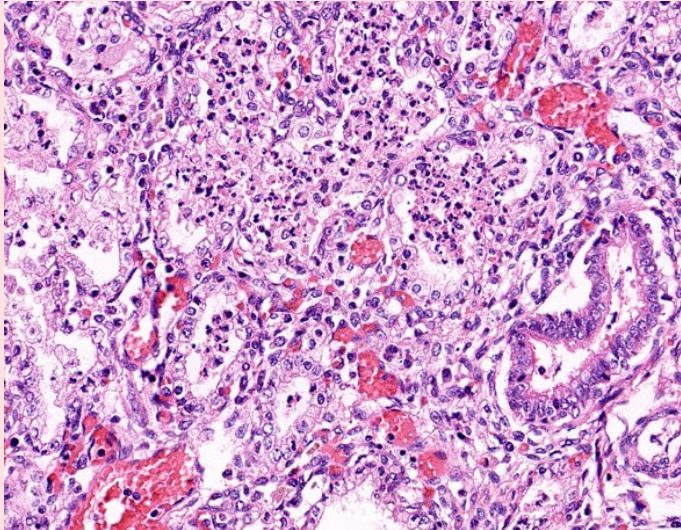
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Adnate pneumonia



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Pneumopathology
of the newborn

Atelectasis

- ▶ **Areas of unventilated lung in a newborn**
 - ▶ Usually alteration with areas ventilad normally
 - ▶ Etiology
 - ▶ Prognosis
-

- ▶ firm, dark areas of consolidated tissue
- ▶ alveoli contain no air (therefore protected against toxic oxygen)
- ▶ (collapse: not ventilated pulmonary tissue, which was ventilated previously)

Atelectasis

- ▶ Areas of unventilated lung in a newborn
 - ▶ Usually alteration with areas ventilad normally
 - ▶ Etiology
 - ▶ Prognosis
-

- ▶ surrounding tissue is hyperventilated
- ▶ prominent especially in artificially ventilated babies (emphysema)

Atelectasis

- ▶ Areas of unventilated lung in a newborn
 - ▶ Usually alteration with areas ventilad normally
 - ▶ **Etiology**
 - ▶ Prognosis
-

- ▶ immaturity of pulmonary tissue
- ▶ aspiration

Atelectasis

- ▶ Areas of unventilated lung in a newborn
 - ▶ Usually alteration with areas ventilad normally
 - ▶ Etiology
 - ▶ **Prognosis**
-

- ▶ tendency to spontaneous healing

Atelectases, tetralogy of Fallot

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