Radiography of the Upper Airways

General considerations

- Usually in association with thoracic radiographs
- Lateral view
- Easy to identify
- Important parameters:
  - diameter
  - position

Anatomy of the Larynx

Radiography of the Trachea

- Visible structures: lumen, cartilages (when calcified)
- Diameter
- Line: acute angle with line of thoracic spine
Radiography of the Upper Airways

**Tracheal collapse**
- toy breeds, middle/old aged dogs
- coughing

**Radiography of the Upper Airways**

**Tracheal collapse**

Radiography: suspicion
Endoscopy: confirmation

**Radiography of the Upper Airways**

**Brachycephalic syndrome**
- congenital malformation(narrowing) of different portions of the upper airways
- in brachycephalic dog (bulldog, boxer, pekinese, pug etc)
- restricted respiratory capacity, higher susceptibility to respiratory infections

1. Stenotic nares

2. Elongated soft palate

3. Laryngeal hypoplasia

4. Eventrated laryngeal saccule

5. Tracheal hypoplasia

!!!
Hypoplasia of the trachea
- congenital malformation
- the entire trachea is affected
- brachycephalic dogs!!
  (boxer, bulldog, mastiff etc.)

Diameter of the trachea
- Tracheal diameter (TD)
- Thoracic inlet (TI)

Non-brachycephalic: >20%
Brachycephalic: >16%
Bulldogs: >12%

Radiography of the Upper Airways
Foreign body in upper airways

Radiography of the Thorax
General considerations
- frequently indicated
- assessment of vital organs
- monitoring progression of diseases
- high kV, low mAs
- grid
Radiography of the Thorax

General considerations

- The quality of thoracic radiograph is influenced by:
  - left / right recumbency
  - movement blur
  - respiratory phase (expiration - inspiration)

Projections

Left lateral

Right lateral

Ventrodorsal

Dorsoventral

Gross radiographic anatomy

Lateral view
Radiography of the Thorax

Gross radiographic anatomy

Lateral view

Dorsoventral view

Precise positioning!

Radiographic anatomy of the lungs

Composite shadow of:
- alveoli
- interstitium
- vasculature
- brochi and broncheoli
- (thoracic wall)

Alveoli and interstitium
Radiography of the Thorax

Radiographic anatomy of the lungs

Bronchi and bronchioles

Radiography of the Thorax

Lung patterns

Normal lung pattern

Radiography of the Thorax

Lung patterns

Alveolar pattern

Fluid (cells) in the lumen of the alveoli.

Radiography of the Thorax

Lung patterns

Interstial pattern

Causes:
- general increased radiopacity
- diffuse haziness
- increased non-branching linear densities

1. Structured interstitial pattern (nodular)
2. Non-structured interstitial pattern

Causes:
Cell or fluid accumulation in the interstitium
(oedema, haemorrhage, fibrosis, neoplasia etc.)
Radiography of the Thorax

Lung patterns

Interstitial pattern

Causes:
Cell or fluid accumulation in the interstitium of any origin (oedema, haemorrhage, fibrosis, neoplasia, pneumonia etc.)

Nodular pattern – A. Micronodular

- metastases
- PIE (pulmonary infiltrates with eosinophilia)

Brochial pattern

Penbrochial
- inflammation
- proliferation
- calcification
- parallel lines
- end-on view ("donut sign")

Mixed pattern (interst.-alveol.)

Bronchial pattern

Penbrochial
- inflammation
- proliferation
- calcification
- parallel lines
- end-on view ("donut sign")

Nodular pattern – A. Macronodular

- pulmonary metastases
Radiography of the Thorax

Lung patterns

**Mixed pattern** (interst.- bronch.)

**Bullous pattern** (bullae)

**Hypovascularisation**

Extrapulmonary anomalies

**Pneumothorax**
- air in the pleural space
- displacement of the heart
- retraction of the lung lobes

**Pleural effusion**
- homogenous opacities with sharp margins
- interlobar

**Flail chest**
Radiography of the Heart

1. Shape
2. Size
3. Secondary changes (vessels, lung)

Pericardium, muscles, chambers, blood, valves etc. are not seen separately!

Cardiologic diagnosis: never only on the basis of the radiograph!

Radiographic anatomy of the heart

1. Shape

• height: max. 2/3 of the thorax
• width: max. 3 intercostal space

Vertebral Heart Scale (VHS)

VHS = 5.5 + 6.5 = 12

Normal range: 8.5-10.5
Radiography of the Heart

Cardiac enlargement

- Left heart
- Right heart
- Both (generalized cardiomegaly)

Left heart enlargement

- Straight/concave caudal margin
- Elevated trachea
- Secondary pulmonary oedema (e.g. mitral insufficiency)

Right heart enlargement

- Rounded cranial margin
- Longer sternal contact

Generalized enlargement

- E.g. cardiomyopathies
Radiography of the Thorax

**Radiography of the Heart**

Generalized enlargement

Note: pericardial disease
(effusion, hema) !!

**Radiography of the Mediastinum**

- craniodorsal: soft tissue opacity (vena cava, esophagus, a. subclavia, nerves, thymus etc.)
- cranioventral

**Radiography of the Mediastinum**

Esophagus

- cat: herring-bone pattern

**Radiography of the Mediastinum**

Esophageal disorders

- Dilatation:
  - partial (e.g. PRAA)
  - total (megaoesophagus)

SURVEY
Radiography of the Mediastinum

Esophageal disorders

Dilatation: CONTRAST
- partial (e.g. PRAA)
- total (megaoesophagus)

Radiography of the Thorax

Radiography of the Mediastinum

Esophageal Foreign Body

Radiography of the Thorax

Radiography of the Mediastinum

Pneumomediastinum
• injury of the trachea/esophagus or skin on the neck
• the tracheal wall is separated from the mediastinum

Radiography of the Thorax

Radiography of the Mediastinum

Radiography of the Diaphragm

Radiography of the Diaphragm
Radiography of the Diaphragm

**Diaphragmatic hernia**

- abdominal organs in the thorax
- abnormal abdominal anatomy