Radiography of the Abdomen

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Radiography of Abdomen

Standard projections

Laterolateral

Standard projections

Ventrodorsal

Standard projections

Dorsoventral
Radiographic opacities

- Metal
- Bone
- Soft tissue/fluid
- Fat
- Gas

Liver
Kidney
Spleen
Urinary bladder
Fluid filled stomach and intestine

Border effacement

Radiography of Abdomen

Boundaries of the Abdomen

Liver
Kidney
Spleen
Urinary bladder
Fluid filled stomach and intestine

Abdominal hernia: a protrusion of abdominal contents into the subcutis through a natural or acquired opening of the abdominal wall.

Abnormalities in density

Increased radiopacity (loss of abdominal detail):
- decrease in intraabdominal fat (young (<3 month), cachexia)
- abdominal effusion (transudate, exudate, hemorrhage, urine etc.)
Increased radiopacity (loss of abdominal detail):
- decrease in intraabdominal fat (young, kachexia)
- abdominal effusion (transudate, exudate, hemorrhage, urine etc.)

Intraabdominal gas accumulation
- ruptured hollow viscus
- postlaparotomy (3-7 days)

Radiographic sign:
increased visualisation of serosal surface

Radiography of Abdomen
Abnormalities in density

Radiography of Abdomen
Abnormalities in density

Radiography of the Liver
Radiography of the Abdomen

Radiography of the Liver

Homogenous opacity, sharp edge
Liver does not exceed costal arch
Relatively bigger in case of:
- small breed dog
- in Young
- in expiration
- right lateral recumbency

Abnormalities in size

Enlargement (Hepatomegaly)

Causes:
- tumor
- congestion
- hepatitis

Decreased Liver Size

Causes:
- cirrhosis
- portosystemic vascular shunts

Radiography of the Spleen

Spleen
Spleen

Splenomegaly

Abdominal masses

Radiography of Abdomen

Radiography of the Pancreas
Radiography of the Abdomen

Radiography of the Pancreas

Normally not seen!

Pancreatitis, pancreatic mass

- soft tissue radiopacity in the epigastrium

Radiography of the Stomach

Anatomy (ventrodorsal)

Stomach

Location (laterolateral)

Radiographic anatomy

Depends on contents and recumbency!

Solid

Gas
Stomach

Radiographic anatomy
Depends on contents and recumbency!

1. Plain/survey (position, contents)
2. Contrast radiography
   - negative
   - positive (gastric emptying)
   - double

Stomach

1. Survey (position, content)

2.A. Negative contrast
Stomach

2.B. Positive contrast
- BaSO$_4$ (liquid) suspension, 10 ml/kg p.os
- shows the route of chymus along the GI tract
- series of regular bilateral view projections
- evaluation of
  - gastric emptying process
  - anatomy

Gastric emptying process:
- starts 5-10 minutes after feeding
- usually complete emptying in 4 hours
- $4 \text{ h} <$ : delayed gastric emptying

Causes:
- hypertrophy of the pyloric muscle
- hyperplasia of the mucosa
- fibrosis of the pyloric wall
- pyloric tumor
- pyloric foreign body

Morphologic abnormalities

2.C. Double contrast (BaSO$_4$ + air)

dose: 2 ml/kg BaSO$_4$ + 10 ml/kg air

Stomach

Pyloric stenosis – delayed gastric emptying

stenosis of the pyloric canal
**Gastric Dilatation**

- Content: Food

**Gastric Dilatation**

- Content: Gas (tympania ventriculi)

**Gastric dilatation and volvulus**

- Acute, life threatening disease of large breed dogs

**Gastric Foreign Body**

- Radiopaque

**Gastric Foreign Body**

- Radiopaque
Radiology of the Abdomen

Stomach

Gastric Foreign Body

radiopaque

Gastric Neoplasia

Stomach

Gastric Foreign Body

radiolucent

Small Intestine

Survey

Contents!

Small Intestine

Survey

Normal diameter: dog: body of L2
cat: 2xL4
**Small Intestine**

**Contrast radiography**
- to prove/rule out ileus
- barium sulphate liquide p. os, 2-3 ml/kg
- control in 12 hours

**Ileus**
Failure of intestinal contents to pass through the small intestine.

**Survey:**
1. foreign body sometimes visible
2. gas-filled, unequally distended portions of the small intestine
3. sometimes no radiographic evidence
4. further doubt: ultrasound or contrast study

**Small Intestine**

**Small Intestinal Obstruction**

**Small Intestine**

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**Small Intestinal Obstruction**
Small Intestine

**Small Intestinal Obstruction**

*contrast*

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Small Intestine

**Ileus**

*Subileus:*
partial obstruction or narrowing (adhesion, scar)

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Small Intestine

**Ileus**

*Caused by Linear Foreign Body*

- string, fishing line, recording tape, dental floss etc.
- intestine becomes pleated/plicated
- partial/complete obstruction

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Small Intestine

**Ileus**

*Caused by Linear Foreign Body*
**Ileus**
Caused by Linear Foreign Body

- Severe acute clinical signs!
- Uniform gas-filled small intestine loops

**Mesenteric Volvulus**

- Severe acute clinical signs!
- Uniform gas-filled small intestine loops

**Paralytic ileus**

- Decreased motility of the intestines of any origin
- Gas accumulation

**Intestinal perforation**

- Gas/fluid in the peritoneal space

**Enteritis**
Radiography of the Abdomen

Radiography of the Large Intestine

- colon asc., transv., desc.
- cecum

Cecum:
- dog: helical-shaped
- in the geometric midpoint of the abdomen
- cat: not visible

Survey radiograph:
- LL, DV
- contains gas or feces
- location, content
- diameter: max small int. x 3, or length of L7

Contrast study:
- 24 h withhold the food or enema 12 h before examination
- general anaesthesia
- BaSO4 enema
- mucosal surface / space occupying processes
Radiography of the Abdomen

**Radiography of Abdomen**

**Radiography of the Large Intestine**

Positive contrast medium

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Double contrast study

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**Constipation**
- dense, firm contents

**Megacolon**
- motility/innervation disorder of the colon

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- Space-occupying process in the colonial lumen (tumor)
- endoscopy!!

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**Kidneys**
- position: retroperitoneum (craniodorsal)
- same size (L2x2-3)
- well defined (retroperitoneal fat)
1. Intravenous/Excretory Urography (IU, EU)
- intravenous application of water soluble iodinated contrast medium
- selective excretion by kidneys
- dose: 300-600 mg I/kg iv.
- morphological and functional examination
  - of kidney, ureters, bladder
- sedation, withhold the food 24 h before examination

1. Intravenous/Excretory Urography (IVU, EU)
Technique:
- expositions: in the 1, 5, 10 min after injection LL, DV
- contrast enhancement in:
  - renal vasculature/parenchyma
  - renal collecting system, and ureters
  - urinary bladder
    - nephrogram/parenchyma phase 0-1 min
    - pyelogram phase 1-10 min
    - bladder phase >10 min.
2. Positive contrast (retrograde) cystography
- morphological examination of the urinary bladder
- bladder emptying prior to examination
- 5 ml/kg diluted iodinated contrast (300 mg I/ml) (1 part contrast to 1-3 parts water) through catheter
3. Pneumocystography

- Bladder emptying prior to examination
- 5-10 ml air (or CO$_2$)/kg
- Indication: evaluation of the thickness of the bladder wall

4. Double-contrast cystography

- Catheterize and empty the bladder
- Infuse gas to distend the bladder (5-10 ml/kg)
- Inject small volume iodinated contrast media
  (1-2 ml/kg cat, 2-10 ml/kg dog)
- Roll the animal 360°
- Indication: radiopaque cystolith, tumor

5. Positive contrast retrograde urethrography

- To demonstrate urethral stenosis
  Males: catheter 3-4 cm long into the urethra, manual compression
  Females: catheter with cuff
- Exposure: during continuous injection

Kidneys
- Survey, excretory urography

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<tr>
<th>Increased</th>
<th>Size</th>
<th>Decreased</th>
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**Urinary Tract - Abnormalities**

**Kidneys**

- Hydronephrosis

**Ureter**

- Excretory urography

- Dilatation of the ureter (hydroureter)

- Rupture of the ureter

- Excretory urography (+ negative contrast)

- Ectopic ureter
  - Young dog/cat
  - Incontinence
Urinary Tract - Abnormalities

Urinary bladder
- positive contrast cistography
- negative contrast cistography (+EU)
- double contrast cistography
- excretory urography

Dilatation of the bladder

Urinary bladder
Abnormal position

Thickened bladder wall
- cystitis

Cystolithiasis

Cystolithiasis
Radiology of the Abdomen

**Urinary Tract - Abnormalities**

**Urinary bladder**

- Cystolithiasis - double contrast urography

**Urinary Tract - Abnormalities**

**Urinary bladder**

- Rupture of urinary bladder

**Urinary Tract - Abnormalities**

**Urinary bladder**

- Neoplasia of the bladder
  - irregular filling defect / thickening

**Urinary Tract - Abnormalities**

**Urethra**

- Urethral calculi
  - survey: radiopaque calculi

**Urinary Tract - Abnormalities**

**Urethra**

- Urethral calculi
  - filling defect
Radiology of the Abdomen

**Urinary Tract - Abnormalities**

**Urethra**

- Narrowing of the urethral lumen
- Rupture of the urethra

**Male genital system**

**Prostate**

- Prostatomegaly

**Female genital system**

**Uterus**

- Non-gravid: not seen
- Gravid: <45. day – tubular, soft tissue opacity
- Gravid: >45. day – fetal skeleton
Female genital system
Pyometra
tubular, soft tissue opacity in the hypogastrium