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Introduction

At one time or another, all of us in clinical practice have explained to clients such things as the pathology of a failing heart or a prolapsed intervertebral disk. Oftentimes, we’ve used radiographs or hand drawings to communicate important points. Irrespective of our artistic skills, such drawings and explanations transfer information to clients not only about specific diagnoses but also about the rationale behind therapeutic plans.

Hill’s Pet Nutrition thinks client communication is vital to the success of veterinary practice. In accord with that philosophy, Hill’s is proud to present the *Hill’s Atlas of Veterinary Clinical Anatomy*™ - an in-exam room atlas to heighten client communications.

Each illustration in the *Atlas* has been drawn by professional medical illustrators. Generally, the left-hand page depicts normal anatomy, and the right-hand page a pathologic presentation. A brief outline of diagnostic, therapeutic, and dietary plans is included on the right-hand page. This arrangement will allow you to show clients normal anatomy and the pathology affecting their pets while you describe how your therapeutic plan will, if possible, return their pets to health and normal anatomy.

The *Atlas* contains eight sections. Refer to the contents pages for the page numbers and color assigned to each section. These blocks of color are placed around the page numbers at the top of each page. Each section has been assigned a different color for ease of use.

Every effort has been made to ensure the accuracy of the medical illustrations and the diagnostic, therapeutic, and nutritional plans in the *Atlas*. For example, each illustration has been reviewed by appropriate veterinary faculty at the College of Veterinary Medicine, Colorado State University. The *Atlas* is not intended to be an exhaustive review of anatomy, pathology, or medicine. For more information, consult the Bibliography, refer to prescribing information on specific drugs, or call Hill’s Veterinary Consultation Service at 1-800-548-VETS (8387) or e-mail vet_consult@HillsPet.com.

The *Atlas* contains illustrations of the most common conditions seen in clinical practice. Therefore, its proper place is in the exam room, so you can use it daily to enhance client education.

Hill’s Pet Nutrition, Inc.
Chronic Valvular Disease

Diagnostic Plan
- History
- Physical examination
- Chest auscultation
- Chest palpation
- Blood work
- Urinalysis
- Chest x-rays
- Electrocardiography
- Heartworm check
- Echocardiography
- Angiocardiography

Therapeutic Plan
- Drugs to strengthen the heart
- Diuretics
- Drugs that dilate blood vessels
- Drugs that correct abnormal heart rhythms
- Exercise restriction

Dietary Plan
- A mildly restricted sodium diet
- or a moderately restricted sodium diet
- If necessary, change to a severely restricted sodium diet
Heartworm Disease

**Diagnosis Plan**
- History
- Physical examination
- Heartworm check
- Blood work
- Urinalysis
- Chest x-rays
- Electrocardiography
- Echocardiography

**Therapeutic Plan**
- Drugs to kill adult worms
- Restricted exercise
- Aspirin
- Corticosteroids
- Drugs to kill larvae in the bloodstream
- Prevention
- Surgery

**Dietary Plan**
- A diet with controlled levels of protein, phosphorus and sodium
- Consider body condition

Adult heartworms in the pulmonary arteries, right atrium, and right ventricle. Disease within the pulmonary arteries leads to right ventricular dilation, hypertrophy, and failure.
Canine Dilated Cardiomyopathy

**Diagnostic Plan**
- History
- Physical examination
- Urinalysis
- Blood work
- Chest x-rays
- Electrocardiography
- Echocardiography
- X-rays of the heart after dye injection

**Therapeutic Plan**
- Enforced rest
- Removal of fluid from the chest and abdomen
- Diuretics
- Drugs that strengthen the heart
- Drugs that dilate blood vessels
- Bronchodilators
- Oxygen therapy

**Dietary Plan**
- A diet that avoids excess levels of sodium

A globular-shaped heart with severe dilation of both atria and ventricles

- Abnormally thin ventricular walls
- Atrophied papillary muscle
Feline Hypertrophic Cardiomyopathy

**Diagnostic Plan**
- History
- Physical examination
- Chest auscultation
- Palpation of femoral pulses and hindlimb musculature
- Blood work
- Urinalysis
- Electrocardiography
- Chest x-rays
- Echocardiography
- X-rays of the heart and abdominal blood vessels after dye injection

**Therapeutic Plan**
- Enforced rest
- Bronchodilators
- Oxygen therapy
- Removal of fluid from the chest and abdomen
- Drugs that dilate blood vessels
- Aspirin
- Beta blockers
- Heparin
- Surgery

**Dietary Plan**
- A diet that avoids excess levels of sodium

Abnormally increased muscle mass due to a hypertrophied, nondilated left ventricle
Normal Feline Heart

- Aortic arch
- Pulmonary artery
- Left atrium
- Right atrium
- Left ventricle
- Right ventricle
- Chorda tendinea
- Papillary muscle
- Right ventricular free wall
- Ventricular septum
- Left ventricular free wall
Feline Dilated Cardiomyopathy

Diagnostic Plan
History
Physical examination
Chest auscultation
Palpation of femoral pulses and hindlimb musculature
Blood work
Urinalysis
Electrocardiography
Chest x-rays
Echocardiography
X-rays of the heart and abdominal blood vessels after dye injection
Plasma taurine analysis

Therapeutic Plan
Enforced rest
Diuretics
Bronchodilators
Oxygen therapy
Removal of fluid from the chest and abdomen
Drugs that dilate blood vessels
Drugs that strengthen the heart
Heparin
Surgery

Dietary Plan
A diet that contains adequate levels of taurine and avoids excess levels of sodium

A globular heart with severe dilation of the four chambers. Depressed ventricular contractile performance occurs. Ventricular dilation distorts the atrioventricular valves leading to mitral regurgitation and atrial enlargement.
Normal Lymph Node Architecture

- Cortex
- Lymphocytes
- Germinal center
- Efferent lymphatic vessels
- Medulla
- Afferent lymphatic vessel
Lymphosarcoma

The tumor mass is often white on the cut surface, and the capsule is thinned. Microscopically, malignant cells have replaced normal cells and destroyed the normal architecture of the lymph node.

**Lymphosarcoma**

**Diagnostic Plan**
- History
- Physical examination
- Blood work
- FeLV test (for cats)
- X-rays
- Urinalysis
- Biopsy of tissue
- Cell studies
- Endoscopy
- Exploratory surgery
- Examinations of chest and abdominal fluid
- Bone marrow biopsy
- Cerebral spine fluid examination

**Therapeutic Plan**
- Supportive therapy
- Chemotherapy
- Surgical excision
- Radiation

**Dietary Plan**
A diet based on individual patient evaluation including body condition and other organ system involvement or disease
Normal Feline Dentition

Upper Teeth
- Incisors
- Canine
- Premolars
- Molar

Lower Teeth
- Molar
- Premolars
- Canine
- Incisors
Periodontal Disease

Diagnostic Plan
- History
- Physical examination
- Oral examination
- Dental x-rays

Therapeutic Plan
- Tooth scaling above and below the gumline
- Tooth polishing
- Extraction
- Surgery
- Antibacterials
- Tooth brushing

Dietary Plan
- Postsurgery or extractions, a food with nutritional characteristics that support tissue repair.
- A soft food may minimize postprocedural discomfort.
- Long term, a food with formulation and texture that slows the accumulation of plaque and tartar.
Normal Canine Dentition

Upper Teeth
- Incisors
- Canine
- Premolars
- Molars

Lower Teeth
- Molars
- Premolars
- Canine
- Incisors
Carnassial Tooth Abscess

Diagnostic Plan
History
Physical examination
Oral examination
Dental x-rays

Therapeutic Plan
Tooth extraction
Root canals
Antibiotics

Dietary Plan
A diet based on overall patient evaluation including body condition and other organ system involvement
A soft diet may minimize postsurgical pain
Normal Stomach

- Line of dissection
- Esophagus
- Fundus portion of the stomach
- Cardiac portion of the stomach
- Pyloric antrum
- Gastric folds
- Body portion of the stomach
Hemorrhagic Gastritis with Ulcers

**Diagnostic Plan**
- History
- Physical examination
- Blood work
- Stool check for blood
- Stool check for parasites
- Urinalysis
- X-rays of the stomach
- Endoscopy
- Gastric fluid analysis
- Gastric biopsy

**Therapeutic Plan**
- Nothing orally for 12 to 24 hours
- Fluid therapy
- Gastric lavage
- Antiemetic drugs
- Whole blood
- Drugs to inhibit gastric acid secretion
- Surgery

**Dietary Plan**
- A diet based on overall patient evaluation including body condition and other organ systems
- A diet with moderate protein and moderate to low levels of fat and fiber to minimize dietary-induced delays in gastric emptying
- For pets with gastritis caused by food allergy, a hypoallergenic diet

Diffuse redness of the mucosa due to active inflammation and hemorrhage

Gastric ulcers
The pyloric antrum is displaced downward.

The pylorus crosses the midline, passes underneath the distended proximal part of stomach, and moves upward along the left abdominal wall.
**Canine Gastric Dilatation with Volvulus**

**Diagnostic Plan**
- History
- Physical examination
- X-ray of the stomach
- Blood work

**Therapeutic Plan**
- Stomach distention relief
- Shock therapy
- Surgery

**Dietary Plan**
- A low-residue diet, fed in small portions
- Avoid excessive postprandial exercise

**Gastric Dilatation with Volvulus**

- Clockwise volvulus of the stomach; the organ is greatly enlarged
- Duodenum displaced to the left
- Hemorrhages on the stomach’s surface
- The greater omentum covers the stomach’s surface
- The gastric fundus moves ventrally and becomes located in the ventral abdomen.
- The continuing gastric dilatation displaces the greater curvature ventrally.
Hill’s Atlas of Veterinary Clinical Anatomy

Normal Small Intestine

- Kidney
- Descending colon
- Ureter
- Liver
- Stomach
- Spleen
- Mesenteric blood vessels
- Mesentery
- Small intestine
- Urinary bladder

Small intestine

[Image of the normal small intestine with labeled structures]
Foreign Bodies

Diagnostic Plan
History
Physical examination
Abdominal palpation
Abdominal x-rays
Upper G.I. series
Stool analysis
Blood tests
Urinalysis
Endoscopy

Therapeutic Plan
Fluid therapy
Antibacterials
Surgery (to remove foreign bodies)
Nothing by mouth for 24-48 hours

Dietary Plan
Postsurgically, a low-residue diet fed in small portions
Consider overall patient condition when determining the protein level and caloric density of the diet

Foreign body
Dilated loops of bowel cranial to the obstruction
Congested mesenteric blood vessels
Dilated loop of bowel
Foreign object (ball)
Paroviral Enteritis

**Diagnostic Plan**
- History
- Physical examination
- Stool analysis
- Blood tests
- Urinalysis
- Abdominal x-rays
- Upper G.I. series
- Endoscopy with tissue biopsy

**Therapeutic Plan**
- Nothing by mouth
- Fluid therapy
- Intestinal protectants
- Antibacterials
- Analgesics

**Dietary Plan**
- A highly digestible diet
- Consider overall patient condition when determining the protein level and caloric density of the diet

**Paroviruses infecting an intestinal epithelial cell**

The virus typically affects the small intestine

Mitochondria

Golgi apparatus

Viral particle

Nucleus
Intussusception

**Diagnostic Plan**
- History
- Physical examination
- Abdominal palpation
- Abdominal x-rays

**Therapeutic Plan**
- Fluid therapy
- Surgery
- Removal of the cause
- Nothing by mouth

**Dietary Plan**
- Postsurgically, a low-residue diet fed in small portions
- Consider overall patient condition when determining the protein level and caloric density of the diet

Intussusception refers to a loop of intestine within an adjacent segment of intestine. The mesentery and blood vessels supporting the invaginating segment of bowel are included in the intussusception. Congested mesenteric blood vessels lead to obstruction of the small intestine caused by the telescoping of a segment of intestine into an adjacent segment.
Hill’s Atlas of Veterinary Clinical Anatomy

Normal Canine Colon

Transverse colon

Descending colon

Normal mucosa
**Chronic Colitis**

**Diagnostic Plan**
- History
- Physical examination
- Stool analysis
- Abdominal palpation
- Rectal palpation
- Stool culture
- Blood work
- Urinalysis
- X-rays of the colon
- Colonoscopy and biopsy

**Therapeutic Plan**
- Antibacterials
- Dewormers
- Anti-inflammatory drugs

**Dietary Plan**
- High-fiber diets benefit some cases of colitis
- If a high-fiber diet is ineffective, a dietary trial using a low-residue diet is indicated
- For a food-allergy-induced colitis, a hypoallergenic diet is indicated

Friable mucosa that bleeds easily

Ulcers
Normal Feline Colon

- Rectum
- Descending colon
- Transverse colon
- Ascending colon
- Small intestine
**Constipation/Colonic Impaction**

**Diagnostic Plan**
- History
- Physical examination
- Rectal palpation
- Abdominal palpation
- Abdominal x-rays

**Therapeutic Plan**
- Fluid therapy
- Laxatives
- Enemas
- Manual removal of impacted stool
- Surgery
- Treat primary cause, if possible
- Stool softeners
- Pro-motility medication

**Dietary Plan**
- A moderate- to high-fiber diet if no neurologic or obstructive lesions; chronic cases may benefit from low residue food
- Ensure adequate water intake

*Extreme dilation of the descending colon due to impacted feces*

*Dilated descending colon*

*Mass of impacted feces in the descending colon*
Hill’s Atlas of Veterinary Clinical Anatomy

Normal Canine Pancreas

- Esophagus
- Stomach
- Right lobe of the pancreas
- Left lobe of the pancreas
- Duodenum
- Cecum
- Ileum
- Jejunum
- Transverse colon
- Descending colon
Acute Pancreatitis

**Diagnostic Plan**
- History
- Physical examination
- Blood work
- Urinalysis
- Abdominal x-rays

**Therapeutic Plan**
- Fluid therapy
- No oral medication or food
- Antibacterials
- Drugs to suppress vomiting
- Analgesics

**Dietary Plan**
- When resuming enteral nutrition, small portions of a diet low in fat and residue
- After the initial episode, manage hyperlipidemia, if necessary
**Normal Pancreas**

- Left lobe of the pancreas
- Right lobe of the pancreas
- Duodenum
- Cecum
- Ileum
- Jejunum
- Transverse colon
- Descending colon
- Esophagus
- Stomach
Exocrine Pancreatic Insufficiency

Diagnostic Plan
- History
- Physical examination
- Stool analysis
- Absorption tests
- Blood work
- Intestinal biopsy

Therapeutic Plan
- Pancreatic enzymes
- Medium-chain fats
- Antacids
- Drugs that inhibit acid secretion in the stomach

Dietary Plan
- A highly digestible diet
- Consider overall body condition
- Feed quantities sufficient to maintain normal body weight
- Avoid excess fat

Shrunken pancreatic lobes with reduced production of digestive enzymes
End-Stage Liver Disease

Diagnostic Plan
- History
- Physical examination
- Abdominal palpation
- Blood work
- Abdominal x-rays
- Blood clotting time
- Urinalysis
- Liver biopsy
- Abdominal ultrasonography

Therapeutic Plan
- Fluid therapy
- Cage rest
- Corticosteroids

Dietary Plan
A diet that will reduce the need for certain liver functions
Provide adequate protein, but avoid excess
Consider possible need for controlled sodium intake

Fibrous connective tissue between regenerative nodules

Regenerative nodules

Fatty change of liver cells

Reduced number of normal liver cells

Fibrous connective tissue separating parenchymal nodules
Caudal vena cava
Caudate process of caudate lobe
Portal vein
Right lateral lobe
Right medial lobe
Quadrate lobe
Hepatic artery
Left lateral lobe
Papillary process of caudate lobe
Gallbladder
Lungs
Kidney
Omentum
Heart
Liver
Gallbladder
Diaphragm
Hepatic Neoplasia

Diagnostic Plan
History
Physical examination
Blood work
Urinalysis
X-ray of the liver
Ultrasound
Liver biopsy
Exploratory surgery

Therapeutic Plan
Supportive care
Chemotherapy
Surgery

Dietary Plan
A diet based on individual patient evaluation including body condition and other organ system involvement. Special attention should be given to protein levels and amino-acid balance of the diet.
**Anal Sac Abscess**

**Diagnostic Plan**
- History
- Physical examination
- Abscess culture

**Therapeutic Plan**
- Lancing of the abscess
- Anal sac expression
- Hot soaks
- Antiseptic solutions
- Antibacterials
- Anal sac removal

**Dietary Plan**
- Postsurgically, a diet adequate for tissue repair
Skin Abscess

**Diagnostic Plan**
- History
- Physical examination
- Abscess culture
- X-rays

**Therapeutic Plan**
- Hot compresses
- Abscess drainage
- Dead tissue removal
- Antibacterial therapy
- Surgery

**Dietary Plan**
- A diet adequate for tissue repair

*Staphylococcus intermedius organisms*

- Ruptured abscess caused by a bite wound
- Collection of pus in the walled-off abscess
- Thickened skin walls around the abscess

Collection of pus in the walled-off abscess

Ruptured abscess caused by a bite wound

Thickened skin walls around the abscess
Flea-Allergy Dermatitis

**Diagnostic Plan**
- History
- Physical examination
- Detection of fleas, flea dirt, and tapeworm segments
- Intradermal skin testing

**Therapeutic Plan**
- Flea control
- Short-term corticosteroids

**Dietary Plan**
- A diet adequate for tissue repair

Self-inflicted trauma results in erythema, papules, pustules, crusts, and hair loss in areas where fleas feed.
Spinous process

Transverse process

Intervertebral disk

Spinal nerve

Vertebral body

Spinal cord

Nucleus pulposus

Intervertebral disk
Intervertebral Disk Disease

Diagnostic Plan
- History
- Physical examination
- Neurologic examination
- X-ray of the spine

Therapeutic Plan
- Enforced rest
- Anti-inflammatory drugs
- Analgesics
- Muscle relaxants
- Surgery
- Physical therapy

Dietary Plan
- Postsurgically, a diet adequate for tissue repair
- If obesity is a complicating factor, restrict caloric intake so the patient reaches and maintains an ideal body weight
**Osteochondritis Dissecans**

**Diagnostic Plan**
- History
- Physical examination
- X-rays

**Therapeutic Plan**
- Surgery

**Dietary Plan**
- Postsurgically, a diet adequate for tissue repair and patient growth
- Avoid overfeeding throughout life
- Avoid excess calcium and energy in growing large and giant-breed pups

Free-floating fragment of cartilage and bone within the shoulder joint

Site of detachment
Normal Elbow

- Humerus
- Ulna
- Radius
- Anconeal process
Ununited Anconean Process

diagnostic plan
history
physical examination
x-rays of the elbow

therapeutic plan
surgery

dietary plan
postsurgically, a diet adequate for tissue repair and patient growth
avoid excess calcium and energy in growing large and giant-breed pups
avoid overfeeding throughout life

Panosteitis

diagnostic plan
history
physical examination
palpation
x-rays

therapeutic plan
analgesics

dietary plan
a diet adequate for growth
avoid overfeeding throughout life
Normal Hip Joint

Well-formed, deep hip joint

Ilium

Femoral head

Pelvis
Hip Dysplasia

Diagnostic Plan
History
Physical examination
Palpation of the hips
X-rays of the hips

Therapeutic Plan
Enforced rest
Mild analgesics
Anti-inflammatory drugs
Surgery

Dietary Plan
Postsurgically, a diet adequate for tissue repair
If obesity is a complicating factor, restrict caloric intake so the patient reaches and maintains an ideal body weight
Normal Rear Leg

- Pelvis
- Femur
- Tibia
- Patella
- Quadriceps muscles
Femoral Fracture

Diagnostic Plan
History
Physical examination
Palpation of the femur
X-rays

Therapeutic Plan
Surgery

Dietary Plan
A diet adequate for tissue repair
Normal Stifle

- Patella
- Femur
- Lateral collateral ligament
- Caudal cruciate ligament
- Cranial cruciate ligament
- Medial meniscus
- Lateral meniscus
- Medial collateral ligament
- Tibia
- Fibula
Ruptured Cranial Cruciate Ligament

Diagnostic Plan
History
Physical examination
Palpation of the knee
X-rays of the knee

Therapeutic Plan
Enforced rest
Analgesics
Surgery

Dietary Plan
Postsurgically, a diet adequate for tissue repair
If obesity is a complicating factor, restrict caloric intake so the patient reaches and maintains an ideal body weight
Normal Stifle

- Quadriceps tendon
- Patella
- Cranial border of the tibia
- Femur
- Tibia
- Fibula
**Patellar Luxation**

**Diagnostic Plan**
- History
- Physical examination
- Stifle palpation
- Stifle x-rays

**Therapeutic Plan**
- Surgery

**Dietary Plan**
- Postsurgically, a diet adequate for tissue repair
- If obesity is a complicating factor, restrict caloric intake so the patient reaches and maintains an ideal body weight
Normal Mouth/Upper Airway

- Nasal cavity
- Hard palate
- Soft palate
- Esophagus
- Trachea
- Epiglottis
- Tonsil
- Tongue
- Larynx
### Tonsillitis

#### Diagnostic Plan
- History
- Physical examination
- Examination of the tonsils
- Culture of the tonsils
- Cytologic study of tonsillar exudate
- X-rays

#### Therapeutic Plan
- Elimination of the cause
- Antibacterials
- Tonsillectomy

#### Dietary Plan
- A diet based on overall patient evaluation including body condition and other organ system involvement
- A soft diet may minimize postsurgical pain

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![Illustration of Inflamed Tonsils Protruding from the Pharynx and Reddened Pharynx](image-url)
Collapsing Trachea

**Diagnostic Plan**
- History
- Physical examination
- Tracheal palpation
- Chest auscultation
- Chest x-rays
- Tracheoscopy
- Cultures of tracheal wash fluid

**Therapeutic Plan**
- Activity restriction
- Corticosteroids
- Steam vaporization
- Bronchodilators
- Antitussives
- Antibacterials
- Surgery

**Dietary Plan**
If surgery is performed, a diet adequate for tissue repair
If obesity is a complicating factor, restrict caloric intake so the patient reaches and maintains an ideal body weight

Grade IV collapsed trachea; the airway lumen is essentially obliterated

The tracheal cartilage is inverted dorsally and contacts the tracheal membrane

Normal tracheal ring

The tracheal cartilage is inverted dorsally and contacts the tracheal membrane
Hill’s Atlas of Veterinary Clinical Anatomy

Normal Feline Thorax

- Cervical vertebrae
- Esophagus
- Trachea
- Scapula
- Cut away section of the ribs
- Hyoid apparatus
- Larynx
- Humerus
- Diaphragm
- Heart
- Cranial lobe of the lung
- Middle lobe of the lung
- Caudal lobe of the lung
**Pulmonary Edema**

**Diagnostic Plan**
- History
- Physical examination
- Chest auscultation
- Chest x-rays
- Electrocardiography
- Blood work
- Urinalysis

**Therapeutic Plan**
- Activity restriction
- Oxygen therapy
- Morphine
- Diuretics
- Corticosteroids
- Nebulization
- Bronchodilators
- Vasodilators
- Drugs to strengthen the heart

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
- Avoid excess sodium
Normal Canine Kidney

- Renal artery
- Renal vein
- Ureter
- Fat in the renal sinus
- Renal pelvis
- Cortex
- Medulla
- Capsule

Renal Cut Surface
**Chronic Renal Disease**

**Diagnostic Plan**
- History
- Physical examination
- Abdominal palpation
- Urinalysis
- Blood work
- Blood pressure measurement
- Abdominal x-rays
- Kidney biopsy
- Ultrasound

**Therapeutic Plan**
- Fluid therapy
- Sodium bicarbonate
- Drugs to control stomach acidity
- Phosphate binders
- Blood transfusions
- Anabolic steroids
- Peritoneal dialysis

**Dietary Plan**
- A diet with controlled and appropriate levels of protein, phosphorus, sodium, and calories

Pal, shrunken, firm kidney with a pitted surface

Scarring
Acute Renal Failure

**Diagnostic Plan**
- History
- Physical examination
- Abdominal palpation
- Urinalysis
- Blood work
- Abdominal x-rays
- Kidney biopsy
- Ultrasound

**Therapeutic Plan**
- Fluid therapy
- Diuretics
- Phosphate binders
- Sodium bicarbonate
- Drugs to control stomach acidity
- Peritoneal dialysis

**Dietary Plan**
A diet with controlled and appropriate levels of protein, phosphorus, sodium, and calories
Normal Urinary Bladder

Prostate gland

Urethra

Urinary bladder
Bladder Stones

Diagnostic Plan
History
Physical examination
Palpation of the urethra and urinary bladder
Urinalysis
Urine culture
Blood work
X-rays of the urinary tract
Quantitative analysis of passed bladder stones

Therapeutic Plan*
Fluid therapy
Antibacterials
Urease inhibitors
Xanthine oxidase inhibitors
Urine alkalizers
Thiol-containing drugs
Surgery
Voiding urohydropropulsion

Dietary Plan*
For dissolution, the proper calculolytic diet
To aid in prevention or recurrence, a diet that allows the body to produce the appropriate urine pH and avoids excesses of the urolith’s precursors
If surgery is necessary, a diet adequate for tissue repair
* Determined by stone type
Hemorrhages on the surface of the bladder

Distended urinary bladder caused by an obstructing urethral calculus

Urethral calculus immediately behind the os penis; the calculus is obstructing the outflow of urine from the bladder

Canine Urethral Obstruction

**Diagnostic Plan**
- History
- Physical examination
- Urethral palpation
- Abdominal palpation
- X-rays of the urinary tract
- Urinalysis
- Urine culture
- Blood work
- Analysis of passed bladder stones

**Therapeutic Plan**
- Emptying of the bladder
- Fluid therapy
- Flushing of the urethral calculi into the bladder
- Surgery

**Dietary Plan**
- For dissolution, the proper calculolytic diet
- To aid in prevention or recurrence, a diet that allows the body to produce the appropriate urine pH and avoids excesses of the urolith's precursors
- If surgery is necessary, a diet adequate for tissue repair
Hill’s Atlas of Veterinary Clinical Anatomy

Normal Feline Lower Urinary System

- Urinary bladder
- Testicular vessels
- Ureter
- Descending colon
- Prostate gland
- Rectum
- Bulbourethral gland
- Urethra
- Pelvic symphysis
- Ductus deferens
- Prepuce
- Testicle
- Penis
- Glans penis
Feline Urologic Syndrome

**Diagnostic Plan**
- History
- Physical examination
- Abdominal palpation
- Urethral palpation
- Urinalysis
- Urine culture
- X-rays of the urinary tract
- Blood work

**Therapeutic Plan**
- Emptying of the bladder
- Fluid therapy
- Removal of the urinary obstruction

**Dietary Plan**
- For dissolution, the proper calculolytic diet
- To aid in prevention or recurrence, a diet that allows the body to produce the appropriate urine pH and avoids excesses of the urolith's precursors
- If surgery is necessary, a diet adequate for tissue repair
Normal Prostate Gland

- Ductus deferens
- Descending colon
- Ureter
- Urinary bladder
- Prostate gland
- Urethra
Benign Prostatic Hyperplasia

Diagnostic Plan
- History
- Physical examination
- Rectal palpation
- Abdominal palpation
- X-rays
- Ultrasound
- Urinalysis
- Urine culture
- Blood work
- Prostate biopsy

Therapeutic Plan
- Emptying of the bladder
- Enemas
- Stool softeners
- Castration
- Medical therapy

Dietary Plan
- If surgery is necessary, a diet adequate for tissue repair
- A low residue food

The enlarged prostate gland may impinge on the rectum

Diffuse enlargement of the prostate gland due to epithelial or glandular hyperplasia
**Ovariohysterectomy**

**Indications**
- Sterilization
- Ovarian disease
- Uterine disease
- Behavioral problems
- Vaginal hyperplasia
- Diabetes
- Epilepsy
- Mammary tumor prevention

**Dietary Plan**
Postsurgically, a diet adequate for tissue repair
**Pyometra**

**Diagnostic Plan**
- History
- Physical examination
- Vaginal cytologic study
- Abdominal palpation
- Rectal palpation
- Blood work
- Urinalysis
- Urine culture
- Abdominal x-rays
- Ultrasound

**Therapeutic Plan**
- Fluid therapy
- Surgery
- Antibacterials
- Prostaglandins

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement
- Postsurgically, a diet adequate for tissue repair

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**Normal Anatomy**
- Uterine horns
- Body of the uterus
- Cervix
- Vagina

**Cut section showing an enlarged, pus-filled uterus**

**Congestion of uterine body walls**

**The tissue is friable and easily torn**
Canine Castration

**Indications**
- Sterilization
- Testicular disease
- Prostatic disease
- Behavioral problems
- Retained testicles

**Dietary Plan**
- Postsurgically, a diet adequate for tissue repair

**Diagram**
- Cut section of the pelvis
- Dorsal artery to the penis
- Dorsal vein to the penis
- Scrotum
- Epididymis
- Testicle
- Ligature around the vas deferens
- Castration
- Sutures cranial to the scrotum
- Ductus deferens
- Urinary bladder
- Testicular artery
- Testicular vein
- Penis
- Dorsal artery to the penis
- Dorsal vein to the penis
- Epididymis
- Testicle
Testicular Tumors

Diagnostic Plan
History
Physical examination
Testicular palpation
X-rays of the abdomen
Biopsy

Therapeutic Plan
Surgery
Chemotherapy

Dietary Plan
Postsurgically, a diet adequate for tissue repair
Consider body condition; feed a diet appropriate to maintain ideal body weight
Nuclear Sclerosis/Cataracts

Nuclear sclerosis is a normal aging change that results from compaction and hardening of the lens fibers.

A cataract is an opacity of the lens fibers or capsule.

**Diagnostic Plan**
- History
- Physical examination
- Ophthalmic examination
- Blood tests
- Urinalysis

**Therapeutic Plan**
- Surgery
- Therapy for any concurrent disease
- No therapy is necessary for nuclear sclerosis

**Dietary Plan**
A diet based on individual patient evaluation including body condition and other organ system involvement or disease.
Normal Feline Eye

- Cornea
- Iris
- Vitreous body
- Ciliary body
- Lens
- Retina
- Optic nerve
- Optic disk
- Anterior chamber
- Filtration angle
**Glaucoma**

**Diagnostic Plan**
- History
- Physical examination
- Ocular examination
- Measurement of intraocular pressure

**Therapeutic Plan**
- Drugs that relieve intraocular pressure
- Surgery

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease

Increase in intraocular pressure

The globe is enlarged, pain may be present, the episcleral vessels are congested, and vision loss occurs.

Cloudy, edematous, insensitive cornea

Intraocular pressure is increased due to a disorder of the drainage angle
Normal Feline Eye

- Cornea
- Iris
- Ciliary body
- Lens
- Vitreous body
- Retina
- Optic disk
- Optic nerve
- Anterior chamber
- Filtration angle
**Corneal Ulceration**

**Diagnostic Plan**
- History
- Physical examination
- Ocular examination
- Fluorescein stain
- Culture
- Cytologic examination

**Therapeutic Plan**
- Antibacterial ointment and solutions
- Drugs that dilate the pupil
- Surgery
- Drugs to lessen the risk of pigment formation in the cornea

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
Normal Hearing Apparatus

- Auricular cartilage
- Pinna
- Vertical canal
- Temporalis muscle
- Auditory ossicles
- Cochlea
- Horizontal canal
- Auditory tube
- Tympanic membrane
- Middle ear cavity
- Tympanic bulla
**Otitis Externa, Media, Interna**

**Diagnostic Plan**
- History
- Physical examination
- Ear examination
- Ear cultures
- Thyroid hormone levels
- Intradermal skin testing
- X-rays
- Therapeutic trials with insecticides and hypoallergenic diets

**Therapeutic Plan**
- Removal of ear canal hair
- Ear cleaning
- Topical application of antibiotics/corticosteroids
- Systemic antibacterials
- Systemic corticosteroids
- Surgery

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
- Hypoallergenic diets

**Otitis Externa**
- Inflamed, reddened ear
- Partial occlusion of the ear canal due to cellular hyperplasia
- Inflammatory exudate

**Otitis Media**
- Inflammatory exudate in the tympanic bulla

**Otitis Interna**
- Inflamed reddened ear structures
- Neurologic changes (head tilt and circling)
- Inflammatory exudate
- Osteomyelitis due to the infectious process

**Inflammatory exudate**
- Inflammatory exudate
- Inflamed reddened ear structures

**Neurologic changes**
- Head tilt and circling

**Inflammatory exudate in the tympanic bulla**
- Inflammatory exudate
- Osteomyelitis due to the infectious process

**Inflamed reddened ear structures**
- Inflamed reddened ear structures
- Neurologic changes (head tilt and circling)

**Inflamed, reddened ear**
- Inflamed, reddened ear
- Partial occlusion of the ear canal due to cellular hyperplasia

**Therapy**
- Removal of ear canal hair
- Ear cleaning
- Topical application of antibiotics/corticosteroids
- Systemic antibacterials
- Systemic corticosteroids
- Surgery

**Diet**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
- Hypoallergenic diets
Heartworms

**Diagnostic Plan**
- History
- Physical examination
- Heartworm check
- Chest x-rays
- Blood work
- Urinalysis

**Therapeutic Plan**
- Drugs to kill adult worms
- Aspirin
- Corticosteroids
- Restricted exercise
- Drugs to kill larvae in the bloodstream
- Prevention
- Surgery

**Dietary Plan**
- A diet with controlled levels of protein, phosphorus, and sodium
- Consider body condition

Infected mosquitoes deposit heartworm larvae into the animal’s hemolymph by puncturing the animal’s skin.

Mature females release microfilariae into the bloodstream where they are picked up by mosquitoes.

Young adults migrate to the pulmonary arteries and heart.

Larvae migrate to subcutaneous tissues where they mature to a young-adult stage.
Giardia species exist as motile trophozoites and nonmotile cysts. Both forms are transmitted by ingestion and are passed intermittently in the host’s feces.

**Giardia**

**Diagnostic Plan**
- History
- Physical examination
- Stool analysis
- Analysis of intestinal scrapings collected during endoscopy
- Blood test
  (Giardia antigen test)

**Therapeutic Plan**
- Drugs to kill the parasite

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
Hookworms

**Diagnostic Plan**
- History
- Physical examination
- Stool analysis
- Blood work

**Therapeutic Plan**
- Dewormers
- Blood transfusions
- Supportive therapy

**Dietary Plan**
A diet based on individual patient evaluation including body condition and other organ system involvement or disease.
Whipworms

Diagnostic Plan
- History
- Physical examination
- Stool analysis
- Colonoscopy
- Therapeutic deworming

Therapeutic Plan
- Dewormers
- Supportive therapy

Dietary Plan
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease

The adult whipworm is embedded in the wall of the large intestine and cecum.

Infected larva develops inside the egg but does not hatch unless the egg is swallowed.

Eggs are passed in the feces.
The host either ingests eggs containing infective larvae or an intermediate host with larvae arrested in its tissues. Eggs are passed in the feces. Larvae may be shed in the milk and ingested by neonates.

Roundworms

Diagnostic Plan
- History
- Physical examination
- Stool analysis

Therapeutic Plan
- Dewormers
- Supportive therapy

Dietary Plan
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
Tapeworms (Taenia)

Diagnostic Plan
History
Physical examination
Detection of tapeworm segments in the stool

Therapeutic Plan
Dewormers
Control of patient’s hunting and eating habits

Dietary Plan
A diet based on individual patient evaluation including body condition and other organ system involvement or disease

The host becomes infected by eating an infected intermediate host.

The oncosphere hatches in the intermediate host and differentiates into a metacestode.

Proglottids shed in the feces.
Tapeworms (Dipylidium caninum)

**Diagnostic Plan**
- History
- Physical examination
- Detection of tapeworm segments in the stool
- Detection of fleas or flea dirt

**Therapeutic Plan**
- Dewormers
- Flea control

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
Fleas

**Diagnostic Plan**
- History
- Physical examination
- Stool inspection for tapeworm segments

**Therapeutic Plan**
- Flea control

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
Adult ticks lay thousands of eggs, which undergo two molts: larva to nymph and nymph to adult.

Larvae, nymphs, and adults feed on blood and lymph.

Dermacentor variabilis larvae and nymphs feed on small mammals and drop off between molts.

Adults feed on pets.

Rhipicephalus sanguineus larvae, nymphs, and adults all feed on pets.
Female mites burrow into the skin and lay eggs in the tunnels that they form.

Larvae and nymphs develop in these tunnels.

The patient response is often severe self-inflicted trauma.

**Sarcoptes**

**Diagnostic Plan**
- History
- Physical examination
- Skin scrapings
- Skin biopsy
- Therapeutic trial

**Therapeutic Plan**
- Coat clipping
- Parasiticidal dips
- Antibacterials

**Dietary Plan**
A diet based on individual patient evaluation including body condition and other organ system involvement or disease
Demodex is part of the normal skin fauna and is usually present in small numbers in healthy animals.

Demodex

**Diagnostic Plan**
- History
- Physical examination
- Skin scrapings
- Skin biopsy
- Skin culture

**Therapeutic Plan**
- Topical keratolytic agents
- Antibacterials
- Topical drugs to kill the mite

**Dietary Plan**
- A diet adequate for tissue repair
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
- Medication to kill the mite

The entire life cycle is spent on the host in the hair follicles or sebaceous glands.

Adult Demodex mite
These mites live in keratin on the skin’s surface and feed on tissue fluids.

The entire life cycle is thought to occur on the host.

**Cheyletiella**

**Diagnostic Plan**
- History
- Physical examination
- Skin scrapings
- Skin biopsy
- Acetate tape impressions
- Direct visualization of the parasite

**Therapeutic Plan**
- Parasiticidal dips

**Dietary Plan**
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease
Ear Mites

**Diagnostic Plan**
- History
- Physical examination
- Ear examination
- Microscopic examination of ear canal exudate

**Therapeutic Plan**
- Ear canal cleaning
- Drugs to kill the mites
- Surgical repair of aural hematomas
- Antibacterials, if needed

**Dietary Plan**
- A diet adequate for tissue repair
- A diet based on individual patient evaluation including body condition and other organ system involvement or disease

Adult mites live on the surface of the skin, most commonly in the ear canals. The entire life cycle occurs on the host.