DISEASES OF JOINTS

DEVELOPMENTAL DISEASES OF JOINTS

- **Osteochondrosis:** Osteochondrosis is a common and important disease of pigs, horses, and large breeds of dog.
- The etiology and pathogenesis of osteochondrosis are poorly understood.
- The etiology is multifactorial, but most likely involves the effect of trauma or biomechanical factors on cartilage that has been weakened by nutritional or hormonal imbalances, vascular disruption, or genetic factors.
- Trauma almost certainly plays an important role, as supported by the increased prevalence of articular lesions at sites of greatest weightbearing force.

DEVELOPMENTAL DISEASES OF JOINTS

- **Subluxation** is the term referring to a partial separation of the joint.
- The most commonly subluxated joints in dogs include the hip and elbow, although any joint can be affected.
- "Trauma, such as an automobile accident, is the most common cause of sudden or acute joint subluxations in veterinary practice.

DEVELOPMENTAL DISEASES OF JOINTS

- Atlanto-occipital subluxation:
- In dogs, goats, cattle, and horses.
- It is inherited in some Arabian foals.
- Affected foals may be dead or tetraparetic at birth, or develop progressive ataxia within a few months.
- Temporomandibular subluxation:
- It is reported in Basset Hounds and Irish Setters.
- Clinically; The jaw joint is locked and the mouth is open.

DEVELOPMENTAL DISEASES OF JOINTS

- Subluxation of the corpus:
- is reported as a sex-linked recessive trait in a colony of dogs in which hemophilia.
- Signs of carpal subluxation first appear when the animals begin to walk.
- Most carpal subluxations and luxations are secondary to trauma.
- Patellar luxation and subluxation:
- are common in dogs, less so in horses, and rare in other species.
- It is more common in females and thought to be hereditary.

Hip dysplasia (acetabular dysplasia)

- *Hip dysplasia is the most common skeletal disease of large and giant breeds of dogs,* but may occur in all dog breeds and is occasionally reported in cats, cattle, and horses.
- The *disease is characterized by a lack of conformity between the femoral head and acetabulum resulting in subluxation and, invariably, degenerative joint disease.*

Hip dysplasia (acetabular dysplasia)

❖ Two forms are distinguished;

- Congenital type is the hereditary dominant feature. The joint depends on the capsule-ligament slackness.
- The delayed type develops later and is associated with acetabular dysplasia.

❑ There are two theories in their development:

✓ It develops due to insufficient pelvic muscle mass.

✓ It develops due to osteochondrosis.

Hip dysplasia

- Radiographic evidence of hip dysplasia in affected pups is usually not apparent until about 6 months of age.
- Radiographic diagnosis of hip dysplasia is based on the presence of subluxation of the joint or evidence of degenerative joint disease, or both.
- The gross lesions of canine hip dysplasia vary with the stage of the disease.
- The lesions are most prominent in weightbearing areas of the femoral head and the dorsal rim of the acetabulum.
- Hip dysplasia in cattle is best known in Herefords but also occurs in the Aberdeen Angus, Galloway, and Charolais.

DEGENERATIVE DISEASES OF JOINTS

- It can be either monoarticular or polyarticular and may be classified as either primary or secondary.
- **Primary** degenerative joint disease refers to those cases where there is no apparent predisposing cause and generally occurs in older animals.
- **Secondary** degenerative joint disease is associated with an underlying abnormality in the joint or its supporting structures, predisposing to premature degeneration of the cartilage.
- Any condition that causes direct damage to the articular cartilage, creates instability, or results in abnormal directional forces can predispose to degenerative joint disease.

DEGENERATIVE DISEASES OF JOINTS

- In general, two main factors are effective in the development of degenerative arthropathy:

❑ 1. Mature articular cartilage is not sufficient to repair itself

❑ 2. Constant mechanical pressures

- The most important and severe degenerative changes occur in large joints in the extremities, which are important in the movement and in the heavy load.

Traumatic Injuries

- Traumatic injury is handled in two headings:
- The first one is sudden and severe (acute) and the second is chronic injuries.
- Acute cases are the cause of degenerative arthropathy.
- Synovial tissue and capsule is stretched, lasered and rotated in acute injuries of sprains (distortion, incomplete, dislocation and dislocation).
- The ligament can be separated from the bone.

Spondylosis

(Spondylosis Deformans, Ankylosing Spondylosis)

- Spondylosis is a common degenerative disease of the vertebral column characterized by the formation of osteophytes at the ventral and lateral margins of vertebral bodies adjacent to intervertebral spaces.
- The pathogenesis of spondylosis is believed to involve an initial degenerative change in the ventral annulus fibrosus, probably secondary to trauma.
- Spondylosis occurs most frequently in bulls, pigs, and dogs.

INFLAMMATORY DISEASES OF JOINTS

- Inflammatory diseases of joints are generally referred to as either arthritis or synovitis
- **Synovitis refers to inflammation of a synovial membrane, whereas arthritis implies** *of other joint components in addition to the synovial membrane.*
- **Inflammation of tendon sheaths often accompanies inflammation of an adjacent synovial joint and is referred to as tenosynovitis (synonyms: tendosynovitis or tendovaginitis).**

INFLAMMATORY DISEASES OF JOINTS

- Arthritis may be either infectious or noninfectious, depending on the etiology.
- Infectious arthritis occurs most frequently in farmed livestock and horses, especially in young animals where it is a common sequel to neonatal bacteremia.
- Most cases of noninfectious arthritis occur in dogs or cats and are immune-mediated. Further classification is based on the duration of the lesion, the nature of the exudate, and the host response.

INFLAMMATORY DISEASES OF JOINTS

According to the type of exudate;

- **Fibrinous arthritis**
- **Purulent (suppurative) arthritis**
- **Fibrinopurutent arthritis**

According to the etiologic agent;

Infectious arthritis

- ***Bacterial arthritis***
- **Erysipelas**
- **Streptococcal septicemia and polyarthritis**
- **Coliform polyarthritis**
- **Staphytococcal arthritis**
- ***Haemophilus* and *Histophilus* septicemia and arthritis**
- **Borretiosis**
- **Rickettsial polyarthritis**
- **Chlamydial polyarthritis**
- **Mycoplasmal arthritis**
- ***Viral arthritis***
- ***Fungal arthritis***
- ***Protozoal arthritis***

Noninfectious (immune-mediated) arthritis

❖ ***Erosive arthritis***

- **Rheumatoid arthritis**
- **Polyarthritis of Greyhounds**
- **Feline chronic progressive polyarthritis**

❖ ***Nonerosive arthritis***

- **Idiopathic polyarthritis**
- **Drug-induced polyarthritis**

Fibrinous Arthritis

- This is typical of many acute inflammatory diseases of synovial joints, particularly those caused by bacterial infections.
- The presence of fibrin within synovial fluid indicates increased permeability of blood vessels in the synovial membrane, as fibrinogen and other large molecules are normally excluded.
- Fibrin clots may be floating free within the joint fluid, attached to the synovial membrane or lodged within recesses of the joint.

Fibrinous Arthritis

- In some cases, *sheets of yellow fibrin* partially or completely cover the synovial membrane, which is often edematous and hyperemic or may be studded with petechiae
- *Synovial villi,* which are barely noticeable in normal joints, may become prominent macroscopically due to the edema and hyperemia.
- The synovial fluid is increased in volume and is usually slightly *turbid and mucinous.*
- When the inflammatory reaction is severe, there may be *gross edema of the periarticular tissues.*

Fibrinous Arthritis

- At this early stage, microscopic changes in the synovial membrane consist of edema and vascular engorgement, with few inflammatory cells.
- *Serous fluid or serofibrinous exudate* often infiltrates the fibrous layer of the articular capsule and the adjacent periarticular tissue.

Fibrinous Arthritis

- In arthritis of longer duration, edema of synovial tissues is less apparent but the joint capsule and synovial membrane are thickened due *to proliferation of stromal cells and synoviocytes,* the latter often becoming several layers thick.
- *Sheets of fibrin containing variable numbers of neutrophils and fibroblasts may be attached to the surface.*
- Villi continue to enlarge as a result of the cellular proliferation and may become extensively branched, with increasing numbers of lymphocytes and plasma cells, but few neutrophils.

Fibrinous Arthritis

- Early resolution of the infection in animals with fibrinous arthritis is common, especially in smaller joints.
- The synovial lining is repaired by proliferation of synoviocytes.
- Articular cartilage generally remains intact in fibrinous arthritis, except in areas where it is covered by pannus.
- Pannus formation in joints with restricted movement may result in adhesions between apposed articular surfaces, leading to ankylosis.

Purulent (suppurative) arthritis

- This is characterized by the presence of *significant numbers of neutrophils in the synovial fluid, synovial membrane, and sometimes in adjacent structures.*
- When caused by bacterial infection, the neutrophils are usually abundant and may show *degenerative changes* in cytologic preparations of joint fluid.
- This is often referred to as **septic arthritis.**
- Neutrophilic inflammation is a feature of arthritis caused by *Mycoplasma* spp., *Borrelia burgdorferi,* and certain viruses, but in these infections the neutrophils in synovial fluid are *nondegenerate.*

Purulent (suppurative) arthritis

- Noninfectious, immune-mediated arthritis is also characterized by the presence of nondegenerate neutrophils in synovial fluid and differentiation from infectious arthritis is often difficult.
- Septic arthritis is often monoarticular and is potentially a much more destructive process than fibrinous arthritis.
- The synovial fluid is initially thin and cloudy but may resemble flank pus after a few days.

Purulent (suppurative) arthritis

- *Destruction of articular cartilage* is much more likely to occur in septic arthritis than in fibrinous arthritis.
- *Lysosomal enzymes,* particularly collagenase, released from degenerating neutrophils probably play an important role in the cartilage destruction.
- Flegmon is formed by the spread of the purulent arthritis to the surrounding tissues
- The circumference of the joint extends greatly and the fistula may form in the skin.

Purulent (suppurative) arthritis

- *Complete resolution of septic arthritis is possible* if the infection is eliminated spontaneously or by antibiotic therapy before erosion of cartilage occurs, but if the inflammatory process persists, the joint and adjacent structures will be severely altered.
- Granulation tissue originating in the subchondral bone may grow out over the degenerate articular surface and predispose to ankylosis.

Infectious arthritis

- A variety of infectious agents, including *bacteria, viruses, and fungi,* are capable of infecting diarthrodial joints in humans and domestic animals.
- **Cattle**
- *Arconobocterium pyogenes*
- *Escherichio coli*
- *Histophilus somni*
- *Mycoplosmo bovis*
- *Salmonella* spp.
- *Streptococcus* spp.

Infectious arthritis

- **Swine**

- *Actinobacillus suis*
- *Arcanobacterium pyogenes*
- *Brucella suis*
- *Erysipelothrix rhusiopathiae*
- *Escherichia coli*
- *Haemophilus pomsuis*
- *Mycoplasma* spp.
- *Salmonella* spp.
- *Staphylococcus aureus, Staphylococcus hyicus* ssp. *hyicus*
- *Streptococcus* spp.

Infectious arthritis

- **Horses**
  - *Actinobocillus equuli*
  - *Escherichio coti*
  - *Klebsiella* spp.
  - *Rhodococcus equi*
  - *Salmonella* spp.
  - *Streptococcus* (Group C)
- **Dogs**
  - *Blastomyces dermatitidis*
  - *Borrelio burgdofferi*
  - *Ehrlichia ewingii*
  - *Escherichia coli*
  - *Staphylococcus* spp.
  - *Streptococcus* spp.

Infectious arthritis

- ***Sheep***
- Erysipelothrix rhusiopathiae
- Escherichio coli
- Histophilus somni
- Mycoplasmo spp.
- Staphylococcus spp.
- Streptococcus spp. (including types 1 & 2)
- **Goats**
- Mycoplasma spp.
- Retrovirus

Caprine Arthritis Encephalitis

- **Caprine arthritis encephalitis** (**CAE**) is a viral disease of goats caused by a lentivirus called **caprine arthritis encephalitis** virus.
- The main clinical finding is lameness and it is related to arthritis and carpal hygroma.
- There is also a decrease in weight loss and milk yield.
- The prevalence of flocks can reach 25-30% and even some flocks 100%.
- Single or double carpal hygroma is characteristic in the syndrome.

Caprine Arthritis Encephalitis

- The multisystem diseases caused by CAEV infection are: arthritis, pneumonia, mastitis, weight loss (all of which are more common in does and bucks), and encephalitis (more common in kids).
- Lesions in joints are characterized by thickening of the joint capsule and marked proliferation of synovial villi.
- In chronic cases, soft-tissue calcification involving joint capsules, tendon sheaths, and bursae is not uncommon.

Caprine Arthritis Encephalitis

- Severe cartilage destruction, rupture of ligaments and tendons, and periarticular osteophyte formation have also been described in advanced cases.
- Microscopic features of articular lesions include synovial cell hyperplasia, subsynovial mononuclear cell infiltration, villous hypertrophy, synovial edema, and synovial necrosis.

Caprine Arthritis Encephalitis

- Gross lesions associated with the neurologic form of CAE include asymmetric, brownish pink, swollen areas, most commonly in the cervical and lumbosacral spinal cord segments.
- Histopathologically, these lesions are characterized by multifocal, mononuclear cell inflammatory infiltrates and varying degrees of demyelination.

Immune-mediated Arthritis

1. Erosive form (primary-immunological disease in the joint)
2. Nonerosive form (secondary-immunological disease in elsewhere)

- **Erosive arthritis:**
- In the *erosive form,* the immunologic process is centered in the joint and stimulates pannus formation, which may result in erosion of the margins of articular cartilage, instability or luxation of joints, or fusion of low-motion joints.
- The erosive pattern of immune-mediated arthritis is a feature of *rheumatoid-like arthritis of dogs, polyarthritis of Greyhounds, and feline chronic progressive polyarthritis*.
- The most prominent findings are proliferative synovitis and fibrovascular pannus-induced tissue destruction.

Immune-mediated Arthritis

- ***Nonerosive arthritis***
- a) primary or idiopathic form
- b) systemic lupus erythematosus form
- c)variety of chronic diseases form (chronic parasites, bacteria, virus infections, hypersensitivity reactions to the drug, tumors etc.)
- It occurs most often in *dogs and cats.*

TUMORS of JOINTS

Benign tumors➔

- Synovial chondromatosis (osteochondromatosis)
- Benign giant cell tumors of tendons and tendon sheaths
- Synovial hemangiomas or vascular hamartomas

Malignant tumors➔

- Synovial sarcoma
- Histiocytic sarcoma