



THE UNIVERSITY OF TOLEDO  
**MEDICAL CENTER**

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THE UNIVERSITY OF TOLEDO MEDICAL CENTER

# ORTHOPAEDIC MONTHLY

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## Dog and Cat Bites

Dog bites are the most common animal bite in America. Dog bites have a lower rate of infection than cat bites. Dog bites will cause infection in about 2%-5% of cases, while cat bites will cause infection in about 30%-50% of cases.

Causes of unprovoked attacks may include:

- Approaching the animal's young. •The animal is protecting their territory. •Approaching the animal while it is eating. •Attempting to separate a fight between multiple animals.

When a dog bites, the bite tears, avulses, and crushed soft tissue which can be treated by cleaning it in the emergency room and local wound care, plus some antibiotics. In some rare cases, the crush is so severe that compartment syndrome may develop and the patient may need a fasciotomy.

In 90% of the cases, the dog is usually known to the victim. Most dogs will revert back to their normal, friendly behavior after an attack.

Bacteria associated with the bite:

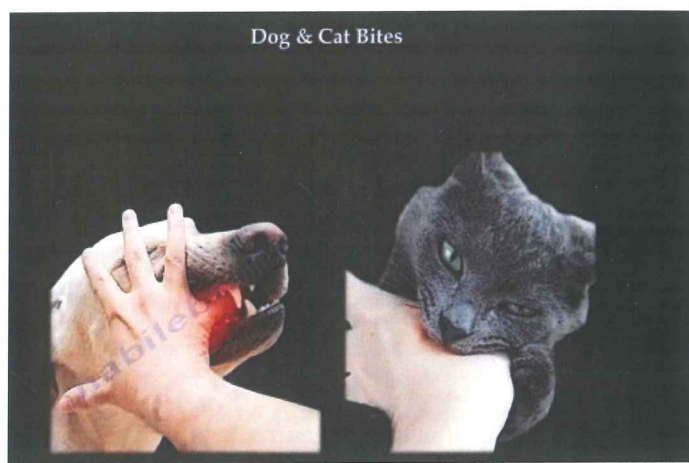
- Dog: -50% mixed infection. -Mix of aerobic and anaerobic organisms -On average, there are about six different organisms.
- Cat: -Higher rate of infection. -Has small, sharp teeth (needle-like) that can puncture and cause deep wounds that can penetrate the joint and the flexor tendon sheath. -The puncture wounds sometimes seal up immediately, becoming unnoticed or underestimated (not obvious). -It may take longer to initiate the treatment

What causes infection in both dog and cat bites?

- Delayed treatment more than 12 hours. •Older age. •Crush or puncture wound. •Host condition (Diabetes or Immunosuppressed patients). •In general, the bacteria for both dogs and cats is Polymicrobial with more than one anaerobe.

The most common bacteria isolated from both dog and cat bites is *Pasteurella*. *Pasteurella* bacteria takes about a week to grow. It is present in about 50% of dog bite infections and 80% of cat bite infections.

Common bacteria in dog bites include *Pasteurella*, *Streptococci*, *Staphylococci*, *Neisseria*, *Corynebacterium*, and anaerobes.



Common bacteria in cat bites include *Pasteurella*, *Streptococci*, *Staphylococci*, *Staphylococci*, *Moraxiella*, *Corynebacterium* and *Neisseria*.

**Treatment:** If the patient is seen early, do irrigation in the emergency room, give tetanus toxoid vaccine, splint, give antibiotics and do local wound care and observation

If the treatment is delayed, the patient may have infection such as an abscess, septic arthritis, tenosynovitis, or osteomyelitis. The patient will need to go to surgery for incision and drainage. You can suture the wound primarily in facial wounds because this area is very rich in blood supply. Do secondary closure in most of the wounds. Augmentin is the antibiotic that is commonly used for dog and cat bites. If the patient is suspected to have rabies, then the patient will be given vaccination and immunoglobulin.

Cat Scratch disease is different! It is an infection that is transmitted by a cat's scratch. The lesion is small (less than 1 cm). It is self-limited caused by exposure to *Bartonella Henselae* bacteria.

Symptoms include swollen or draining lymph nodes, fever, fatigue headache. Swollen, tender lymph nodes could be confused with a tumor

Treatment includes antibiotics. No biopsy will be needed.



# Aneurysmal Bone Cyst

The typical locations of aneurysmal bone cysts are the posterior elements of the vertebrae or in the long bones, such as the distal femur and proximal tibia.

Aneurysmal bone cysts are destructive expansile lytic lesions that contain cavities filled with blood. This expansile lytic lesion could expand greater than the width of the growth plate or the width of the bone. Patients with aneurysmal bone cysts are usually younger than 20 years old. The lesion is usually located in the metaphysis. There is usually a periosteal rim around the lesion, however the lesion can expand into the soft tissue.

MRI or CT scans will likely show fluid, fluid lines or levels.

The lesion can occur as a primary lesion and it will express USP6 translocation or it can be secondary and can be associated with underlying lesion in 30% of the time, such as giant cell tumor, fibrous dysplasia, chondromyxoid fibroma and chondroblastoma.

Pathology:

Blood filled cysts and lakes of blood with fibrous stroma, may have giant cells.

Differential Diagnosis:

Aneurysmal bone cysts can be confused with two entities on x-rays: simple bone cysts and telangiectatic osteosarcoma.

Aneurysmal bone cysts may mimic a giant cell tumor pathologically because it contains giant cells.

Clinical Examination: •Pain. •Swelling. •May have a fracture (rare). •Rarely, the patient may have neurological deficit, if the lesion occurs in the spine and is pushing or pressing onto nerves.

Treatment: •Start with nonoperative treatment, if there is a fracture. •The treatment is usually curettage of the cyst and bone graft. •Recurrence of aneurysmal bone cysts occurs in approximately 20% of the cases. The highest rate of recurrence occurs in patients with open growth plates

## Osteoclasts

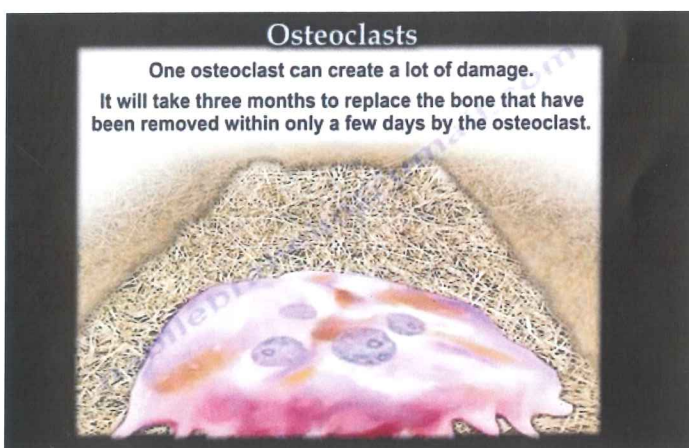
A bone has two important cells; the osteoclasts and osteoblasts. Osteoclasts are irregular shaped giant cells that break down or reabsorb the bone. Osteoblasts are cells that are responsible for new bone formation. Osteoclasts arise from either macrophages or monocytes. Monocytes fuse together to form multinucleated osteoclast cells. Osteoclast cells have a "ruffled border" which touches the bone and increases the surface area for absorption of the bone. Osteoclasts bind themselves to the bone via integrin (protein). Vitronectin helps to attach the osteoclasts to the bone.

The bone is absorbed at the Howship's Lacunae. As the ruffled border of the osteoclast contacts the bone, it then secretes acids that lower the pH level, and the osteoclast then absorbs the mineralized bone matrix. Cathepsin K (CTSK) is an enzyme that removes the bone at the ruffled border. Osteoclasts secrete tartrate resistant acid phosphates. Osteoclasts are unable to absorb unmineralized osteoid.

Osteopetrosis, or "stone bone", occurs due to deficiency in carbonic anhydrase. These proteins interact with the osteoclasts and osteoblasts to control bone reabsorption.

The osteoclast has RANK receptors on its surface. RANK ligand is a protein given off by osteoblasts and tumor cells which is important to the formation and regulation of osteoclast activity. RANK ligand proteins interact with the RANK receptors on the surface of the osteoclast.

Osteoprotegerin (OPG) is another protein that is secreted by the osteoblasts that blocks the binding of RANK ligand to RANK. The OPG protein is a decoy that stops the osteoclast from differentiation, fusion and activation, which causes a decrease in bone reabsorption and destruction. This action of blocking the binding of RANK ligand to RANK reduces osteoclast activity. Excessive amounts of RANK ligand leads to more osteoclasts and greater bone loss.



Osteoclast Inhibition: •Calcitonin – there is a receptor for calcitonin on the osteoclast surface that inhibits bone resorption. •Bisphosphonate (pamidronate) – prevents formation of the ruffled border and may cause apoptosis (death of the cell). •Interleukin-10 (IL-10) – suppressed osteoclast activity. •Osteoprotegerin (OPG) – blocks the binding of RANK ligand to RANK. •Transforming Growth Factor Beta – increases OPG. •Estrogen – decreases RANK ligand expression by osteoblasts and decreases activity of adenyl cyclase.

Osteoclast Activation: •Parathyroid hormone-related protein (PTHrP): Secreted by many cancer cells including breast cancer. Utilizes adenyl cyclase. Binds to a receptor of the osteoblast to produce RANK ligand. RANK ligand will go to an osteoclast and get attached to RANK for activation of the osteoclast. •Interleukin 1 (IL-1): Total joint loosening. •1,25 Dihydroxy Vitamin D: Increases production of RANK ligand. •IL-6 (myeloma): Tumors, especially myeloma



# Shoulder Dislocations and Associated Lesions

Shoulder dislocations may occur in association with different presentations and pathology. We need to identify the different lesions that can be seen during shoulder dislocations, specifically the anterior shoulder dislocation. Anterior shoulder dislocations are more common than posterior shoulder dislocations. There is a high incidence of recurrence in the young and there is a high incidence of rotator cuff tears in the elderly. Some percentage of patients may have axillary nerve palsy.

Two lesions that may be present with anterior shoulder dislocation are:

1. Bankart lesion: Labrum
2. Hill-Sachs Lesion: Humeral Head

Different Scenarios Associated With Anterior Shoulder Dislocation

• Bankart Lesion

- Avulsion of the anterior inferior labrum
- Present in about 90% of traumatic shoulder dislocations

Rotator cuff tears may occur in 80% of individuals older than 60 years old with anterior shoulder dislocations.

• Axillary Nerve Injury

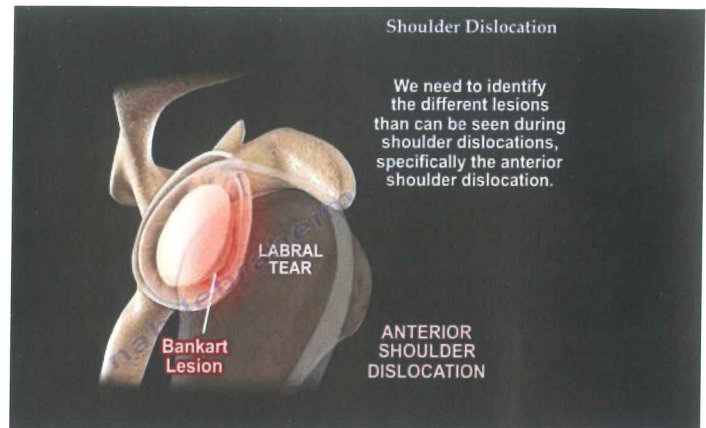
- The patient may not be able to raise the arm after shoulder dislocation which may occur in about 5% of the time.
- This may also cause inability to raise the arm due to rotator cuff tear, especially in older patients.
- Check the sensation over the shoulder area (axillary nerve injury).

• HAGL Lesion (Humeral Avulsion of the Glenohumeral Ligament)

- The ligament becomes avulsed at the insertion of the humerus, and not at the midsubstance or glenoid area.
- It may be hard to diagnose this lesion and some believe that an open surgical procedure is better.

• Hill-Sachs Lesion

- Humeral compression fracture in the posterolateral aspect of the humeral head which is present in about 80% of anterior shoulder dislocations.



- May also be seen as edema in the posterolateral aspect of the humeral head.

• ALPSA Lesion

- Medial displacement of the glenohumeral ligament (medialized Bankart lesion).

• Recurrence of anterior shoulder dislocation after surgery

- Occurs in over 65% of patients because the lesion is not addressed.
- What is the lesion? Bony defect of the scapula.

• GLAD Lesion

- A tear of the anterior inferior labrum (nondisplaced) with avulsion of the adjacent glenoid cartilage.
- In the case of a GLAD lesion, you will find the anterior inferior labrum is detached with an associated glenoid chondral defect.
- This lesion results from impaction of the humeral head against the glenoid.
- The patient will complain of persistent shoulder pain, but no instability.
- In the GLAD lesion, the labrum is not detached and there is no capsular stripping.

## Ganglion Cyst of the Wrist

Ganglion cyst of the wrist is the most common hand mass and it is not a tumor. The cyst is filled with mucinous (gelatinous) fluid and it transilluminates.

Ganglion cysts of the wrist can be either dorsal or volar. The dorsal type of ganglion cyst is common and not as bad. Occasionally the volar type (rare) occurs. The dorsal type originates from the scapholunate articulation. The volar types originates from the radiocarpal joint, which is the wrist joint itself.

Clinical findings include a bump or a mass that is well defined,

localized, smooth, and not attached to the skin. The dorsal ganglion cyst is obvious with flexion of the wrist. The volar ganglion cyst is obvious with extension of the wrist.

The ganglion cyst, in general, is usually asymptomatic. When examined, it is a firm mass that can transilluminate.

Make sure to do the Allen's Test. Check the nerves of the hand and make sure that the circulation is not affected.

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*Ganglion Cyst of the Wrist continued*

MRI is usually not done and when it is done, there is usually a fluid signal seen inside the mass. Ultrasound is a good study to check the relationship between the cyst and the vascularity, especially the radial artery with volar cysts. Ultrasound is good during aspiration when the ganglion cyst is near the artery.

Treatment: •Observation in the majority of cases. •In children, the majority of ganglion cysts resolve themselves in about one year

•Aspiration. -Aspiration is usually done for dorsal ganglion cysts. -High recurrence rate with aspiration of dorsal ganglion cyst (about 50%). -Minimal risk. -Try to avoid aspiration with volar ganglion cysts because the volar cyst is close to the artery. -If the physician decides to do an aspiration of the volar ganglion cyst, they must place the needle in an area away from the artery.

•Surgery:

- Done for severe symptoms and neurovascular compromise.
- Excision of the ganglion cyst if it is painful.
- Resect the capsule and the stalk.
- Excision for dorsal ganglion cyst (less than 10% recurrence).
- High recurrence rate excision volar ganglion cyst (about 20%).

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Dr. Ebraheim, Amanda Critton, Julie Anderson and Ellen Finch do not have any relationships with industry to disclose.

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