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**Bursitis/Tendinitis** ( 1-Jan-1985 )

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## **Section One: Bursae**

The anatomy of bursae has been described previously (Chapter 4). While many of the characteristics of anatomical bursae and acquired bursae are similar, it is more convenient to discuss the clinical conditions of the two bursal types separately.

### **Anatomical (True) Bursae**

A bursa serves to reduce friction between moving parts, such as tendons, ligaments, and muscles, or to cushion the effects of excess pressure between these movable structures and bony prominences. Therefore, pathologic changes in bursae can be associated with changes in the adjacent tendon, ligament, muscle, or bone.

In humans and in horses, inflammatory conditions of bursae are well-known clinical entities. For example, in humans, bursitis of the subdeltoid or subacromial bursae is seen, an inflammation that is almost always the result of a lesion involving neighboring structures, such as a strained tendon. Another example is the inflammation in the intertubercularis bursa in horses, which is almost always associated with sprain of the biceps brachii muscle. In many cases, there is little pain associated with sprain of a tendon until the adjacent bursa is involved, since the latter structure is abundantly supplied by vessels and nerves.

Bursae are small and are associated anatomically with other structures. For these reasons, specific diagnosis of bursitis is difficult, and few reports exist in the veterinary literature. It is obvious, however, that bursal problems exist, and the

veterinarydiagnostician should be aware of the normal anatomical sites ofbursae, the pathologic changes associated with bursae, and thespecific bursal problems that have been reported. It is obvious that bursitis can be diagnosed more frequently and moreaccurately than has been the case thus far.

### ANATOMICAL SITES

There are manyanatomical bursae in the hindleg of the dog.(5) Bursae are associated with the quadricepsfemoris muscle. A small bursa is occasionally present under the tendon of origin of the rectus femoris muscle, and, moreconsistently, one is present between the distal third of thismuscle and the femur. A small bursa is usually present under the tendon of insertion of the vastus medialis muscle and the vastuslateralis. A large bursa is present under the tendon of theflexor digitorum superficialis on the tuber calcanei. Thisbursa, the bursa calcanei, extends proximally and distally fromthe tuber to separate the tendon of the flexor digitorumsuperficialis not only from the bone, but from the tendon of thegastrocnemius and from the plantar ligaments as well. A verythin walled large bursa is interposed between the tendon of theobturator internus and the ramus of the ischium and a smallerbursa is present between this tendon and the bone in thetrochanter fossa.

In many dogs there are bursae situatedbeneath the tendons of insertion to the trochanter major of thegluteus superficialis and the gluteus profundus.

In theforeleg, the large infraspinatus bursa is present between thetendon of the infraspinatus and the caudal part of the greatertubercle of the humerus. Proximal to this bursa, there is asecond, smaller one. A significant bursa is situated where thetendon of the triceps brachii crosses the proximal end of theolecranon. This bursa, bursa subtendinea olecrani, is often over1 cm wide; however, it is not connected to the acquired bursathat is sometimes present between the skin and the olecranon.

Inconstant bursae can be present under tendons of theextensor carpi radialis at the carpus. There is usually a largebursa under the tendon of origin of the extensor carpi ulnarisand between its tendon of insertion and the distal ulna. A bursamay be present where the tendon of the abductor pollicis longuspasses over that of the extensor carpi radialis.

In largedogs, a bursa 2 cm to 2.5 cm long is present between the tendonof origin of the flexor digitorum superficialis and theunderlying medial epicondyle of the humerus. This bursacommunicates with a bursa beneath the origin of the flexor carpiulnaris. There is also a bursa beneath the tendon of origin ofthe flexor digitorum profundus.

In addition to theseconstant and inconstant synovial bursae, there are structures that function in a similar manner; however, they are moreaccurately described as projections of joint capsules beneath tendons than as bursae. In the foreleg, there are twosignificant examples: the projection of the shoulder jointcapsule beneath the tendon of insertion of the biceps brachii (Fig. 70-1) and the projection of theelbow joint capsule beneath the origin of the flexor carpiradialis. The former structure in the shoulder joint can beclinically significant as affections lead to inflammation andpain in the intertubercular groove of the humerus. Thisprojection of the joint capsule actually surrounds the tendon sothat the projection acts as a tendon sheath, rather than abursa.

In the hindleg there are three areas in whichprojections of joint capsules occur. The patellar joint capsulehas a large projection dorsally under the tendon of thequadriceps muscle (Fig. 70-2). In addition, in the stifle joint, there is a 3-cm to 4-cm longprojection of the joint capsule under the tendon of origin ofthe extensor digitorum longus (Fig.70-2). This so-called capsular synovial bursa almostsurrounds the tendon and has been termed a synovial tendonsheath. The third capsule projection is a bursa situated beneaththe plantar end of the tendon of insertion of the peroneuslongus. This bursa communicates with the joint capsule between the third and fourth tarsal bones.

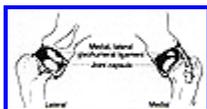


FIG. 70-1 Capsule of the leftshoulder joint. (Evans HE, Christensen GC: Miller's Anatomy ofthe Dog, 2nd ed. Philadelphia, WB Saunders,1979)

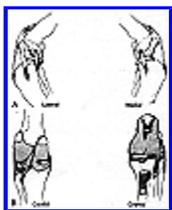


FIG. 70-2 Capsule of the leftstifle joint. (A) Lateral and medial views. (B) Caudal andcranial views. (Evans HE, Christensen GC: Miller's Anatomy ofthe Dog, 2nd ed. Philadelphia, WB Saunders,1979)

## **PATHOLOGIC CHANGES**

### **Open Wounds**

A wound of a bursa has many features in common with wounds of joints and can present equally serious clinical problems. Because the cavity is closed, natural drainage rarely occurs. If infection becomes localized in the dense fibrous wall of the bursa, it can be as persistent as infection in a bony sequestrum. In contaminated open wounds of bursa, organisms seem to proliferate and persist in spite of the apparent bactericidal properties of synovial fluid.(4)

The first important principle in treatment of a bursal wound is to recognize the injury. Any deep laceration or puncture wound in the region of a known bursa should be suspect. A contaminated wound should be explored surgically, debrided, and irrigated. If a puncture wound is treated conservatively, the clinician should be aware of the possibility of infection developing in the bursa. Infection is evidenced by wound discharge and deep pain, and immediate exploration, debridement, and irrigation are needed. The wound is left open or closed if drainage is provided. Local and parenteral antibiotics are needed, and a culture is recommended for susceptibility testing. In a chronic infection accompanied by discharging sinuses, debridement of the bursa and even total excision of the bursa, as in treatment of infected bone sequestrum, may be necessary.

### **Acute Closed Bursitis (Nonsuppurative)**

Acute closed bursitis results from a direct blunt injury to the bursa or indirectly from sprain of the overlying tendon. Because the bursa is a closed sac, inflammation leads to local swelling and considerable pain. In the early stages, there is hyperemia of the bursal wall and excess production of fluid within the bursa. Chronic inflammatory changes are seen eventually, some of which can affect adjacent structures. These include hyperplasia of the endothelium, and in the case of bicipital tenosynovitis ("bursitis"), chondromalacia of the intertubercular groove with osteophyte formation. Calcification of the adjacent tendon can occur spontaneously, and the calcification can precede the inflammatory changes in the bursa.(1)

Treatment is the same as for a sprained tendon or ligament: rest; possibly a light, padded bandage; cold applications in early stages to limit exudation and heat in later stages to promote absorption of exudates. Aspiration of contents and injection of corticosteroids may be indicated; however, this form of therapy necessitates strict rest of the part.

### **Acute Closed Bursitis (Suppurative)**

A closed bursa can become infected either by introduction of organisms as a complication of the procedure of aspiration and injection of the bursa, or by localization of circulating organisms. In some low-grade systemic disease processes in humans, localization of the infection in bursae occurs (tuberculosis). There is little information on localization of the infection in bursae in dogs and cats. *Brucella* organisms have been isolated from bursal infections in horses and cows.

Fluid accumulates in the bursa, causing severe local pain. Eventually purulent material breaks through the bursal wall to create a discharging sinus.

Treatment is the same as for open infections of bursae. Drainage or surgical excision is often necessary.

## **SPECIFIC BURSAL PROBLEMS IN DOGS AND CATS**

As stated above, specific diagnosis of bursitis is difficult because of the involvement of adjacent structures and the low element of suspicion among veterinarians of bursal problems. Some reported bursal problems in dogs and cats include the following disorders:

1. Acute closed (nonsuppurative) bursitis of the bursa associated with the extensor carpi radialis in racing greyhounds. The dog is lame after racing, and a local fluid-filled swelling can be discerned.(11)
2. Bicipital tenosynovitis ("bursitis"). This is a well known condition in young horses and is usually caused by a local blunt injury. It has been reported in the dog and is usually caused by a local injury or chronic sprain of the associated tendon.(7) The clinical signs are persistent or intermittent foreleg lameness that can usually be localized to the area of the bursa by pain on palpation. Radiographic changes may be seen in the bones of the intertubercular groove in chronic cases, and the overlying tendon may be calcified. Recommended therapy includes limited exercise, administration of anti-inflammatory drugs such as aspirin, and intrabursal injection of corticosteroids. It has been recommended that these drugs not be used more than twice. A surgical procedure to excise the bursa and transpose the bicipital tendons to the greater tubercle has been described.(7) This procedure has given excellent results in humans.(3)
3. Chronic calcification of the bursa over the trochanter major of the femur is often seen radiographically. Usually no other clinical evidence of bursitis is present (Fig. 70-3).



FIG. 70-3 Chronic calcification of the bursa between thetrochanter major and the tendons of insertion of the gluteussuperficialis and the gluteus profundus.

## Acquired(False) Bursae or Hygromas

### DEVELOPMENT

When lying, large dogs exert pressure on many bony prominences, including the lateral aspect of the elbow, the tuber calcanei, thetrochanter major of the femur, the tuber coxae of the ilium, and the tuber ischiadicum. These prominences are covered by multiple layers of soft tissue, including skin, loose connective tissue and fat, deep fascia, and periosteum. Pressure on any bony prominence is transmitted from the surface to the underlying dense bone, compressing all intervening tissue to varying degrees. Sitting pressure on skin overlying the tuber ischiadicum in humans has been measured experimentally and found to exceed 300 mm Hg. This is far in excess of the pressure in normal skin capillaries of 12 mm to 70 mm Hg. It is evident that weight bearing on many bony prominences is sufficient to obstruct blood flow to overlying soft tissue, leading to cellular death.

In the vast majority of young dogs, this repeated trauma and inflammation is so mild that severe destruction of tissue does not occur, and a protective callus develops. All adult dogs have this protection to varying degrees. The callus should not be removed for cosmetic reasons unless it becomes severely fissured or hypertrophic.

The first significant lesion that is produced is a grade 1 pressure sore. There is dilatation of blood vessels and inflammatory edema in the skin and subcutaneous tissues over the bone. This lesion can be treated at this stage, mainly by supplying protection to the part, and resolution will occur. Protection is achieved in two ways: by bandaging the limb and by providing padded bedding.

If this inflammatory lesion is not treated and the trauma persists, breakdown of tissues occurs, leading to either an open pressure sore or, more commonly, hematoma formation in the subcutaneous tissues. If the trauma is removed even at this stage, resolution of the hematoma is likely. However, the trauma usually persists, further tissue damage occurs, and the hematoma is not absorbed because the tissues surrounding the hematoma is damaged. Instead, the fluid is enclosed in a well delineated sac. This is the typical false bursa, or hygroma.

Macroscopically, the hygroma is separated from the skin by loose tissue. It has a tough, dense wall and contains a mucinous fluid that varies from yellow to red depending on the degree of trauma and, therefore, the amount of red cells. The fluid is less viscous than synovial fluid, and the protein content is lower. The lining of the sac is pale and is smooth or rough, with irregular villous-like projections of tissue extending into the lumen (Fig. 70-4).

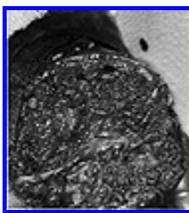


FIG. 70-4 Typical appearance of the inner wall of a hygroma when exposed at surgery. (Newton CD, Wilson GP, Allen HL et al: Surgical closure of elbow hygroma in the dog. J Am Vet Med Assoc 164:147, 1974)

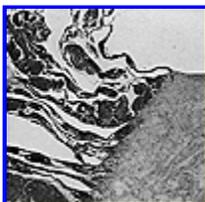


FIG. 70-5 Photomicrograph of a segment of hygroma wall shows numerous fibrin fronds. Small foci of hyaline cartilage are indicated (arrows). The dense collagenous nature of the hygroma wall is clearly evident. (Mallory trichrome stain, x 5) (Newton CD, Wilson GP, Allen HL et al: Surgical closure of elbow hygroma in the dog. J Am Vet Med Assoc 164:147, 1974)

The wall of the hygroma consists of granulation tissue with much collagen (Fig. 70-5). (9) The inner layer of the wall consists of a flattened layer of fibroblasts, giving the false appearance of an epithelial lining (Fig. 70-6). The projections of tissue into the lumen are formed of dense fibrin with occasional foci of hyaline cartilage. Occasionally, free masses of

dense fibrin are found in the fluid. No connection has been established between the typical hygroma that forms over the olecranon in young large breed dogs and the underlying anatomical bursa of the triceps brachii muscle.

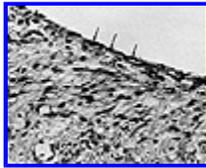


FIG. 70-6 Photomicrograph of a segment of hygroma wall indicates clearly the absence of true epithelium; fibroblasts (arrows) are flattened against the cellular bed. (Mallory trichrome stain, x100) (Newton CD, Wilson GP, Allen HL et al: Surgical closure of elbow hygroma in the dog. J Am Vet Med Assoc 164:147,1974)

Acquired bursae are seen in dogs over the five bony prominences mentioned above. The most common site is the lateral aspect of the elbow over the olecranon (Fig. 70-7,A). Hygromas can be caused by chronic trauma other than lying. They may occur over the spinous processes of thoracic vertebrae as a result of trauma from a choke chain. Hygromas can also form over the external occipital protuberance in puppies (Fig. 70-8). These are caused by striking the top of the head on overhead objects such as a rail while eating. Occasionally multiple hygromas are seen in one dog. one Great Dane had hygromas on both elbows, over the thoracic vertebrae, and on the hock.



FIG. 70-7 (A) A typical hygroma in a 9-month-old Great Dane. (B) The hygroma is drained using a 6-mm Penrose drain, which is passed through the cavity of the hygroma and sutured to the skin. (C) There is some loose skin over the elbow following healing of this large hygroma. (Johnston DE: Hygroma of the elbow in dogs. J Am Vet Med Assoc 167:213, 1975)



FIG. 70-8 Typical hygroma over the occipital tuberosity in a young dog.

Generally, acquired bursae occur in young dogs before tissues over bony prominences form a protective callus. Hygromas can occur in older dogs that develop neuromuscular disorders, leading to weakness and inability to lie in a controlled manner.

## PATHOLOGIC CHANGES

### Chronic Bursitis

The typical hygroma is small and painless and can be present for the life of the dog. Over time, the wall becomes thicker with mature collagen and cartilage and the cavity decreases in size.

### Acute Closed Bursitis (Nonsuppurative)

With repeated trauma, the cavity will increase in size. In general the swelling remains painless or only mild pain is present. These hygromas are usually treated for cosmetic reasons.

### Acute Closed Bursitis (Suppurative)

In the dog there is no information on the localization of systemic infections in hygromas, which occurs commonly in brucellosis in horses. In dogs, the hygroma usually remains sterile unless organisms are introduced from needles or medication. Acute infections have been reported following injections of corticosteroids into hygromas. (8) An infected hygroma is an acute purulent abscess that rapidly bursts to the exterior. The animal is pyrexic and experiences intense pain. The fluid can gravitate down the leg from an infected elbow hygroma to break out as far away as the carpus (Fig. 70-9).



FIG. 70-9 An abscess formed in this elbow hygroma of a 16-month-old St. Bernard after injection of corticosteroids. The abscess has opened in the middle of the forearm and below the carpus. (Johnston DE Hygroma of the elbow in dogs. J Am Vet Med Assoc 167:213, 1975)

### **Chronic Bursitis (Suppurative)**

If an abscess in a hygroma is not treated adequately by drainage, the infection invades the fibrous wall. A suppurating granulomatous bursitis is produced, with multiple discharging sinuses. The infection does not usually spread to the underlying bone; however, periosteal reaction and new bone production are commonly seen.

### **TREATMENT**

There is little information in the veterinary literature on the management of hygromas. Total and partial excision and injection of corticosteroid preparations have been advocated; however, these procedures may be harmful. (2,8) In many instances, elbow hygromas are only a cosmetic problem; the hygroma is small and painless and is present for the life of the dog. Some of these need not be treated. The development of hygromas can be prevented by adequate protection of the bony prominence in young dogs. The first indication of the development of a hygroma is the presence of inflammation and edema without cavity formation. If the part is covered with a loose padded bandage for 2 to 3 weeks, the tissues will heal without cavitation. The floor of the dog's normal resting area should be padded as well. In time, the protective callus forms.

Small early hygromas can be treated by repeated aspiration of the contents and application of a protective bandage. Instillation of corticosteroid preparations cannot be recommended and is not needed. The contents are aspirated weekly with careful aseptic precautions. Success is not likely if fluid is still present after 3 or 4 treatments. This form of management is not successful in long-standing hygromas, in which the wall of the cavity is thick and rigid, even if the hygroma is small.

The recommended treatment for small and large hygromas in which the wall of the cavity is thick and rigid is surgical drainage and bandaging. Surgical excision, including partial excision, is contraindicated in order to avoid complex surgical procedures over the bony prominence and the risk of wound breakdown. (8) To obtain drainage, stab incisions are made into the hygroma dorsally and ventrally, using aseptic procedures. A finger is inserted into the ventral opening, any detached masses of fibrin are removed, and loculi, if present, are broken down. A Penrose drain, 1/4" in diameter, is passed through the hygroma and secured to the skin above and below the hygroma. Care is necessary to be certain that the drain is passed through the cavity of the hygroma, not through the loose tissue between the fibrous wall of the hygroma and the skin (Fig. 70-7, B).

The part, usually the elbow, is bandaged with Vaseline gauze, cotton padding, and an adhesive bandage\* that adheres to the shin above and below the cotton padding. Bandages are changed every 4 to 5 days, and the drain is removed in 2 to 3 weeks. A bandage is reapplied for 1 week following removal of the drain. Some dogs require sedation with promazine hydrochloride or phenobarbital for several days as well as a restraining device to keep them away from the bandage. Antibiotics are not administered.

\*Elastikon, Johnson & Johnson. New Brunswick, NJ

In dogs with small hygromas treated in this way, a normal contour of the elbow with no loose skin is seen. With large hygromas, some excess loose skin over the elbow may result (Fig. 70-7, C). The looseness is reduced over several months, but some degree may persist. Recurrence of the hygroma is not common; however, the owner is instructed to protect the elbow by bandaging if redness or swelling is seen. Recently it has been shown that the same drainage procedure is unsuccessful in treating hygromas in horses. (13)

Treatment of infected hygromas is by gravity drainage using a Penrose drain and bandaging as described for treatment of uncomplicated cases. The drain is removed in 1 to 2 weeks when the cavity of the abscess is obliterated.

Following surgical excision of elbow hygromas, wound breakdown and ulceration are serious complications. Because of repeated trauma to the healing area, these ulcers rarely heal spontaneously.

The ulcerated area is cleaned and a bandage applied for 1 week before surgery. At surgery, the total ulcerated area is excised, adjacent skin is undermined, and the elliptical incision is sutured. The selection of a suturing technique depends on the degree of tension in a closed wound. When tension is minimal, a row of simple interrupted 2-0 chromic surgical gut sutures is inserted in the subcutaneous fascia and the skin is closed with 2-0 monofilament nylon simple interrupted sutures (Fig. 70-10). The sutured incision is made to lie either medial or lateral to the elbow, not directly over the point of the olecranon. When tension is judged to be excessive, two rows of sutures are used: one row of interrupted vertical mattress tension sutures of 1-0 monofilament nylon over soft rubber stents (Penrose drains), and a second row of simple interrupted sutures of 2-0 monofilament nylon in the skin edges. The elbow is loosely bandaged, using Vaseline gauze, cotton padding, and adhesive bandage (Elastikon) that adheres to the skin above and below the cotton padding. When tension on the wound edges is excessive, the limb is placed in a Schroeder-Thomas splint. Bandages are changed every 3 days, the tension sutures

and drains are removed in 3 days, and the simple interrupted sutures are removed when healing has occurred, usually in 10 to 12 days.

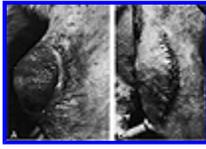


FIG. 70-10 (A) An ulcer on the elbow of a 1-year-old mastiff 4 months after the excision of a hygroma. (B.) The ulcer has been excised and closed. Tension sutures were not required. By selective undermining of skin in one direction, the suture line has been moved away from the point of the olecranon. (Johnston DE: Hygroma of the elbow in dogs. J Am vet Med Assoc 167:213,1975)

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## Section Two: Tendons and Tendon Sheaths

Injury to tendons and tendon sheaths and inflammatory conditions affecting tendon sheaths are relatively common in adult horses, foals, and calves. However, these problems are seen infrequently in dogs and cats. The two main conditions of this type in the latter species are sprains and ruptures in racing greyhounds and external injuries involving tendon sheaths in all breeds. The normal anatomy of tendons and tendon sheaths has been discussed elsewhere in this text (Chapter 4).

### Anatomical Sites of Tendon Sheaths

Most tendons in the body are enclosed within a sheath wherever there is a passage across a joint. In the foreleg, the tendon of origin of the coracobrachialis muscle from the scapula is surrounded by a synovial sheath. The tendons of insertion of the extensor carpi radialis across the front of the carpus are completely or almost completely surrounded by a tendon sheath. The extensors and abductors of the digits—the extensor digitorum communis, the extensor digitorum lateralis, the extensor pollicis longus et indicis proprius and the abductor pollicis longus—are usually enclosed completely within tendon sheaths where they cross the front of the distal radial, carpal, and metacarpal bones.

The flexor tendons in the foreleg also have extensive sheaths. The tendon of the flexor carpi radialis is enclosed in a synovial sheath at the flexor aspect of the carpus where the tendon runs through the flexor retinaculum.

The most important and extensive sheaths in the front leg are those accompanying the tendons of the flexor digitorum superficialis and the flexor digitorum profundus. Virtually all flexor tendons behind and below the carpus are surrounded by highly developed sheath systems that supply individual tendons or are shared by some superficial and deep tendons. This area, the flexor area of the metacarpus and digits, corresponds to the palmar surface of the hand in humans, the so-called no-man's land of tendon surgery in older surgical texts. The area received this designation because of its complex anatomy and the extreme difficulty in obtaining satisfactory tendon healing within tendon sheaths. The area is no less complex in dogs, with its branching tendons, three transverse annular ligaments, and tendon sheaths. Unfortunately, it is probably the most frequently injured area in the leg to involve tendons and sheaths.

In the hindleg, the tibialis cranialis, the peroneus longus, and the peroneus brevis have sheaths surrounding the tendons of insertion. The tendons of the digital extensors—the extensor digitorum longus and the extensor digitorum externus, where they cross the front of the tarsal joint, are enclosed in sheaths. In large dogs, the sheath of the extensor digitorum lateralis almost always communicates with the capsule of the talocrural joint. The digital flexors—the flexor digitorum superficialis, the flexor digitorum profundus, the flexor hallucis longus, and the flexor digitorum longus—have an extensive and important sheath system resembling that in the foreleg.

### Pathologic Changes

#### OPEN WOUNDS OF TENDON SHEATHS (6)

Open wounds of tendon sheaths have features similar to those of bursae. If infection does not occur, the local signs are mild, including slight lameness and local swelling, and recovery is rapid. If the sheath becomes infected, the area is hot, swollen, and painful. The infection can spread to the tendon, resulting in necrosis or rupture of the tendon. In dogs and cats, the most common problem is persistence of infection in flexor sheaths, leading to lameness, swelling of one or

more digits, and discharging sinuses. Characteristically, the sinus closes, then an abscess reforms in a short time, leading to temporary sinus production. This syndrome can be seen with osteomyelitis of the phalanges and with septic arthritis of interphalangeal joints; however, many cases are not associated with radiographic changes in bones or joints and the infection can be traced to synovial sheath.

Treatment is by debridement of infected tendon sheaths or by digit amputation when sinus tracts are extensive.

### **TENDINITIS AND TENOSYNOVITIS**

A "sprained" tendon is the term used to describe inflammation of a tendon following excessive stress. The injury is aseptically and results from over-extension of the tendon. The sprain can be slight, involving tearing of only a few tendon fibers, or more extensive, involving a considerable length or depth of the tendon and the associated synovial sheath. The injury may be acute and can be repaired completely with treatment. However, repeated stress can lead to chronic sprain with a thickened, fibrotic, and weakened tendon. In the foreleg, the tendon of insertion of the flexor carpi ulnaris muscle to the accessory carpal bone is frequently sprained in racing greyhounds.<sup>(12)</sup> Chronic inflammation with repeated bouts of lameness is common. Sprain of the deep flexor tendons to the digits is also seen.<sup>(10-12)</sup> In the hindleg, in muscles such as the semitendinosus and the sartorius, sprain of the muscle belly or the tendon of insertion can occur. Other tendons in the hindleg that are sprained in greyhounds are the Achilles tendon and any of the digital flexor tendons.

An important consideration in therapy is the realization that the condition is often caused by absolute excessive strain, which should be avoided, or by relative excessive strain, which is due to conformation defect or to unfitness in the animal.

Healing of a sprained tendon or sheath should be allowed to occur under optimal conditions to avoid excessive scar tissue formation and adhesions. Therefore, rest and external support by bandaging are important considerations. In acute cases, cold applications and pressure-supporting bandages will limit the amount of exudation. Corticosteroid preparations may be injected; however, their use is controversial. If used, the period of rest should be prolonged, since healing is delayed. Cessation of an acute inflammatory reaction and disappearance of swelling indicate that healing is progressing satisfactorily; however, this does not necessarily indicate that adequate strength is present in the healing tissue. Chronic sprain can result unless rest and support are provided until maturation of collagen has occurred. This usually requires 6 to 8 weeks under optimal conditions.

Treatment of chronic sprained tendons is discussed at great length in equine literature. Blistering, firing, tendon splitting, and other procedures are used with inconsistent results.

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