Dr. Wernham disclosesthat he has received financial support from Pfizer Animal Health Group, New Zealand, and Boehringer-Ingelheim.

Bicipital tenosynovitis is defined as inflammation of the biceps brachii tendon and its enveloping synovial sheath.1–3 Although the condition has been reported as a common cause of forelimb lameness in dogs, its true prevalence is unknown.1–5 Bicipital tenosynovitis has been described as a difficult and frustrating disease to diagnose, and the diagnosis is often made by eliminating all other causes of lameness referable to the shoulder joint.1–2 Likewise, definitive recommendations regarding the treatment and management of bicipital tenosynovitis have not been fully evaluated. This article discusses the pertinent anatomy, signalment, history, etiology, pathophysiology, and diagnosis of bicipital tenosynovitis. Medical and surgical treatment options, including postoperative rehabilitation, are also reviewed.

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ANATOMY

The biceps brachii muscle originates from the supraglenoid tubercle via a long tendon that courses distally through the intertubercular groove of the humerus (Figure 1). Distal to the groove, the tendon blends into the spindle-shaped biceps brachii muscle.4 The joint capsule reflects around the tendon of origin at the cranial aspect of the scapulohumeral joint, forming a synovial tendon sheath that contains the blood vessels and nerves supplying the tendon. Bicipital tenosynovitis affects this intracapsular, extrasynovial region of the tendon.1 The joint capsule projects distally along the tendon, through the intertubercular groove, and for a short distance distal to the transverse humeral ligament.2 The transverse humeral ligament spans the greater and lesser tubercles of the humerus and acts to maintain the tendon and its sheath within the intertubercular groove. The capsule blends with this ligament craniomedially, with the supraspinatus and infraspinatus tendons laterally, and with the subscapularis tendon medially.
Medially and laterally, the joint capsule is irregularly thickened to form the medial and lateral glenohumeral ligaments, which, in combination with the joint capsule and periarticular musculature, are primarily responsible for shoulder stability. The tendon of insertion of the biceps brachii muscle divides into two parts at the region of the elbow joint. The stronger part inserts on the ulnar tuberosity, and the weaker part inserts on the radial tuberosity.

The biceps brachii muscle acts to flex the elbow and extend the shoulder joint. The biceps tendon contributes to passive shoulder joint stability, particularly in the neutral and flexed positions, and provides medial stability of the shoulder joint during extension.

**SIGNALMENT AND HISTORY**

Bicipital tenosynovitis primarily occurs in medium-sized to large, middle-aged or older dogs. No breed or sex predilection has been reported. Brinker and colleagues reported that poorly conditioned or sedentary animals may be more prone to bicipital tenosynovitis than physically fit animals. However, other reports have suggested that active and athletic dogs are more susceptible to developing the disease.

**ETIOLOGY AND PATHOPHYSIOLOGY**

Inflammation of the biceps tendon and its associated sheath has been reported to be due to a variety of causes (Box 1). However, in many cases, an inciting cause is not established, and the disease is considered primary.

It is suspected that repeated stress or trauma to the biceps tendon results in hemorrhage and edema of the tendon and its surrounding synovium. The resulting inflammatory response leads to a predominantly lymphocytic-plasmacytic cellular infiltration of the tendon and synovium. Progression of the disease leads to synovial villous hyperplasia and tendon fibrosis. In synovial villous hyperplasia, the synovium proliferates and develops folds, and vascularization subsequently increases. Dense fibrous adhesions form between the tendon and its sheath, tending to limit motion. Continual movement of these inflamed tissues within the intertubercular groove causes pain and additional inflammation. Hypoxia of the tendon as a result of damaged blood supply can promote chon-
droid metaplasia and calcification of the biceps tendon (biceps brachii calcifying tendinopathy). Calcification of the tendon is thought to result from chondrocyte-mediated osteogenesis, resembling the early stages of endochondral ossification. However, fibrocartilage transformation is not an essential step for calcification to develop within the biceps brachii tendon.

DIAGNOSIS

Orthopedic Examination

A thorough and systematic orthopedic examination is essential when bicipital tenosynovitis is suspected. Details of the canine orthopedic examination are described elsewhere. A complete orthopedic examination allows the veterinarian to isolate the pain to the shoulder joint and aids in the diagnosis of any concurrent orthopedic conditions. After localizing the pain to the shoulder, the veterinarian should create a differential diagnosis (Box 2). A detailed neurologic examination may also be warranted, as conditions affecting the brachial plexus (e.g., peripheral nerve sheath tumor) and caudal cervical spine (e.g., intervertebral disk extrusion) often mimic shoulder pain.

Dogs generally bear weight on the affected limb because pain occurs only when the diseased tendon is gliding within the intertubercular groove. Animals are visually lame during ambulation, and this lameness is exacerbated with exercise. Affected animals may guard against flexion and extension of the shoulder joint, which can limit the swing phase of the gait.

On initial examination, atrophy of the supraspinatus and infraspinatus muscles may be palpable (Figure 2). It has been suggested that the degree of muscle atrophy is associated with the chronicity and the severity of the disease.

Acute pain is often elicited by applying focal digital pressure on the biceps tendon within the intertubercular groove while flexing the dog’s shoulder with its elbow held in extension (Figure 3). In one study, this test was highly suggestive of bicipital tenosynovitis, consistently eliciting a response in all affected dogs. However,
failure to detect pain in the biceps brachii tendon does not rule out disease.19

It has been reported that the biceps retraction test may be used to differentiate painful conditions of the biceps tendon from other shoulder conditions.5 However, in a study by Bardett,7 85% (40 of 47) of dogs diagnosed with glenohumeral instability were also positive for the biceps retraction test. Thus, a positive biceps retraction test result appears to be an indicator of shoulder joint pain rather than a pathognomonic sign of biceps tendon disease. The biceps retraction test is conducted with the dog standing or in lateral recumbency. The examiner’s hand is passed medial to the elbow so that the olecranon rests in the palm of the hand (Figure 4). The index finger is curled around the insertion of the biceps tendon and pulled caudally. The presence of pain is noted and compared with the contralateral limb.

Radiography

Radiographic evaluation of the shoulder joint should include standard lateral and craniocaudal views and cranioproximal–craniodistal (“skyline”) views of both shoulders. Radiographic findings may include sclerosis of the intertubercular groove, periarticular osteophyte formation on the caudal aspect of the humeral head and glenoid cavity (Figure 5), osteophyte formation at the intertubercular groove, enthesiophyte formation at the supraglenoid tuberosity, and mineralization of the biceps brachii and supraspinatus tendons.1–3,5,9,21 Only sclerosis of the intertubercular groove has been reported as a specific radiographic feature of bicipital tenosynovitis.22 However, a study by Lechleitner and Mayrhofer23 reported that 60 of 100 dogs with no history of forelimb lameness had radiographic evidence of sclerosis within the intertubercular groove. Others have suggested that enthesiophyte formation at the supraglenoid tuberosity and mineralization of the biceps brachii tendon are more specific radiographic features of bicipital tenosynovitis.2,18

The cranioproximal–craniodistal radiographic view can be obtained by placing the animal in sternal recumbency. The affected shoulder and elbow are hyperflexed.
while the radius and ulna are placed adjacent to the thoracic wall. The animal’s head is positioned away from the affected limb. The cassette is positioned over the antebrachium and parallel with the table. It is essential that the humeral head is positioned over the film and not obliquely so that distortion of the intertubercular groove is minimized. Once the correct positioning has been obtained, the x-ray beam is centered over the cranial aspect of the shoulder (Figure 6). This view assists in the identification of calcification of the biceps brachii tendon and subtle irregularities in the intertubercular groove. Radiographic imaging of the contralateral limb can be useful for direct comparison.

**Arthrocentesis**

Arthrocentesis should be performed to rule out other potential causes of shoulder pain, such as septic arthritis and immune-mediated polyarthritis. The shoulder region is clipped and surgically prepared. A 1.5-inch, 22-gauge spinal needle is used. The joint is entered about 1 cm distal to the acromion process of the scapula, with the needle directed toward the glenoid (Figure 8). If fluid is not found, the needle should be “walked” in different directions from the same skin puncture site. Synovial fluid is aspirated, and its turbidity and viscosity are assessed. Synovial fluid should be subject to complete laboratory analysis and culture if any abnormalities are suspected.

Cytologic analysis of synovial fluid from dogs with bicipital tenosynovitis tends to show changes consistent with degenerative joint disease. In one study, 82% (14 of 17) of dogs diagnosed with bicipital tenosynovitis showed elevations in monocyte, macrophage, and vacuolated phagocyte concentrations, which were indicative of degenerative joint disease. However, these synovial fluid changes are not specific for bicipital tenosynovitis, and

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**Figure 5. Mediolateral radiograph of a dog with a 1-month history of forelimb lameness before diagnosis of bicipital tenosynovitis and shoulder osteoarthritis.** Note the marked sclerosis (Sc) within the intertubercular groove and the osteophytosis (Os) associated with the caudal aspect of the glenoid and humeral head.

**Figure 6. Correct position to obtain the cranioproximal–craniodistal view of the shoulder.** Note that the x-ray beam (red outline) is centered over the cranial aspect of the shoulder. This view gives the veterinarian the clearest image of the intertubercular groove because it avoids superimposition of the intertubercular groove and the proximal end of the humerus.
not all cases of bicipital tenosynovitis exhibit synovial fluid abnormalities.1,5

Positive-Contrast Arthrography
Positive-contrast arthrography has been described as a useful diagnostic modality for identifying abnormalities associated with bicipital tenosynovitis in dogs.2,3,5,10,15,21 The details and application of the procedure are described elsewhere.25 Because the tendon sheath is continuous with the scapulohumeral joint, a normal arthrogram should fill the tendon sheath.9 The column of contrast agent should be continuous and have a lobulated appearance distally.9 Common abnormal findings include absent or incomplete filling (“filling defects”) of the tendon sheath with contrast agent, irregularities in the appearance of the tendon sheath, widening of the distal aspect of the tendon sheath, narrowing of the biceps tendon proximal to the transverse humeral ligament, and leakage of the contrast agent from the tendon sheath.1,3,5,9,10,15,21 Filling defects along the tendon may correspond to proliferative synovium, inflammation and adhesions between the tendon and sheath, or joint mice.9,15,21 Leakage of contrast agent from the tendon sheath is consistent with tendon sheath rupture. However, iatrogenic tendon sheath rupture caused by overdistention of the sheath during arthrography must also be considered.25

Because the synovium of the biceps tendon sheath is contiguous with that of the scapulohumeral joint capsule, effusion and, hence, filling defects within the biceps brachii tendon sheath can be due to other conditions that cause effusion within the scapulohumeral joint.22 Negative findings on arthrography in dogs with bicipital tenosynovitis have also been described.2,9 Therefore, abnormal findings associated with positive-contrast arthrography should complement clinical, radiographic, and ultrasonographic findings and should not be used as the sole means of diagnosing bicipital tenosynovitis in dogs.1,10,22,26

Figure 7. Cranioproximal-craniodistal radiographs.
Radiograph of a dog diagnosed with bicipital tenosynovitis and concurrent supraspinatus tendon avulsion. Note the increased calcification of the biceps brachii tendon (B) and the sclerosis (Sc) of the intertubercular groove. The veterinarian must be cautious when interpreting the finding of calcification adjacent to the intertubercular groove as being within the biceps tendon. More often, increased radiopacity in this area is the result of calcification of the supraspinatus tendon of insertion or supraspinatus tendon avulsion (S).

Radiograph of a normal canine shoulder. The biceps tendon travels along the intertubercular groove (ITG), which is located between the greater (GT) and lesser tubercles (LT) of the humerus. Note the sharp outline of the intertubercular groove compared with the image on the left.

Figure 8. Anatomic landmarks used when performing arthrocentesis on the left shoulder joint of a dog. The right index finger is placed on the acromion of the spine of the scapula, and the left index finger is placed on the greater tuberosity of the humerus. The surgical draping has been removed for illustration.
Debate still exists over the benefits of using ultrasonography versus arthrography to evaluate bicipital tendon disease in dogs. Rivers et al. reported that ultrasonography was less sensitive for diagnosing bicipital tenosynovitis compared with arthrography. However, more recent reports have suggested that ultrasonography is more accurate, particularly in identifying intratendinous pathology.

Ultrasonography

Ultrasonography of the canine biceps apparatus has been described in detail. The biceps tendon is easily recognized by its dense, linear, hyperechoic fiber pattern, which is oriented with its long axis (Figure 9). The compact, hyperechoic appearance of the biceps tendon is rapidly replaced by the coarse, hypoechoic biceps muscle fibers at the musculotendinous junction. Above and below the tendon, the tendon sheath appears as a hyperechoic line, and its oval shape is readily recognized on cross-section. A small amount of joint fluid is seen within the tendon sheath at its origin, represented by a thin anechoic halo surrounding the tendon on cross-section. Scanning the transverse plane allows broad visualization of the entire intertubercular groove around the tendon, which is typically smooth and uniformly reflective.

Changes associated with bicipital tenosynovitis on ultrasonographic examination may include the following (Figure 9):

- A hypoechoic to anechoic area around the biceps tendon consistent with excess fluid within the tendon sheath.
• A hypoechoic, thickened tendon with possible fiber pattern disruption
• An irregular or proliferative synovial lining
• Mineralization within the biceps tendon
• An irregular intertubercular groove (in chronic cases)

Joint mice within the tendon sheath may be seen as irregular hyperechoic structures; joint mice larger than 2 to 3 mm in diameter commonly result in distal acoustic shadowing. As with arthrography, identification of excessive fluid within the tendon sheath during ultrasonography is not a specific finding for bicipital tenosynovitis.

The advantages of ultrasonography are that it (1) is a fast, noninvasive procedure that does not require general anesthesia; (2) allows the exact location and extent of the lesion to be determined; (3) allows dynamic studies to be conducted to assess abnormal tendon gliding motion; and (4) allows serial examinations to be easily performed to assess tendon healing after therapy. The major disadvantage of ultrasonography is that the information obtained is highly operator dependent. A high level of experience with orthopedic ultrasonography and the use of standardized examination procedures are essential for correct ultrasonographic evaluation and diagnosis of bicipital tenosynovitis.

**Arthroscopy**

Arthroscopy has significantly advanced the diagnostic investigation of intraarticular conditions of the shoulder joint. It has become an extremely useful modality for diagnosing bicipital tenosynovitis in dogs. Shoulder arthroscopy allows thorough, minimally invasive visual assessment of the intraarticular, extrasynovial component of the biceps tendon and provides a potential avenue for treatment. The type of arthroscope required, necessary instruments, and arthroscopic techniques for evaluation of the shoulder joint have been described elsewhere. Arthroscopic examination may show synovial hyperemia and proliferation, partial tearing of biceps tendon fibers, mineralization and hypertrophy of the biceps tendon, and osteophyte production within the intertubercular groove (Figure 10).

Most cases of bicipital tenosynovitis occur at the origin and midsubstance level of the tendon. However, careful evaluation of the entire intraarticular portion of the tendon is recommended to avoid diagnostic error. Probing the tendon with a blunt instrument may be necessary in order to evaluate integrity and detect partial tears.

**Magnetic Resonance Imaging and Arthrography**

Studies investigating the use of MRI and magnetic resonance arthrography in the diagnosis of bicipital tenosynovitis in dogs are lacking. A recent study by Schaefer and Forrest aimed to evaluate specific MRI acquisition sequences and planes for observing diagnostic structures of interest in the canine shoulder. They found that the T2*-weighted gradient echo sequence was preferred for evaluation of tendons and ligaments. They concluded that the sagittal plane was most useful for evaluating the biceps tendon in the longitudinal/long oblique view and that both the transverse and dorsal planes provided the

**Figure 10. Arthroscopic image of the biceps tendon in a dog diagnosed with bicipital tenosynovitis.** Note the severe synovial proliferation and partial tearing of biceps tendon fibers. (Image courtesy of Drs. James Cook and James Tomlinson, University of Missouri)

Arthrocentesis should be conducted to rule out other causes of shoulder pain, such as septic arthritis and immune-mediated polyarthritis.
best views for evaluating the relationship between the supraspinatus and biceps tendons. Ultrasonography and MRI have been shown to have comparable accuracy for detecting partial tears of the rotator cuff in humans.\textsuperscript{34} However, MRI enables better evaluation of the extent, location, and classification of lesions as well as detection of associated pathologies of the shoulder.\textsuperscript{34} Magnetic resonance arthrography has been shown to be more accurate than conventional MRI in evaluating rotator cuff size and morphologic features in humans.\textsuperscript{35} Nevertheless, MRI is still limited by its cost and accessibility and should therefore be used to complement rather than replace other diagnostic modalities.

**MEDICAL THERAPY**

The primary objective of medical therapy is to reduce inflammation of the biceps tendon and sheath.\textsuperscript{2,9} Intraarticular methylprednisolone acetate therapy is advocated if no known mechanical causes (e.g., joint mice) are associated with the disease.\textsuperscript{9} Arthrocentesis and a complete examination of the synovial fluid should be conducted before corticosteroid injection to confirm that the joint is not septic.\textsuperscript{9} Injection of methylprednisolone acetate (20 to 40 mg) into the joint should be followed by strict confinement for 6 weeks.\textsuperscript{5,9} If lameness is markedly improved but still persists, a second injection may be given after the 6-week confinement period. Direct injection of corticosteroids into the tendon has been associated with collagen necrosis and tendon rupture and is therefore contraindicated.\textsuperscript{36}

The use of systemic NSAID or corticosteroid therapy in the medical management of bicipital tenosynovitis has not been scientifically evaluated. One report showed resolution of lameness in six of seven dogs diagnosed with traumatic bicipital tenosynovitis that were treated with a 3-week course of carprofen (2 to 4 mg/kg/day PO) and strictly confined for 6 weeks.\textsuperscript{5} It has been reported that strict confinement and NSAID or intraarticular steroid therapy is often sufficient in acute or traumatic cases of bicipital tenosynovitis.\textsuperscript{5,9} In one study, lameness resolved in 11 of 13 dogs diagnosed with traumatic bicipital tenosynovitis after administration of intraarticular steroids (five of six dogs) or systemic nonsteroidal (six of seven dogs) antiinflammatories and 6 weeks of strict confinement followed by another 6 weeks of exercise restriction.\textsuperscript{5} In contrast, Stobie et al\textsuperscript{1} reported that only seven of 16 dogs responded favorably to intratendinous steroid therapy followed by 2 weeks of exercise restriction. It has been proposed that adequate confinement of
at least 3 months’ duration may be required in determining a favorable outcome in cases of traumatic bicipital tenosynovitis. Reintroduction of uncontrolled exercise too early in the repair phase can disrupt tissue healing, slow recovery, and incite chronic lameness.

It has been shown that corticosteroids can impair the biomechanical properties and metabolic activities of articular cartilage. Therefore, prolonged medical therapy should be avoided in dogs with bicipital tenosynovitis, and surgery should be considered for dogs that do not improve after one or two doses of corticosteroids.

The use of antiinflammatory medications in combination with physical rehabilitation has not been fully evaluated as a treatment for bicipital tenosynovitis in dogs. Intraarticular methylprednisolone acetate, shoulder stabilization/stretching exercises, and pulse mode 3.3-MHz therapeutic ultrasound are used as initial treatment modalities in our hospital, with good success. Therapeutic ultrasound has thermal (mechanical) and nonthermal (biomechanical) effects on tissues. The deep heating produced by ultrasound can produce increases in collagen extensibility, pain threshold, blood flow, and macrophage and enzyme activity while decreasing muscle spasms. Nonthermal effects (i.e., the effects resulting from sound waves causing molecules to vibrate) include stimulation of collagen deposition, angiogenesis, and fibroblast proliferation. The use of therapeutic ultrasound, including its indications and treatment guidelines, has been described in detail elsewhere.

**SURGICAL THERAPY**

Surgical treatment is often recommended for dogs that do not respond to medical therapy or for dogs in which a mechanical cause is found initially. It is hypothesized that motion of the inflamed biceps tendon and sheath within the intertubercular groove is the cause of pain; therefore, eliminating movement of the biceps tendon through the intertubercular groove is the goal of surgical treatment. This goal may be achieved by either tenodesis or tenotomy of the origin of the biceps brachii tendon.

**Biceps Tenodesis**

Clinical reports of biceps tenodesis show good to excellent results. Biceps tenodesis involves transferring the origin of the biceps tendon from the supraglenoid tubercle to the proximal humerus. The procedure may be performed via an open or arthroscopically assisted approach. There are three methods of open biceps tenodesis:

- Screw and spiked plastic washer technique. This method involves transecting the biceps tendon near its attachment at the supraglenoid tuberosity. An appropriately sized bone screw and spiked plastic washer are then used to attach the tendon to the proximal humerus (Figure 11). Redundant tendon proximal to the screw is removed and submitted for histopathology.

- Passage of the transected biceps tendon through a tunnel drilled in the greater tubercle of the humerus, followed by suturing the tendon laterally to the supraspinatus muscle or the infraspinatus tendon.

- Placement of a double Bunnell-Meyer suture pattern, using number 1 nonabsorbable suture material, in the proximal biceps muscle. Two parallel holes are then made in the greater tubercle of the humerus adjacent to the proximal biceps muscle. The two ends of suture material are passed through the holes and tied laterally with the shoulder extended.

The use of arthroscopy-assisted biceps tenodesis in six dogs diagnosed with bicipital tenosynovitis was reported. Although technically demanding, the technique was minimally invasive and resulted in good to excellent outcomes in all six dogs. The authors of the study concluded that further studies were required to fully assess the feasibility and results of the technique.
Biceps Tenotomy

Biceps tenotomy involves transecting the biceps tendon from its origin, thereby preventing movement of the inflamed tissue within the intertubercular groove. The procedure may be performed through an open approach or arthroscopically. Arthroscopic tenotomy may be performed using a scalpel, motorized shaver, or bipolar radiofrequency and is typically associated with fewer postoperative complications, less tissue trauma, and subsequently less postoperative pain than tenodesis. The optimum location for tenotomy has yet to be determined. Some surgeons cut the tendon as close to its origin as possible, while others cut below the lesion and attempt to remove the diseased tissue.

Esterline and colleagues described the use of ultrasound-guided percutaneous biceps brachii tenotomy as an alternative to arthroscopic tenotomy or surgical tenodesis in 11 dogs. They concluded that this technique was a quick, easy, and accurate method of providing biceps tendon release.

The effect of biceps tenodesis and tenotomy on shoulder and elbow function has not been adequately determined in dogs. Early studies showed that the biceps tendon does not contribute significantly to scapulohumeral stability. However, a more recent in vitro study showed that transection of the biceps tendon resulted in a small but significant increase in shoulder joint instability. Some authors suggest that after tenotomy, the brachialis muscle acts to maintain normal elbow flexion while the biceps brachii tendon slowly forms adhesions to the proximal humerus, essentially producing a natural tenodesis.

The indications for, and long-term functional outcomes of, biceps tenotomy versus tenodesis have not been determined in dogs. Tenodesis is typically recommended over tenotomy in athletic humans. Some authors have suggested that this finding, in addition to the canine forelimb’s weight-bearing function, favors the use of biceps tenodesis, especially in athletic and working dogs. Long-term studies are required to determine the effects of tenotomy versus tenodesis on muscle, elbow, and limb function before definitive recommendations can be made.

**POSTOPERATIVE CARE**

Postoperative care must be tailored to the individual patient, and recovery times may vary. As is true for the management of any orthopedic condition, weight management, physical rehabilitation, use of antiinflamm-
tory medications, and owner compliance are critical for obtaining the most successful outcome when treating biceps tenosynovitis using any modality.40
We have found the following postoperative regimen effective in many patients treated surgically:

• Use ice in the early postoperative period to decrease the pain originating from the shoulder region, local inflammation, and edema formation.
• Apply a Velpeau or modified Velpeau sling and strictly confine the patient for 3 weeks.9,43 The sling should be changed weekly, at which time, 45 minutes of passive range of motion (PROM) exercises should be performed on the affected limb.
• After 3 weeks of confinement, remove the sling and place the dog on exercise restriction for a further 5 weeks.1
• During the 5 weeks of exercise restriction, the owner should massage the surrounding musculature and perform gentle PROM exercises and flexion/extension exercises of the shoulder joint up to three times a day to assist with joint motion and prevent disuse muscle atrophy. In our hospital, a registered animal physical therapist teaches the owner how to perform these exercises.
• Eight weeks after surgery, start the dog on a 6-week controlled exercise program. Initially, heat therapy, shoulder flexion/extension exercises, and 10-minute leash walking sessions are performed up to three times a day. Between sessions, the dog is confined to a small area and is allowed no free activity.3 The flexion-extension exercises can be varied and may include walking through tall grass, controlled swimming, use of an exercise ball, or walking in shallow water; all of these increase the range of joint motion and the endurance of the surrounding musculature.3 The duration of the leash walks is gradually increased. By the sixth week, the dog should be able to walk on a leash for 20 minutes followed by free activity for a further 10 minutes.3 Normal activity may resume after the end of the 6-week exercise program.

PROGNOSIS
The prognosis for normal limb function with bicipital tenosynovitis depends on several variables, including the degree of pathology and associated degenerative joint disease, weight control, physical rehabilitation, and owner compliance.3 In the few studies published, results of biceps tenodesis and tenotomy are comparable, with good to excellent return to limb function reported for both techniques.1,3,12,40 Most dogs regain normal limb function 2 to 3 months after surgery.1,3 However, return to function may be prolonged in some dogs, and up to 9 months may be required before full recovery is seen.1

CONCLUSION
The diagnosis of bicipital tenosynovitis requires a planned, methodical approach. Advances in arthroscopy and ultrasound evaluation of the biceps brachii tendon have led to a greater understanding of biceps tendon pathology and have revolutionized the diagnostic accuracy in these cases. Studies evaluating long-term outcomes of medical and surgical therapy in the treatment of bicipital tenosynovitis are lacking. Prospective, randomized, controlled studies comparing treatment options for bicipital tenosynovitis are required before recommendations regarding the optimum treatment modality can be made.

ACKNOWLEDGMENT
The authors acknowledge Pfizer Animal Health Group, New Zealand, for its support of Dr. Benjamin Wernham’s internship program.

REFERENCES


Which of the following statements regarding bicipital tenosynovitis in dogs is false?

a. Affected dogs are primarily medium sized to large.
b. Male dogs are overrepresented.
c. A history of a chronic, progressive or intermittent, moderate to severe, weight-bearing lameness is often recorded.
d. The disease typically affects middle-aged to older dogs.

Which of the following is not a reported cause of bicipital tenosynovitis in dogs?

a. Mechanical injury secondary to calcifying tendinopathy of the supraspinatus tendon
b. Mechanical injury secondary to glenohumeral instability
c. Infraspinatus muscle contracture
d. Direct trauma

Which of the following statements regarding the biceps retraction test is true?

a. It may be performed with the dog standing or in lateral recumbency.
b. A positive result is pathognomonic for biceps tendon disease.
c. Direct comparison should be made with the contralateral limb.
d. a and c

Radiographic changes that may occur with bicipital tenosynovitis include

a. Sclerosis of the intertubercular groove.
b. Enthesiophyte formation at the supraglenoid tuberosity.
c. Mineralization of the biceps tendon.
d. All of the above

The advantages of ultrasonographic assessment in the diagnosis of bicipital tenosynovitis do not include

a. The ability to determine the exact location of the lesion within the biceps tendon.
b. The independence of the results from operator experience and skill.
c. The ability to perform dynamic studies to assess abnormal tendon gliding motion.
d. Its speed and noninvasiveness.

Medical treatment of canine bicipital tenosynovitis should involve injection of methylprednisolone acetate into the affected joint followed by ___ weeks of strict confinement.

a. 2  b. 3  c. 4  d. 6

Which of the following statements regarding the anatomy of the canine shoulder joint is false?

a. The transverse humeral ligament spans the greater and lesser tubercles of the humerus.
b. The biceps brachii muscle acts to flex the elbow and the shoulder joint.
c. Medially and laterally, the joint capsule is irregularly thickened to form the medial and lateral glenohumeral ligaments, respectively.
d. The biceps tendon contributes to passive shoulder joint stability, particularly in the neutral and flexed positions.

Biceps tenodesis

a. Involves transferring the origin of the biceps tendon from the supraglenoid tuberosity to the proximal humerus.
b. Typically produces good to excellent results regardless of the duration of lameness.
c. May be performed via an arthroscopically assisted technique.
d. All of the above

Which of the following statements regarding arthroscopic biceps tenotomy is false?

a. The procedure should only be reserved for acute cases of bicipital tenosynovitis.
b. The procedure is typically associated with fewer postoperative complications than an open approach.
c. The optimum location for tenotomy has not been established.
d. The procedure may be performed using a scalpel, a motorized shaver, or bipolar radiofrequency.

What factors may influence an animal’s recovery from biceps tendon surgery?

a. Obesity  c. Owner compliance
b. Physical rehabilitation  d. All of the above