

SURGICAL TREATMENT OF SELECTIVE SOFT TISSUE INJURIES IN WORKING AND RACING DOGS

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Introduction

This presentation will address the clinical signs and treatment of a variety of soft tissue injuries in dogs:-

Forelimb

Infraspinatus Contracture

Traumatic injury of working dogs, i.e. kicked, which results in fibrosis and contracture of the infraspinatus muscle.

The dog will initially have a fairly obscure forelimb lameness prior to developing the characteristic fore limb abduction and swinging leg gait. On palpation of the affected shoulder there is obvious loss of extension and pain on forced extension.

Treatment involves the surgical exploration via a lateral approach. The fibrosed tendon of the infraspinatus is identified as it crosses the joint capsule. This fibrosed tendon of insertion is either cut or a segment resected. The shoulder joint should then be forcibly extended. This often involves considerable force and makes a disquieting noise.

No attempt is made to close the joint capsule, the remaining soft tissues are re-apposed with a suitable absorbable material.

The dog should be restricted to leash activity for 5-7 days and then allowed free exercise to encourage shoulder extension, non steroidal anti inflammatories should also be prescribed for the post operative period.

Resection of the fibrosed muscle results in an excellent outcome, with the dog returning to normal activities.

Resection of the biceps origin.

This procedure, performed arthroscopically, is advocated for the treatment of tenosynovitis / injury to the biceps origin. In my experience this may result in a chronic lameness in working and performance dogs.

I have seen two working dogs, one with resection of the biceps origin and one with avulsion that remained lame for more than 6 months after this injury. Both were sound after exploratory surgery and fixation of the tendon with a spiked washer. Neither of these could be relocated anywhere near the intertubercular ligament, and were relocated about 25% of the way down the humerus. Both dogs returned to a working career.

Surgical approach is via an anterior medial approach, the superficial pectoral is released and the biceps tendon exposed. Once the tendon has been stabilised the pectorals are re-aposed and the soft tissue and skin closed routinely

Inter tubercular ligament injury (ITL)

Rupture of the ITL has been reported in a number of breeds. The dog is presented with a mild forelimb lameness and the biceps tendon can be felt to luxate and relocated on flexion and extension of the shoulder joint.

Examination of post mortem specimens revealed that the insertion of the ITL was more degenerate than ruptured, suggesting a chronic rather than acute injury. In light of this the insertion of a smooth shanked screw, 4.0mm partially threaded, was used to prevent the biceps tendon from luxating. Any ligament remnants were then sutured to the screw. This resulted in a more successful outcome and a shortened post operative recovery time.

The surgical approach is anterior medial, the pectoral muscle is released, the ITL located and the lesser tubercle exposed. The biceps tendon is relocated in the intertubercular groove and an appropriate screw inserted into the lesser tubercle. Any ITL remnants that are long enough can then be attached to the screw. The pectoral muscle is then re-aposed and soft tissue and skin closed routinely.

The dogs should be started on a walking machine at 3 weeks post surgery. The screw remains in situ. We have had a number of dogs return to racing only to injure the other side.

Long Head of Triceps Avulsion

A relatively common injury in racing greyhounds. This injury is of little consequence and is treated conservatively. Occasionally it may be necessary to drain the haematoma. Early return to galloping exercise will ensure that sufficient muscle has avulsed to prevent muscle pain post exercise.

Avulsion of the biceps brachii

Avulsion / rupture of the biceps brachii usually involves both the radial and ulnar insertions

The dog is only minimally lame but has the characteristic anterior hyper extension of the elbow when it is walked. On extension of the elbow there is no palpable biceps insertion and deep palpation over the insertion is painful. In acute injuries there is swelling and discolouration of the skin from proximal to the elbow extending down the radius and ulna. Also, if the dog is placed on its back there is an obvious hyper extension of the elbow. Radiographs are unremarkable unless there are avulsed bone fragments.

The surgical approach is anterior medial, the skin and fascia is incised to reveal the ruptured tendon. Again the tendon suture pattern of choice is used to re-establish the tendon. No attempt is made to distinguish between the radial and ulna heads, the entire tendon is re-attached to the radial component. Occasionally the tendon has been avulsed from the bone and a screw and spiked washer can be used to re-attach it to the radius. Subcutaneous tissue and skin are closed routinely.

The immediate post operative period is critical if the repair is to be successful. The dog is recovered from anaesthesia with a sling around the carpus up to the neck to fully flex the elbow. The best material for this sling is a pair of ladies tights, as they will stretch and allow some joint movement while protecting the repair. This sling is progressively lengthened to allow more elbow movement over the next 10-14 days.

The dog is confined to leash exercise for emptying purposes for the first 3 weeks then allowed progressively more exercise. A walking machine is excellent as it allows normal function but the dog is kept quiet.

Flexor Carpi Ulnaris

This injuries range from small sprains in the tendon to gross avulsion off the accessory carpal bone. They all, however, have serious implications for return to racing.

Simple sprains may be treated by a variety of physiotherapy modalities and rest and the minor ones may return to successful racing. The severe injuries and the avulsion fractures of the accessory carpal carry a poor prognosis.

Flexor Tendon Sheath injuries

Injuries to the tendon sheath, over the posterior aspect of the accessory carpal bone, can occur either as a vertical and horizontal tear. The dog is usually not lame at a walk but the owners report swelling and failure to perform.

Physical examination reveals a swelling associated with the posterior aspect of the accessory carpal and careful palpation will reveal the deficit in the sheath. These should be surgically repaired.

The dog is placed either in dorsal or lateral recumbency, the former makes the surgery access much easier. A posterior lateral approach is made to the injury, soft tissues reflected and the deficit identified. If the injury is old the edges of the sheath should be lightly debrided and then multiple "pulley" sutures of 3/0 or 4/0 absorbable suture used to close the deficit. In my opinion multiple very small sutures give better results than fewer large ones.

In the case of vertical tears the repair should be supported with a modified Robert-Jones dressing in the post operative period, 10-14 days. For horizontal tears the immediate post operative support should be changed to a light cast applied with some carpal flexion for 10 days, followed by a light support dressing for a further 7-10 days

Palmar Ligament Injuries

Very important to take stressed views under general anaesthesia to determine the level of injury, as provided the radio-carpal joint is intact, in my hands a partial arthrodesis using I/M pins will provide better function and fewer complications for working dogs.

The intercarpal and carpo metacarpal joints are debrided, cancellous bone is inserted between the various levels and IM pins inserted via a slot in the distal metacarpals. It is important to insert the pin blunt end first initially to decrease the likelihood of the pin penetrating the posterior cortex, once the pin has been inserted and the medullary canal "reamed" the pin can be reversed and placed sharp end first.

A Synthes oscillating pin driver works very well for this as the metacarpal and carpal bone is dense and difficult to penetrate. In smaller breeds a minimum of 2 metacarpals should be pinned and in large breeds it is better to pin all four, all the pins should be cut to the same length prior to insertion so that the depth they have been inserted is easier to gauge.

A modified Robert-Jones should be applied until all swelling has subsided then a full cast is applied for 3 weeks, this is followed by a half cast for a further 3 weeks, follow up radiographs at this stage will indicate if the support can be removed.

Hind limb

Tensor Fascia Lata, TFL

Injuries to the TFL are best handled by conservative methods. Using various surgical techniques and comparing them with conservative ones it has become obvious that no matter how bad the injury, the dog will be returned to the track faster if surgery is avoided, conservative treatment also negates the complication associated with placing sutures in the biceps femoris. We have had excellent results with acupuncture, and magnetic field therapy.

Gracilis Muscle Injuries

Gracilis injuries, commonly called “a dropped back muscle” can occur at either the insertion or the origin. Clinically the dog has usually not performed up to expectations and is found to have a gross muscle tear either by the track veterinarian or the owner the following day. Classically there is extensive haemorrhage and bruising the following day.

The surgical approach to origin injuries is horizontally along the line of the origin. Very little dissection is necessary to reveal the ruptured muscle. Multiple near-far-far-near 0/- absorbable sutures are pre-placed, these are then progressively tightened to bring the muscle belly back to its original position. The skin and subcutaneous tissue is then re-apposed. Care should be taken when placing the sutures in the origin of male dogs as it is possible to interfere with the vascular bundle associated with the testicle.

Tears to the insertion are approached via an incision over the posterior border of the muscle, the fascia is incised and any haematoma removed, the muscle and fibrous tendon are then re-apposed with multiple preplaced near-far-far-near “pulley” sutures of 0/- maxon. Particular attention should be given to the tendinous post border of the insertion as this has the best suture holding ability. These sutures are again progressively tightened,

The best suture pattern is a “square or reef” knot, the long end of which is then pulled to turn the knot into a “slip” knot, thus allowing progressive tightening which does not require locking and does not slip. Once the muscle is re-apposed the knot is finished with 2 or 3 throws in the normal manner once

Post operative care consists of lead exercise, for emptying purposes only, for 3 weeks, followed by gradually increasing amounts of exercise for another 3 weeks. The dog is then walked as normal prior to being allowed free exercise in a yard for another 3 weeks at which time the dog can be slipped. I would expect a dog which has undergone Gracilis repair to be racing 12-14 weeks post repair. I would expect the dog to run in the same grade or better post repair.

Straight patella ligament

Rupture of the straight patella ligament can occur as a gross overloading, as a result of direct trauma with physical debridement of the ligament. These can be repaired by surgically placing 1 or 2 loops of heavy stainless steel wire through holes drilled in the patella and the tibial crest. The dog should have light physical activity for 3-4 weeks post surgery to allow the fibrous tissue / re-attached ligament to strengthen

Long Digital Extensor Avulsion

Avulsion of the LDE occurs in younger dogs. There is a mild to moderate joint effusion and in acute cases pain on flexion of the digits and palpation directly over the LDE origin. The diagnosis can be confirmed with radiographs or MRI, if there has been an avulsion fracture of the origin it is visible radiographically as a "chip" in the anterior lateral compartment of the stifle joint. Chronic cases tendon to have more evident radiographic changes as the avulsed fragment appears to "grow".

Treatment involves exploratory surgery to the stifle joint via an anterior lateral approach. The tendon of origin is identified and re-attached into the extensor fossa with a screw and spiked washer. If the tendon has been extensively lacerated or in chronic cases, where the tendon has contracted, it may be necessary to anchor the tendon in its muscular groove in the proximal tibia. This does not appear to have any detectable detrimental effect on limb function. The repair does not usually need post operative support, however, in very boisterous large breeds it may be necessary to apply a foot splint with the digits extended for 7-10 days

Popliteal Muscle Avulsion

A slightly obscure hind limb lameness more common in large breed immature dogs. There is a mild lameness on gaiting the dog and in acute cases a mild joint effusion with pain on palpation of the posterior lateral aspect of the joint. Radiographs will reveal a displaced popliteal sesamoid and if there is an avulsed fragment, this will be visible on the A-P. Treatment is surgical, via a posterior lateral approach, to anchor the tendon, either to its original site or by suturing it to the collateral ligament

Gastrocnemius Tendon Injuries or Common Calcaneal Tendon

These may be complete failures of the tendon of insertion, usually due to laceration, avulsion off the calcaneus, rupture of one or both musculo-tendinous junctions or as an enthesiopathy. In severe cases the dog will present clinically with a characteristic plantar grade stance. If the condition is traumatic rather than caused by a "cut" and the superficial digital flexor is still intact there will be a characteristic change in the dog's stance. There is apparent shortening of the flexor apparatus resulting in the digits appearing to be "flexed". In cases where there is only a partial failure of the CCL this along with a slight dropping of the hock may be the only clinical sign that there is injury to the CCL.

These injuries should be repaired surgically. The dog is placed in ventral recumbency with the injured limb extended posteriorly. The incision is made posterior laterally, to avoid placing it over the point of the calcaneus. The superficial digital flexor is released and reflected medially. The tendon/ musculetendinous junction is repaired with an appropriate suture and pattern. With the hock fully extended the repair is then supported by an appropriate sized positional screw placed from the posterior aspect of the calcaneus into the distal tibia.

The cortices of both bones are then tapped, the entry into the calcaneus counter sunk and an appropriate sized screw placed. The screw should not be over tightened and should be long enough so that in the event of an implant failure, i.e. the screw breaks, it is possible to remove the tibial component of the screw from the anterior cortex.

The digital sheath is then repaired, the subcutaneous tissue re-apposed and the skin closed routinely. A light compression bandage is applied immediately post operative support and once any surgical swelling has subsided the he limb is supported with a light cast. I like to place these casts above the digits so that the dog is more comfortable. This cast is removed at 3 weeks and the screw taken out. The back half of the cast is then re-applied for a further 3 weeks. In dogs where there is excessive swelling it may be advisable to place a transarticular external fixateur for post operative support.

In Dobermans or related breeds a failure of the insertion onto the calcaneus or an enthesiopathy is recognised. The attachment of the CCT is thickened and on palpation a deficit may be detected at the attachment of the CCT. Radiography reveals the shape of the calcaneus at the site of attachment is characteristically deformed. Again there is the characteristic plantar stance with flexion of the digits. Surgical repair is the treatment of choice. The dog is placed in ventral recumbency with the effected leg extended posteriorly, the surgical approach is posterior lateral to the hock, the skin is reflected and the tendon exposed. The CCT is trimmed and the site of attachment debrided, the CCT is then re-attached using a suitable suture pattern such as a locking loop or Bunnell and suture of choice, placed in the tendon and passed through holes drilled in the calcaneus, I use 1/- maxon. A curette can be used to remove any sharp bone edges around the holes. The repair is then protected with a suitably sized screw as previously described. Postoperative care is then as previously described.

Luxation of the Superficial Flexor Tendon

Luxation of the SFT is an occasionally occurring problem in greyhounds and other working or active breeds. Rupture of the tendon sheath on the medial side allows the tendon to luxate laterally, this can be readily seen / palpated in breeds with short hair such as the greyhound but more difficult in other breeds such as the Collie.

Treatment is by primary repair using multiple single interrupted sutures of 3/0 maxon or other absorbable material. Failure of primary repair or the treatment of pet dogs, where the condition is often seen as a chronic problem, will necessitate the augmentation of the surgical repair with a small k wire, used as a "skewer", passed through the tendon and into the calcaneus.

Failure of the repair appears to occur more commonly in the non racing breeds, particularly Shelties. I suspect that this may be due to the more chronic nature of the problem in these dogs