Avulsion of the extensor digitorum longus muscle in the dog: A report of four cases

M. J. POND
University of Glasgow Veterinary Hospital, Department of Veterinary Surgery, Bearsden Road, Bearsden, GLASGOW

ABSTRACT

Four similar cases of avulsion of the extensor digitorum longus muscle in large breed dogs are described. Diagnosis was made after a radiological examination of the stifle joint and in each case the avulsed fragment was successfully retained in position using lag screws.

INTRODUCTION

The extensor digitorum longus muscle of the dog arises on the lateral condyle of the distal femur, traverses the femoro-tibial joint and passes beneath the Tibialis cranialis on the anterolateral aspect of the tibia. The long belly of the muscle terminates just above the tibio-tarsal joint and the tendon continues beneath two transverse fascial bands across the joint. The tendon splits into four and each branch inserts on a distal phalanx. The action of the muscle is thus extension of the digits and flexion of the tarsus. The muscle has a similar course and action in all the domesticated animals but in man it originates on the proximal tibia.

There are no documented cases of lesions specifically involving this muscle and this report describes cases of avulsion of the origin of the muscle in a Dobermann Pinscher, a Weimaraner, an Irish Wolfhound and a Russian Wolfhound.

CASE 1

A 5-month-old male Dobermann Pinscher became lame in the left hindleg when it slipped on an icy pavement. The local veterinary surgeon examined him one day later and found a gross synovial effusion in the left stifle joint. The joint was
stable and pain-free and under general anaesthesia 15 ml of blood-stained synovial fluid were removed. This aspiration was repeated three times at 2-day intervals and on the last occasion 8 mg of Betamethasone (Betsolan—Glaxo) were injected into the joint. The lameness improved only slightly and the veterinary surgeon referred the dog to the University of Glasgow Veterinary Hospital. When examined in the hospital 3 weeks after the onset of lameness the dog occasionally put the foot to the ground and there was atrophy of the flexor and extensor muscles of the upper limb.

Examination of the left stifle joint revealed periarticular swelling, and pain was elicited by pressure over the antero-medial and antero-lateral aspects. There was a slight mechanical limitation of passive flexion of the joint but no other abnormalities were found.

**RADIOLOGY**

Antero-posterior and lateral views were taken of both stifle joints. The only abnormalities were seen on the lateral radiograph of the left stifle joint (Fig. 1). Small spots of irregular calcification were present just anterior to the femoral condyles distal to the patella.

The dog was given a general anaesthetic and 10 ml of clear, slightly yellow synovial fluid withdrawn. This fluid had a total WBC count of 10,000/mm$^3$, 96% of which were neutrophils. No bacteria or fungi grew on culture.

Strict kennel rest over the next 7 days resulted in a marked improvement. The dog used the leg more readily and there was only a slight re-accumulation of fluid. He was discharged for continued rest but was re-admitted 3 weeks later as severely lame as before and with gross fluid distension of the left stifle.

Radiology at this time showed the area of calcification to have increased in size and density and overlapped the anterior edge of the femoral condyles (Fig. 2). The AP view showed an area of calcification overlapping the lateral condyle of the femur (Fig. 3). Both views also revealed a zone of decreased density in the lateral femoral condyle that was of similar area to the calcified mass.

**Treatment**

Surgical exploration of the left stifle joint was performed 8 weeks after the onset of lameness. The joint was approached via a 10 cm skin incision over the antero-lateral aspect. Incision of the fascia lata and joint capsule revealed a mass lying on the antero-lateral aspect of the distal femur (Fig. 4). The mass was not attached along its dorsal border and could be reflected distally to reveal a depression on the lateral condyle (Fig. 5). The depression was lined with cancellous bone as was the medial aspect of the reflected tissue. The lateral surface of the mass was covered by firm fibrous tissue and from its distal border arose the tendon of origin of the extensor digitorum longus muscle (Fig. 6). The tendon passed through the sulcus on the plateau of the tibia and disappeared beneath the *Tibialis cranialis*. Traction
on the tendon extended the digits. There was a general inflammation of the synovial membrane and slight osteophytic proliferation. To preserve the normal action of the muscle it was decided to secure the mass and thus the origin of the

![Image](https://via.placeholder.com/150)

Fig. 1. Lateral left stifle Case 1. The arrow indicates the area of irregular calcification.

muscle, to the depression on the femur. It was anticipated that rigid fixation would result in union between the cancellous bone of the femoral depression and the mass. Two screws were inserted through oversized holes in the separate fragment into the femur at as near to 90° to the pull of the muscle as possible
(Figs. 7 & 8). When tightened, these screws produced compression between the fragment and the femur. Apart from a skin wound breakdown which responded to local treatment the progress was good. Six weeks after surgery the dog was beginning to use the limb and there was a normal range of movement in the joint. Ten weeks after surgery the dog was completely sound and when examined 18 months later the only residual sign was a slight, firm swelling over the lateral aspect of the left stifle.

Fig. 2. Lateral left stifle Case I—taken 1 month after Fig. 2. The area of calcification (arrowed) has increased in size and density.
CASE 2

A 6-month-old female Weimaraner was referred with the owner's complaint that the puppy did not stand squarely on the left hindleg and had occasionally been lame on that leg after severe exercise for the past 4 weeks. The dog was slightly lame on the left hind, the left stifle was slightly thickened laterally and there was
a minor degree of crepitus on full flexion and extension of the joint. There was no obvious pain or gross synovial effusion. The right stifle joint appeared normal.

**Radiology**

Lateral views of the left stifle were the most useful and showed a small calcified mass anterior to the femoral condyles distal to the patella (Fig. 9).

---

**Fig. 4.** Case 1. The patella is retracted medially and the arrows indicate the dimensions of the mass of fibrous tissue over the avulsed origin of the muscle.

**Treatment**

Surgical exploration of the joint by a lateral approach exposed the avulsed origin of the extensor digitorum longus muscle. It had tenuous fibrous attachments to the depression in the femoral condyle and the densely calcified mass was easily palpable at the proximal end of the tendon of origin.
The avulsed origin was re-attached, using one screw which produced compression between the fragment and the femur. The calcified segment of the origin split but surrounding dense fibrous tissue allowed very firm fixation. Four months after surgery the gait was completely normal and the dog was winning at local shows.

![Image of the avulsed muscle origin re-attached to the femur.](image)

**Fig. 5. Case 1.** The origin of the muscle is retracted distally to show the depression in the lateral condyle of the femur and (arrowed) the cancellous bone on the medial aspect of the fragment.

**CASE 3**

A 7-month-old male Irish Wolfhound had been lame on the right hind for 7 weeks when referred. The owners reported that it occasionally did not advance the right paw normally and caught the toes in deep shag pile carpets. The dog
was slightly lame on the right hind, no neurological abnormality was found but pain was produced on full flexion and extension of the stifle. There was a slight synovial effusion and a firm thickening was palpable over the lateral femoral condyle.

![Image](image.jpg)

Fig. 6. Case 1. The origin of the muscle is retracted laterally to show the tendon of origin of the muscle (arrowed).

**Radiology**

Lateral views of the stifle were identical with those of Case 2.

**Treatment**

Surgical exploration revealed a totally avulsed origin of the extensor digitorum longus muscle. This was reattached as described above, using two screws. The dog was sound two months after surgery.
CASE 4

A 7-month-old Russian Wolfhound was referred with a history of 6 weeks’ lameness of the left hindleg that was exacerbated by hard exercise. The left stifle was painful on manipulation, there was a palpable synovial effusion and firm thickening laterally.
Radiology

Lateral views were identical with those seen in Fig. 2, i.e. the fragment was not as densely calcified as in Cases 2 and 3.

Fig. 8.

Treatment

Surgery was performed. The synovial membrane was very inflamed and there was a slight proliferation of osteophytes along the sides of the trochlear ridges. The free fragment, enclosed in a large mass of fibrous tissue was fixed into place using two compression screws. The dog was sound 2 months after surgery.
DISCUSSION

Avulsion of the origin of the digitorum longus muscle has not been reported previously; these four cases were seen over a 6 year period and so it is not a commonly diagnosed cause of lameness in the dog.

The four dogs have a number of features in common:
(1) They were all large breed dogs and were between 4 and 6 months old at the onset of the lameness.
(2) The condition was unilateral.
(3) In only Case 1 was the onset of lameness associated with a known traumatic incident.
(4) Clinical signs were localized to the stifle joint although Case 3 may have been showing a slight malfunction of the muscle/tendon unit when catching its toes in the deep carpet pile.
(5) When the detached tissue was firmly secured clinical signs regressed. The clinical signs were probably due to the local irritation of the detached tissue inducing an acute synovitis and subsequently more chronic changes in the synovial membrane and joint capsule.

The unilateral occurrence and sudden onset indicate that some trauma must have occurred but in three of the cases no unusual incidents were observed. Only the Dobermann (Case 1) was seen to slip awkwardly and to be lame immediately afterwards.

The attachments of tendon into bone are very strong because the collagen fibres pass directly into the bone from the tendon—Sharpey’s Fibres. Thus, the tendon itself is very unlikely to be detached. It is therefore probable that minor trauma could cause an avulsion of the bone at the origin of a muscle. Although a separate ossification centre at the origin of the M. extensor digitorum longus muscle has not been described, the occurrence of the clinical condition indicates that it might be interesting to investigate the region in some small and large breeds of dogs.

It would seem useful to add this condition to a list of possible causes of stifle lameness in young dogs.

ACKNOWLEDGEMENTS

The author is most grateful for the helpful advice and criticism given by Dr J.R. Campbell and for the photographic and secretarial assistance of Mr Alan May and Mrs Anne Inglis.
