

# Luxation of the superficial digital flexor tendon in a dog: a case report



Luxation of the superficial digital flexor tendon (SDFT) is an infrequent orthopaedic condition in dogs. A case of SDFT luxation is herein reported in a 2-year old bitch, crossbred with a Shetland sheepdog.

The dog was referred for severe, left hind limb lameness. Physical examination revealed a painful swelling located at the calcaneal tuber, related to ectasia of the bursa tendinis calcanei. Lateral SDFT luxation was observed on flexion of the hock. No other orthopaedic pathologies were identified either in the affected limb or in the contralateral limb.

The SDFT luxation was treated surgically by securing the tendon with a non-absorbable suture using simple interrupted stitches. The limb was then immobilised in plaster for 3 weeks and, after removal, the tendon was found to be stable with no signs of bursitis.

Upon examination 6 weeks after surgery, no lameness was detected and no signs of relapse were noted.

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## INTRODUCTION

The superficial digital flexor muscle originates from the lateral supracondylar tuberosity of the femur and is covered proximally by the gastrocnemius muscle.<sup>1</sup> Its tendinous distal insertion, the superficial digital flexor tendon (SDFT), runs together with the gastrocnemius tendon, winding round it to become medial and caudal to this tendon.<sup>1</sup> Distally, the SDFT broadens on the tuber calcanei, forming an extensive “calcaneal cap” kept in place by a medial and a lateral retinaculum.<sup>1</sup> The tendon then divides into four parts which run on the plantar surface of the metatarso-phalangeal joint to insert on the middle phalanges of digits II, III, IV and V.<sup>1,2</sup> At the calcaneal tuberosity, the SDFT is separated from the gastrocnemius tendon and the calcaneus by a synovial bursa,<sup>3</sup> or bursa tendinis calcanei,<sup>1</sup> which extends proximally and distally to the tuberosity.<sup>2</sup> Luxation of the SDFT is reported to be an orthopaedic condition that occurs infrequently in dogs.<sup>2</sup>

According to the literature, the incidence of luxation of the SDFT is higher in Shetland sheepdogs and in Collies.<sup>4</sup> Indeed, a study carried out in 2002 by S. Solanti et al. indicated that in Shetland sheepdogs luxation of the SDFT is transmitted as an autosomal recessive condition. No sex- or age-related predisposition has been described.

The aetiology is unknown, but some predisposing factors have been recognised: obesity, repeated microtrauma, excessive physical activity, torsional forces and skeletal malformations,<sup>6</sup> such as hypoplasia of the medial or lateral process of the tuber calcanei.<sup>2</sup>

The clinical findings almost always include inflammation of the bursa tendinis calcanei, secondary to damage to the lateral or medial insertion of the tendon.<sup>4,6,7,8</sup>

Lateral luxation of the SDFT is more frequent, presumably because the lateral insertion of the tendon into the calcaneus is stronger and more pronounced than the laxer, medial insertion.<sup>2,4,6,8,9</sup>

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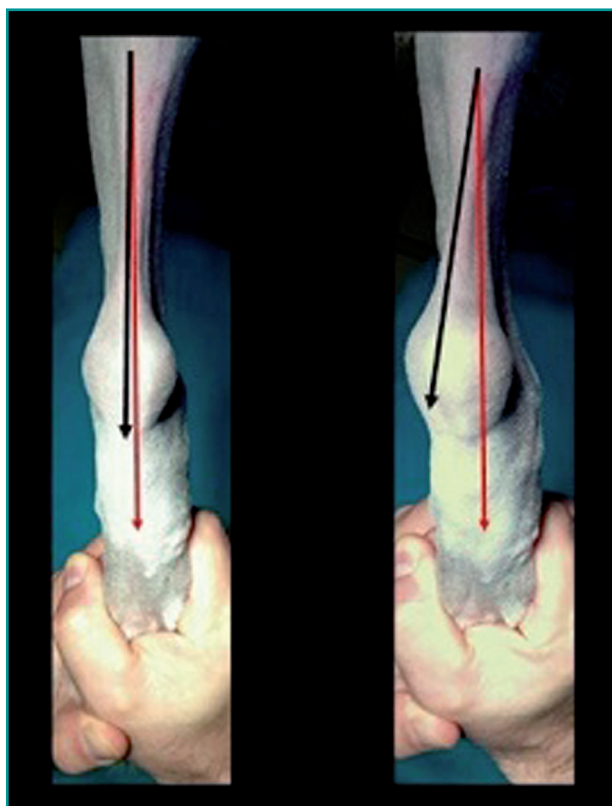
In 2010, M. Gatineau reported that intermittent luxation or subluxation of the SDFT could lead to longitudinal tears in the tendon, which could severely compromise the mechanical function of the tendon.

**Luxation of the SDFT is an uncommon orthopaedic condition in dogs, although its incidence is higher among Shetland sheepdogs. The luxation is more frequently lateral and a calcaneal bursitis is almost always present.**

## CASE REPORT

Lea, a 2-year old, spayed bitch, a crossbred Shetland sheepdog weighing 40 kg, was brought for examination because of intermittent lameness of the left hind limb which had started 3 weeks earlier, following a run in the park.

The patient was initially treated with an anti-inflammatory drug, Meloxicam (Loxicom®, Vetoquinol) (0.1 mg/kg) for 7 days, which reduced the severity of the lameness, without achieving complete remission of the symptoms. The dog was therefore referred to a specialist for assessment.



**Figure 1** - On the left, the SDFT (black arrow) can be seen in its site along the anatomical axis of the pelvic limb (red arrow), during extension of the hock. On the right it can be seen that the SDFT luxates laterally during flexion of the hock.

The orthopaedic examination revealed a grade 2 lameness (on a scale from 0 to 4) of the left hind limb. On inspection an evident swelling was present at the calcaneal tuberosity of the hock, which, on deep digital palpation, was tender and of soft elastic consistency. With flexion of the hock the SDFT luxated laterally; with extension of the joint it returned to its correct position (Fig. 1). No other orthopaedic abnormalities were found either in the affected limb or in the contralateral one.

Planto-dorsal and medio-lateral X-rays of the hock were taken. These showed hypoplasia of the lateral process of the calcaneal tuberosity in the symptomatic limb as well as in the contralateral one (Fig. 2).

With the agreement of the owner, surgical stabilisation of the SDFT was performed.

The patient was pre-medicated with Medetomidine (Sedastart®, Esteve) (10 µg/kg) and Methadone hydrochloride (Semfortan®, Dechra) (0.5 mg/Kg); anaes-



**Figure 2** - The red arrow points to the lateral process of the calcaneal tuberosity, which is hypoplastic compared to the medial process.

thetia was induced with Propofol (Proposure®, Meri-al) (1 mg/kg) and maintained with inhalation of isoflurane gas. An antibiotic was administered pre-operatively (Cefazoline®, Teva) (22 mg/kg) and the left hind limb was prepared for surgery and positioned in extension on the operating table with the dog in sternal recumbency. The skin was incised caudally and medially to the calcaneus, starting just proximal to the calcaneal tuberosity and continuing distally along the medial margin of the calcaneus (Fig.3). The subtendinous synovial bursa was considerably distended and the medial retinaculum was torn. It was confirmed that the SDFT luxated during flexion of the tarsus and returned to its place during extension (Fig. 3).

The bursa tendinis calcanei was incised and a large amount of synovial fluid emerged. The medial part of the synovial bursa and of the medial retinaculum in excess was then removed. The free margin of the medial retinaculum was juxtaposed and sutured to the medial margin of the SDFT with non-absorbable size 0

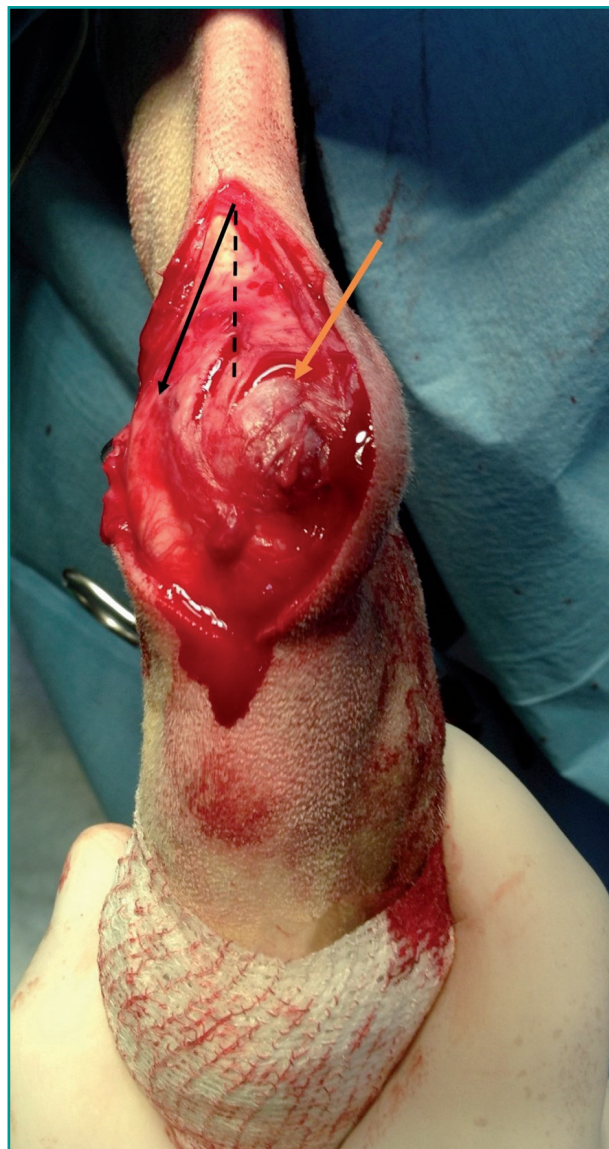
**The medial part of the calcaneal bursa in excess is removed and the tendon is stabilised with a non-absorbable suture. The limb is immobilised for 3 weeks with a plaster cast.**

polyamide monofilament (Seralon®, Serag Wiessner), using simple, interrupted stitches. The skin was closed in layers with a simple uninterrupted suture with 2-0 absorbable monofilament (Serasynth®, Serag Wiessner) (Fig. 4). A plaster cast was then applied for 3 weeks and Carprofen (Dolagis®, Ati) (4 mg/kg) and amoxicillin + clavulanic acid (Synulox®, Pfizer) (12.5 mg/kg) were prescribed for 7 days. At the follow-up examination, 4 weeks after the intervention, the tendon appeared stable during flexion-extension movements of the hock and the swelling at the site of the retrocalcaneal bursa had disappeared. However, a mild, grade 1 limp, was still present, which was managed successfully with a second cycle of anti-inflammatory therapy.

Three months after surgery, the dog was no longer lame and the tendon was perfectly in place.

## DISCUSSION

Luxation of the SDFT is described as an uncommon clinical finding in the dog. The differential diagnoses include all the causes of lameness of the hind limb, with particular attention to orthopaedic conditions of the tarsus such as laceration of the calcaneal tendon, fractures of the calcaneus and neoplasms, which careful clinical examination and radiography can easily exclude.



**Figure 3** - The ectatic bursa tendinis calcanei and the torn medial retinaculum (orange arrow) can be seen on the right. On the left, it can be seen that the SDFT (black arrow) is dislocated laterally with respect to the anatomical axis of the pelvic limb (dashed arrow).

The literature consulted describes a higher incidence of SDFT in Shetland sheepdogs.<sup>4,5</sup> The patient examined was a cross with a Shetland sheepdog, thus concordant with the descriptions in the literature<sup>5</sup> of hereditary factors in this breed.

Obesity is reported as another predisposing factor for SDFT.<sup>6,7</sup> The patient was indeed overweight; this could have overloaded the hind limbs and subjected the superficial flexor tendons to high stress, facilitating inflammation of the calcaneal bursa and of the medial retinaculum.

Since the medial retinaculum is less developed than the lateral one, its fibres can be weakened and overextended, with a resulting inability to perform its function of



**Figure 4** - The luxated SDFT is fixed with interrupted stitches using non-absorbable, size 0, monofilament nylon.

keeping the SDFT in its correct position.

The inflamed calcaneal bursa becomes ectatic, because of the accumulation of synovial fluid, and thus causes a swelling in the plantar compartment of the tibio-tarsal joint, which can be easily seen and palpated during the clinical examination. This bursitis exerts pressure on the superficial flexor tendon, favouring its luxation.

Another relevant aetiopathogenic factor is hypoplasia of the medial or lateral process of the calcaneal tuberosity.<sup>2</sup> In the clinical case considered, the planto-dorsal X-rays of the tarsus showed clear hypoplasia of the lateral process which could have predisposed to the lateral luxation of the tendon.

As for the clinical presentation, the luxation of the SDFT was lateral, in concordance with descriptions in the literature.<sup>2,4,7,8,9</sup>

The SDFT luxates during flexion of the hock and returns to its place spontaneously during extension. It is important to highlight that this flexion-extension manoeuvre of the hock must be performed with the knee extended; in fact, as well known, the knee is a “bracing keystone” of the pelvic limb. With the knee in extension, the tension necessary for the tendon to luxate can be reached.

In agreement with the literature, medical treatment was ineffective in that it alleviated the pain and improved the degree of lameness, but it did not lead to a complete disappearance of either symptoms or the luxation. The SDFT was therefore stabilised surgically using simple interrupted stitches made of non-absorbable material.

Although hypoplasia of the lateral process of the calcaneal tuberosity was present, the surgical correction of the bone surface was not performed. This choice was made on the basis of the lack of data in the literature regarding the efficacy of an osseous intervention and, in contrast, in view of the known efficacy of fixing the tendon only with a suture.

We believe that ultrasonography would be useful to identify the presence of micro-lacerations in the SDFT, which could be present in patients without being clinically apparent.

## CONCLUSIONS

Although luxation of the SDFT is an uncommon orthopaedic disorder it should be included among the differential diagnoses of tarsal lameness in the dog.

One important clinical finding in the diagnostic workup is the eventual presence of calcaneal bursitis. The tendon luxation test is to be performed with the knee extended since extension and flexion of the whole limb do not create the necessary tension to make the tendon

**It is fundamental for the diagnosis that the test for luxation of the tendon is performed with the knee extended as much as possible, in order to create the tension necessary for dislocation of the tendon.**

dislocate and the diagnosis could, therefore, be missed. The efficacy of surgical treatment and the inefficacy of solely medical treatment were confirmed. Surgical fixation using non-absorbable sutures, followed by immobilisation with a cast, is an effective therapeutic approach.

In the future it would be interesting to study lesions of the SDFT in more depth by means of ultrasonography, particularly for microlesions that cannot be identified with other diagnostic investigations.

## KEY POINTS

- Breed predisposition in Shetland sheepdogs and their cross-breeds.
- Inflammation of the bursa tendinis calcanei almost always present.
- Lateral luxation of the SDFT is more frequent.
- Confirmed effectiveness of surgical treatment.

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