Lateral Sesamoidean Ligament of the Forelimb
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The Kinesiology of a Canine
Homework Assignment:

Describe the muscle group name: Mostly could only find information regarding Horses.
Lateral (fibular) sesamoid ligament ligament suspending lateral side of lateral sesamoid; blends with fibres of first metatarsophalangeal joint lateral collateral ligament.

Below will answer the following questions:

- What is its action?
  To stabilize the pair of palmar sesamoid bones. Supports and prevents over extension of fetlock joint

- What is its size?
  Canine smaller than equine.

- What is its location?
  Between distal ends of metacarpal bones and proximal ends of proximal phalanges. They are embedded in the tendon of the interosseous muscle at each of the four main joints.

- What is its origin sites?
  Combined with the Suspensory Ligament - bottom row of knee bones between splint bones. Sesmoidean ligaments attach sesmoid bones to long pastern bone

- What is its insertion sites?
  Divides in two just above the fetlock. Each branch joins to a sesmoid bone and blends with common digital extensor tendon (CDET).

- What tendons and ligaments are involved?
  There are 2 main types of tendons
  1. Flexor tendons- flex or bend with the leg when leaving the ground
  2. Extensor tendons – straighten the leg in mid air to allow or prepare the leg for the next stride.
  There are four different types of ligament: -
  1. Supporting or suspending - the Suspensory ligament.
  2. Annular - a broad band of ligament, which directs the pull on a tendon.
  3. Inter-osseous - ties bone together, e.g. the pedal and navicular, canon and splint
  4. Funicular (or cord like) - holds bones together. The main ligament of interest is the suspensory ligament – it acts as a support bandage or brace – preventing the entire fetlock joint from coming too close to the ground.
The suspensory ligament is different than other ligaments in that it contains some muscle fiber allowing it to have more “give” at the fetlock joint.

The interosseous ligament – joins the splint bones to the canon bones – this is the ligament that becomes ossified (calcified or turns to bone) and appears as a splint.

Sesmoidean ligaments attach sesmoid bones to long pastern bone.

Other ligaments of interest Inferior and superior check ligaments and annular ligaments. Check ligaments are linked from bone to tendon and try to prevent the tendon from being overstretched. They “check” the stretch and movement. The annular ligament wraps around the sesmoid bones providing support and protection.

Once the leg is in motion, the tendons slide up and down when the proper muscles are put in motion by the various nerves.

What is its blood supply?
They are poorly supplied with blood and are very slow to heal after injury and do not withstand prolonged stretching. They are also rich in nerve endings making injuries here painful for the horse. They are made of bands of white and yellow fibrous tissue, the white being inelastic, and the yellow elastic.

What is its innervations? This was difficult to find. The best found and explained was for a equine of course:
The muscle spindles located in the ligament are always supplied with a nervous annulo-spiral termination which is centrally placed in the equatorial region.

Refer to plate #13 and #15 for visual from the Dog Anatomy - A Coloring Atlas by Robert A. Kainer, DVM and Thomas O. McCracken, MS

Below will explain the importance to avoid any injury to the sesamoidean ligament of the forelimb.

What is involved which allows a canine to perform incredible and effortless movements? It is important to understand how a dog moves. It is a result of a symphony of the bones, the joints, the ligaments, the tendons and the muscle groups working together. A canine’s hind legs provide
the driving force and the power for the movement of the entire body. The forelegs are responsible with direction and shock absorption to execute dynamic movement.

Muscles are always arranged in opposing groups performing opposite actions. Example: the extensor muscle group of the foreleg extends the forelimb and paw during protraction. These muscles would be the brachiocephalic muscle, pectoralis major superficialis muscle, mastoid muscle, biceps brachii muscle, extensor carpi radialis muscle, and the serratus thoracis muscle. In the meantime the flexor muscle group of the foreleg flexes the same forelimb and paw during retraction. These muscles would be the triceps muscle, the latissimus dorsi muscle, the flexor muscles, the serratus cervicis muscle, the rhomboid muscle, the cervical part of the trapezius muscle and the pectoralis minor profundus muscle. It is this type of interplay that produces the well-balanced, biomechanically sound and beautiful motion we love to observe in canines.

**Techniques for Rebalancing through Massage:**

Always start any session with a relaxation massage. Begin by vectoring to warm up to create Qi movement, blood movement and to warm up the tissue. Lead into stimulating the cerebral (nervous system, the brain, the spinal cord and the nerve plexes. This is the canines “body awareness.” the mental. This will assist in the canines self awareness stimulating coordination in all aspects of movement, decrease motor nerve tension, and release anxiety associated with muscle tension. This will give the Massage Practitioner the feedback on the state of health of the muscle groups and of the ligaments particularly in regards to elasticity and tonality. Also the flexibility of the the joints. Here, the joint has a stretch reflex response. Hold the the stretch in a relaxed manner and for a longer period of time. The canines flexibility will increase naturally when stretch is introduced regularly.

**General stretch approach:**
- Gentle stretch for 5-15 seconds
- Slowly extend stretch in limb is willing
- Do not overstretched
- Do not makejerky or bouncy movements
- Never stretch an acute torn muscle, tendon or ligament
- Never force the joint in any abnormal range or twist it

**Foreleg Stretches:**
- Forward Stretch: This protraction stretching movement stretches the flexor muscles of the leg.
- Backward Stretch: This retraction movement stretches the extensor muscles of the leg.
- Shoulder Rotation: This circular movement, inward-forward-outward-back, will assist to loosen deep muscles and relax ligaments of the shoulder girdle which directly functions with the foreleg.
In Summary: Issues that occur with Straight Sesamoidean Ligament: desmitis

Cause: fatigue failure; trauma - twisting forces during weightbearing.

- Signs: sudden onset acute lameness (usually forelimb) [Musculoskeletal: gait evaluation], little or no palpable swelling or pain [Musculoskeletal: physical examination - adult].
- Diagnosis: diagnostic analgesia [Hindlimb: perineural analgesia], ultrasonography, MRI [Magnetic resonance imaging].
- Treatment: box rest, anti-inflammatories, support bandaging [Musculoskeletal: fracture - first aid]
- Prognosis: guarded to poor depending on severity; recurrence common.

See also:
- Intersesamoidean ligament disease
- Oblique sesamoidean ligament desmitis

Differential diagnosis

- Other sesamoid ligament injury.
- Other pastern lameness.

Clinical signs

- Acute, sudden onset lameness, usually in a forelimb.
- Acute lameness improves quite quickly to a point, but then persists.

Outcomes Prognosis

- Guarded to poor: depends on extent of injury - severe injuries have shown poor capacity to heal → persistent lameness.
- Recurrent injury is common.
- Co-existing injury to oblique sesamoidean ligaments → poorer prognosis.

Expected response to treatment

- Gradual resolution of lameness over 6-8 weeks.
- Improvement in ultrasonographic appearance over 6 months.

Reasons for treatment failure

- Extensive injury.
- Involvement of other ligaments, eg oblique sesamoidean ligament, suspensory ligament.
<table>
<thead>
<tr>
<th>Ligaments of fetlock joint</th>
<th>Several</th>
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<tbody>
<tr>
<td></td>
<td>Sesamoidean ligaments</td>
</tr>
<tr>
<td></td>
<td>Intersesamoidean ligament</td>
</tr>
<tr>
<td></td>
<td>Collateral sesamoidien ligament</td>
</tr>
<tr>
<td></td>
<td>Distal sesamoidean ligament</td>
</tr>
<tr>
<td></td>
<td>Collateral ligaments</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Sesamoidean ligaments</th>
<th>Interosseeus muscle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homologue of interosseus muscle of dog, little muscle in foal, entirely tendionous in adult horse and well formed</td>
<td></td>
</tr>
<tr>
<td>Divides at distal 1/4 of cannon bone into two</td>
<td></td>
</tr>
<tr>
<td>Each division inserts on abacial surface of proximal sesamoid bone and detaches oblique, dorsal branch (extensor slip) to common digital extensor tendon over dorsal surface of proximal phalanx</td>
<td></td>
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</tbody>
</table>

| Origin of sesamoidean ligament | Proximal part of palmar surface of cannon bone |

<table>
<thead>
<tr>
<th>Functions of sesamoidean ligaments</th>
<th>Support fetlock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventing over extension of joint when foot is on the ground</td>
<td></td>
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<tr>
<td>Dorsal branch limits flexion of the joint and prevents deep flexor tendon from flexing the joint as a result of tension on it, when limb is on the ground and joint extended</td>
<td></td>
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</tbody>
</table>
| Intersesamoidean ligament | Fibrocartilage  
Extends between two proximal sesamoid bones |
|--------------------------|-----------------------------------------------|
| Collateral sesamoiden ligaments | Medial and lateral  
Attach sides of proximal sesamoid bones to metacarpal condyles and proximal tubercles of 1st phalanx |
| Distal sesmoidean ligaments | Thought to be distal continuation of interosseus muscle  
Three ligaments  
Superficial sesamoidean, middle sesamoidean and deep sesamoidean  
Assist the interosseus muscle in support of fetlock joint |
| Superficial sesamoidean ligament | Straight sesamoidean ligament  
Extends from sesamoid bones and intersesamoidean ligament to fibrocartilage lip on palmar aspect of proximal end of 2nd phalanx  
Straight fibers  
Long |
| Middle sesamoidean ligament | Oblique ligament  
Extends from bases of sesamoid bones to palmar surface of proximal phalanx  
Along with superficial digital flexor tendon |
<table>
<thead>
<tr>
<th>Ligament Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>Deep sesamoidean ligament</td>
<td>Prevents buckling forward of pastern joint when foot hits the ground</td>
</tr>
<tr>
<td>Cruciate ligament</td>
<td>Two bands of fibers crossing each other from bases of sesamoids to opposite eminence on proximal end of 1st phalanx</td>
</tr>
<tr>
<td>Short sesamoidean ligaments</td>
<td>Two ligaments running from axial sides of bases of sesamoid bone to abaxial side of eminence of proximal phalanx</td>
</tr>
<tr>
<td>Collateral ligaments of fetlock joint</td>
<td>Medial and lateral</td>
</tr>
<tr>
<td></td>
<td>Each divided into two layers, superficial and deep</td>
</tr>
<tr>
<td></td>
<td>Deep shorter and stronger and covered by superficial layer</td>
</tr>
</tbody>
</table>

Research for Lateral Sesmoidean Ligament of the Canine Forelimb

Note: Most of the research is with Equines. Interesting that the canine and felines have less studies and medical information on this particular area of interested. A lot of information on sesamoid disease in puppies and young dogs. Below are a few of the many PDF and research information that I went through. Overall, very interesting. I became much more aware of Equines, though I had no background. My knowledge and awareness opened up exponentially for canines.

1. [SUSPENSION LIGAMENT INJURIES | Advanced Connections](https://example.com)

2. [acetherapy.ca/blog/?p=309](https://example.com)

3. Nov 27, 2012 - Advances in Diagnosis and Treatment By Mike Scott, DVM, MVSc Suspensory... of the suspensory ligament are continued by the sesamoidean ligaments. ..... Equine/Canine Therapy includes the treatment and prevention of ...
Tarsophalangeal joints are supported by medial and lateral collateral ligaments and sesamoidean ligaments. Metacarpals and metatarsals 3 and 4 are considered with metacarpal 2 of the right forelimb and metatarsal 3 of the right hindlimb... large-breed, working, athletic, or show dog. The veterinary...

The forelimbs of the dog – Blood vessels... Palmar Sesamoids. These are attached by Lateral and Medial Sesamoidean Ligaments and anchored ventrally by...

Forelimb Muscles

Forelimb Muscles... Pectoralis transversus, Cranial sternum, Medial fascia of forearm. Girdle... Pronators + Supinators (significant movement only possible in dog and cat)... Distal sesamoidean ligaments continue on to attach to phalanges.

In 1991, Inerot et al developed a model for arthritis in the canine hip joint by... described where the lateral collateral ligament, lateral meniscus, and sesamoidean ligaments... strikes by the left or right forelimb and the ipsilateral hindlimb and was within...

1. Animal Physiotherapy: Assessment, Treatment and Rehabilitation of... - Page 46 - Google Books Result
2. books.google.com/books?isbn=0470750464
3. Catherine McGowan, Lesley Goff, Narelle Stubbs - 2008 - Medical