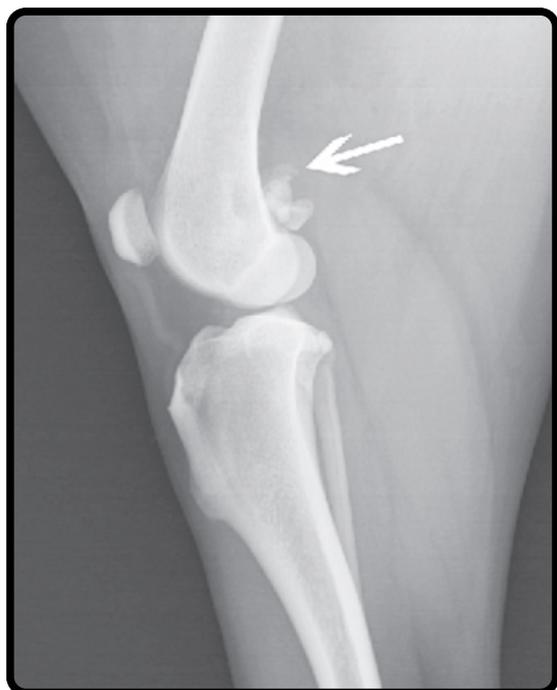


News

Gastrocnemius Muscle Injuries



Introduction

Welcome to this edition of Four Leg Rehab News, focused on gastrocnemius muscle injuries in dogs – an often-overlooked yet critical area for practitioners working with lameness and mobility issues. In the following articles, we'll explore non-surgical treatments like therapeutic ultrasound and diathermy for strains and partial avulsions; case insights into avulsions of the gastrocnemius heads, including surgical approaches and mimics of cruciate injuries; advanced MRI diagnostics for musculotendinopathy; breed predispositions, particularly in herding dogs like Border Collies, alongside anatomic variations; and the iatrogenic risks associated with corticosteroid use leading to atraumatic ruptures. As canine rehabilitation practitioners, understanding proximal gastrocnemius muscle injuries is essential, as they can masquerade as more common conditions like cranial cruciate ligament tears, potentially leading to misdiagnosis and delayed recovery; mastering physical examination techniques—such as palpating for pain at the fabellae, assessing for plantigrade stance, and checking muscle tautness—empowers us to identify these issues early, enabling targeted rehab protocols that restore function and prevent chronic complications.

Enjoy the issue!
Cheers, Laurie

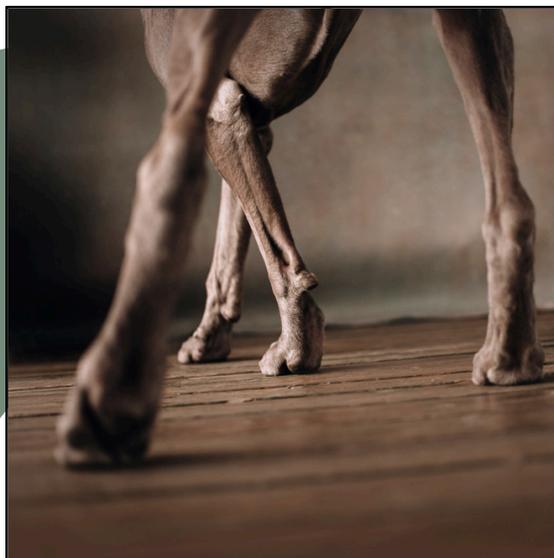


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Typical Subjective History of Dogs with Gastrocnemius Muscle Injuries

Dogs with gastrocnemius muscle injuries (strains, partial avulsions, tendinopathy, or ruptures) most often present with one of the following owner-reported patterns:

- Sudden or acute-onset pelvic limb lameness, frequently triggered by exercise, running, or minor trauma (sometimes with no recalled inciting event).
- Biphasic course: initial lameness after trauma that appears to resolve with rest, followed by sudden recurrence and worsening after return to activity.
- Chronic or progressive hindlimb stiffness/lameness lasting weeks to months, sometimes bilateral, with recent development of a dropped-hock appearance.
- In active/herding/agility dogs (especially Border Collies), owners frequently report no lameness at all despite significant underlying pathology (subclinical presentation).
- Rare iatrogenic history: prolonged corticosteroid use preceding atraumatic rupture.



Typical Physical Findings in Gastrocnemius Injuries

Common physical examination findings for gastrocnemius muscle injuries (e.g., avulsions, strains, or tendinopathies) in dogs include:

- **Lameness:** Often acute onset, ranging from low to high grade, weight-bearing or non-weight-bearing, and chronic in non-traumatic cases. It may be most noticeable during initial steps or after rest.
- **Plantigrade Stance:** Partial or full, due to weakness or rupture affecting the common calcaneal tendon.
- **Pain on Palpation:** Localized to the muscle origin, fabella (lateral or medial), caudolateral stifle, or proximal crus. Deep palpation often elicits discomfort.
- **Muscle Atrophy:** Generalized in the affected hindlimb, particularly quadriceps and gastrocnemius.
- **Palpable Abnormalities:** Taut band in the caudolateral thigh or a palpable rupture/gap in the muscle belly.
- **No Joint Instability:** Absence of cranial drawer sign, tibial thrust, or meniscal click, helping differentiate from cruciate ligament injuries.
- **Other Signs:** Reluctance to move, stiffness, or swelling around the stifle without effusion.

These patterns are consistent throughout the case reports and studies, regardless of whether the injury is traumatic, atraumatic, or subclinical. Early recognition of the plantigrade stance and fabella-origin pain, combined with ruling out stifle instability, allows rehabilitation practitioners to identify and address these injuries promptly.

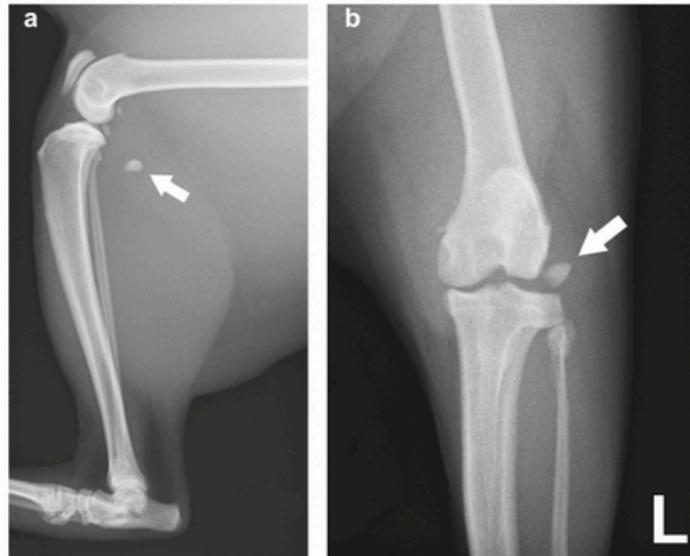


Fig 1. (a and b) Preoperative radiographs of the left stifle, with the hook in flexion, demonstrating a distal displacement of the lateral fabella (white arrow).

Tips for Physical Examination

- Perform a thorough orthopaedic exam with special attention to the gastrocnemius origin and fabellae.
- Palpate the caudolateral and caudomedial thigh while extending/flexing the stifle and hock to assess for pain or tautness.
- Evaluate gait for lameness grading (e.g., 3/6 weight-bearing at walk, 6/6 at trot) and stance abnormalities.
- Rule out mimics like partial cranial cruciate rupture via stability tests (drawer, thrust). **(MY personal thoughts on this, are, learn how to do a drawer test the way I teach it - i.e. the way we test in humans. NOT with your thumb on the fabella!)**
- In herding breeds or agility dogs, screen even without lameness history, as subclinical tendinopathy may be present.

(Note: Findings in a cat case were similar, including plantigrade stance and fabella pain, but focus here is canine.)

MRI Diagnostics in Gastrocnemius Musculotendinopathy

MRI excels in identifying subtle gastrocnemius injuries, especially in non-traumatic cases among herding breeds. Key findings include signal changes around the fabella, aiding differentiation from cruciate issues.

- **Herding Dog Patterns:** In nine herding dogs (mostly Border Collies), MRI showed T2/STIR hyperintensity and T1 contrast enhancement in the lateral head, indicating strain without joint instability; excellent outcomes with conservative care except in severe cases.
- **Multi-Breed Expansion:** In 16 medium-large breeds, MRI revealed T2 hyperintensity and contrast uptake in both heads, often with fabella osteophytes; conservative treatment restored full function in most.
- **Diagnostic Tips:** Use T1 pre/post-contrast, T2-weighted, and fat-suppressed sagittal sequences for oedema and enhancement detection; radiographs may show mineralization but miss soft-tissue details.



Breed Predispositions and Anatomic Variations

Certain breeds show higher risks for gastrocnemius issues, often linked to activity or anatomy. Awareness aids early rehab intervention.

- **Border Collie Tendinopathy:** In 34 agility-trained Border Collies without lameness history, 18 had clinical pain and ultrasound abnormalities at the origin; six showed fabella mineralization. Suggests underdiagnosed in active dogs.
- **Fabella Position Variation:** A Poodle's medial fabella deviation mimicked avulsion but lacked muscle lesions; highlights need to rule out congenital variants before assuming injury.
- **Rehab Implications:** Screen herding breeds routinely; conservative management (rest, NSAIDs) often suffices for subclinical cases.

Iatrogenic Risks: Corticosteroid-Induced Gastrocnemius Rupture

Excessive corticosteroids can cause myopathy, leading to atraumatic muscle ruptures. This underscores cautious use in rehab protocols.

- Case Example: A Shetland Sheepdog on triamcinolone developed gastrocnemius rupture with atrophy, plantigrade stance, and histologic degeneration (myofiber fragmentation, mineralization).
- Clinical Signs: Stilted gait, hindlimb weakness progressing generally; confirmed by low cortisol response and calcinosis cutis.
- Rehab Caution: Surgical repair may fail post-immobilization; taper steroids gradually and monitor for myopathy in chronic cases.

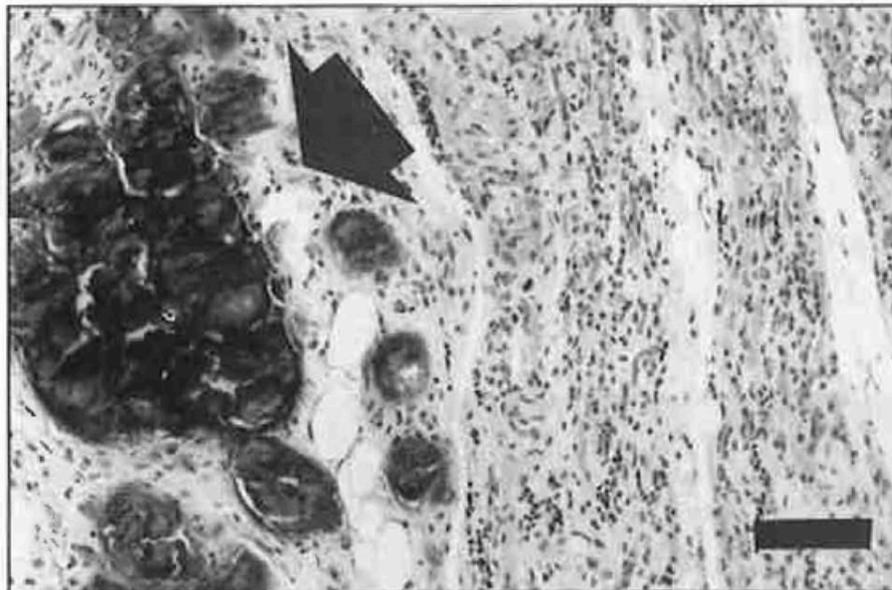


Figure 2—Photomicrograph of a transverse section of the gastrocnemius muscle. Most muscle tissue is replaced by connective tissue containing scattered inflammatory cells. Notice the large focus of mineralization (arrow). H&E stain; bar = 75 μ m.

Avulsion of Gastrocnemius Heads: Case Insights

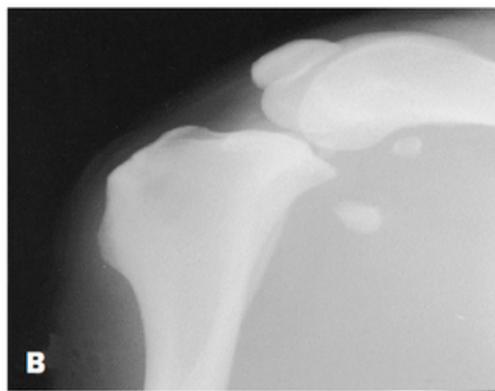
Avulsions of the gastrocnemius muscle heads often present with acute lameness and plantigrade stance, sometimes without clear trauma. Surgical fixation is common, but outcomes vary based on technique and complications.

- **Lateral Head Avulsion:** A Golden Retriever developed delayed plantigrade stance post-trauma; initial wire fixation failed, but monofilament line with trans-hock fixator achieved normal gait at 18 months.
- **Bilateral Avulsions:** An older Golden Retriever with chronic bilateral lameness showed radiographic fabella displacement; sequential surgical fixation with cerclage wire and hock splinting restored good function at 3 years.
- **Mimicking Cruciate Injury:** An Australian Shepherd's avulsion was initially misdiagnosed as cruciate rupture; screw and washer stabilization yielded excellent return to function.
- **Rehab Considerations:** Post-op immobilization (4-6 weeks) followed by gradual exercise; monitor for wire breakage or nerve proximity issues.

(Note: A similar cat case showed successful suture fixation, but canine focus prioritizes breed-specific risks such as in retrievers.)



Avulsion X-rays in a flexed stifle



Avulsion X-rays with a neutral stifle

Non-Surgical Treatments for Gastrocnemius Injuries

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Gastrocnemius muscle injuries, such as partial avulsions or strains, can respond well to conservative therapies like therapeutic ultrasound or shortwave diathermy (TECAR). These approaches promote healing without surgery, focusing on pain relief, reduced inflammation, and tissue repair.

- **Therapeutic Ultrasound Success:** In two dogs with partial gastrocnemius avulsions, pulsed ultrasound led to lameness resolution within one month, with full return to exercise after 6-12 months. Follow-up showed no pain on fabella palpation, minimal scarring on ultrasound, and improved ground reaction forces.
- **Diathermy for Strain Monitoring:** A dog with proximal medial head rupture treated with TECAR showed progressive ultrasound changes: initial hypoechoic hematoma evolved to organized, hyperechoic tissue over sessions, correlating with reduced lameness and full recovery.
- **Key Benefits:** Both modalities accelerate proliferative phases, enhance collagen extensibility, and stimulate cell proliferation, making them ideal for non-athletic or mild cases.

My two cents:

I could see photobiomodulation and shockwave therapy having a place in conservative management protocols as well as or instead of the modalities above. These were just the only modalities studied to date.

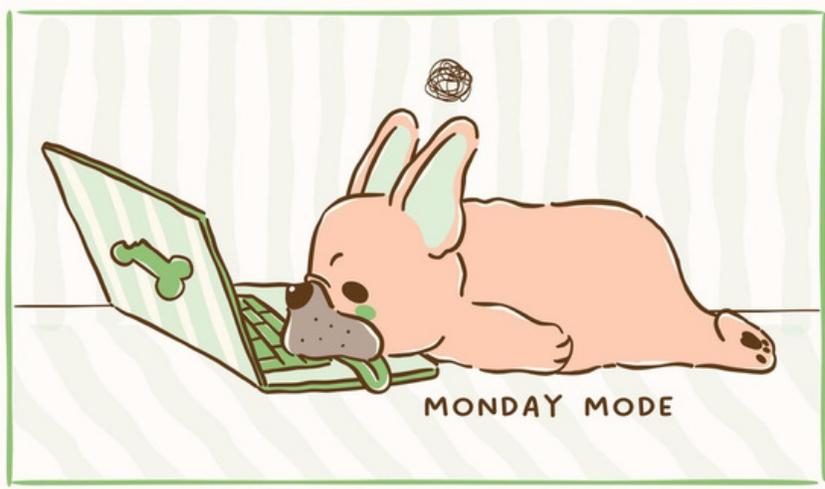
The rehabilitation of a conservative or post-operative case would also require a very well-thought out therapeutic exercise plan that incorporates gradually increasing flexion-promoting movements. Strengthening should also progress systematically - i.e. early phase three legged stand, mid phase stair climbing, and late phase trotting and destination-jumping. Return to normal activity would require training for burst activities. Fascial techniques could be incorporated along the way as well.

As always, understanding the injury is half the battle!!

- LEH

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