

# Evidenced-Based Clinical Review: Laterally-Based Ankle and Hindfoot Pain

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## KEYWORDS:

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Differential diagnosis

Injury mechanism

Treatment

The diagnosis of laterally-based ankle and hindfoot pain is comprehensive and the possibilities of injury origin can be easily overlooked. Injury misdiagnosis can result in improper treatment and can lead to exacerbated injuries, persistent pain, and chronic problems. Successful diagnosis of laterally-based ankle and hindfoot injuries requires knowledge of the differential diagnosis. This differential can be classified into somatic dysfunction, fractures, ligamentous injuries, tendon injuries, osteochondral lesions, and nerve lesions. Narrowing the differential to arrive at an accurate diagnosis necessitates a detailed patient history, an understanding of the injury mechanism, the selective use of diagnostic imaging modalities, and a thorough clinical examination that incorporates palpation, range of motion (ROM), and provocative maneuvers. The initial treatment of minor lateral ligament and syndesmotic sprains should include protection, rest, ice, compression, and elevation (PRICE), weight bearing to tolerance, and pain control with non-steroidal anti-inflammatory drugs (NSAIDs). Early mobilization and functional rehabilitation including osteopathic manipulative therapies (OMT) should also be incorporated to reduce pain and swelling and improve range of motion. The initial treatment of fractures, ligament and tendon injuries, osteochondral lesions, and nerve injuries should include PRICE treatment with non-weight bearing and the referral to an orthopedic or sports medicine specialist should be considered.

## INTRODUCTION/EPIDEMIOLOGY

Of the approximately one million acute ankle injuries evaluated in primary care offices annually, an estimated 85 percent are sprains of the ankle lateral ligament complex.<sup>1,2</sup> Despite this, clinicians must look for other injuries that present similarly to ankle sprains due to the risk of misdiagnosis and improper management.<sup>2-6</sup> This review presents an evidence-based approach to the differential diagnosis, physical examination, and basic treatment of the patient with laterally-based ankle and hindfoot pain.

## DIFFERENTIAL DIAGNOSIS

Though broad, the differential diagnosis of laterally-based ankle and hindfoot pain can be grouped into somatic dysfunction, fractures, ligamentous injuries, tendon injuries, osteochondral lesions, and nerve lesions (Table 1, Figure 1). This differential diagnosis can be narrowed through the process of assessing the patient's history and mechanism of injury, carefully examining the patient for signs and symptoms

of somatic dysfunction, and selectively utilizing provocative tests and diagnostic modalities.

## HISTORY AND MECHANISM OF INJURY

A detailed clinical history of laterally-based ankle and hindfoot pain should include the specifics of the onset, mechanism, and acute or chronic nature of the injury.

In acute injuries, ankle inversion tends to produce lateral ankle ligament complex sprains and peroneal tendon injuries.<sup>1,4,7,8</sup> Rotational forces acting through the ankle can result in fractures of the lateral malleolus,<sup>9</sup> lateral process of the talus, and proximal fifth metatarsal.<sup>10</sup> Soft tissue and chondral injuries such as syndesmotic ligament sprains,<sup>7</sup> peroneal tendon injuries,<sup>5</sup> and chondral lesions of the ankle and subtalar joints<sup>11</sup> can also arise from forces acting during ankle rotation. Axial loading through the lateral forefoot is the mechanism of action which tends to result in fractures of the proximal fifth metatarsal,<sup>10</sup> cuboid,<sup>12</sup> and anterior calcaneal process.<sup>3</sup> Pain in this area without a specific mechanism may indicate the presence of underlying somatic dysfunction.

In cases of chronic injury, symptoms may be particular to a specific foot posture or activity. The duration and intensity of chronic injury symptoms often transitions from intermittent to constant and from tolerable to intolerable. Chronic

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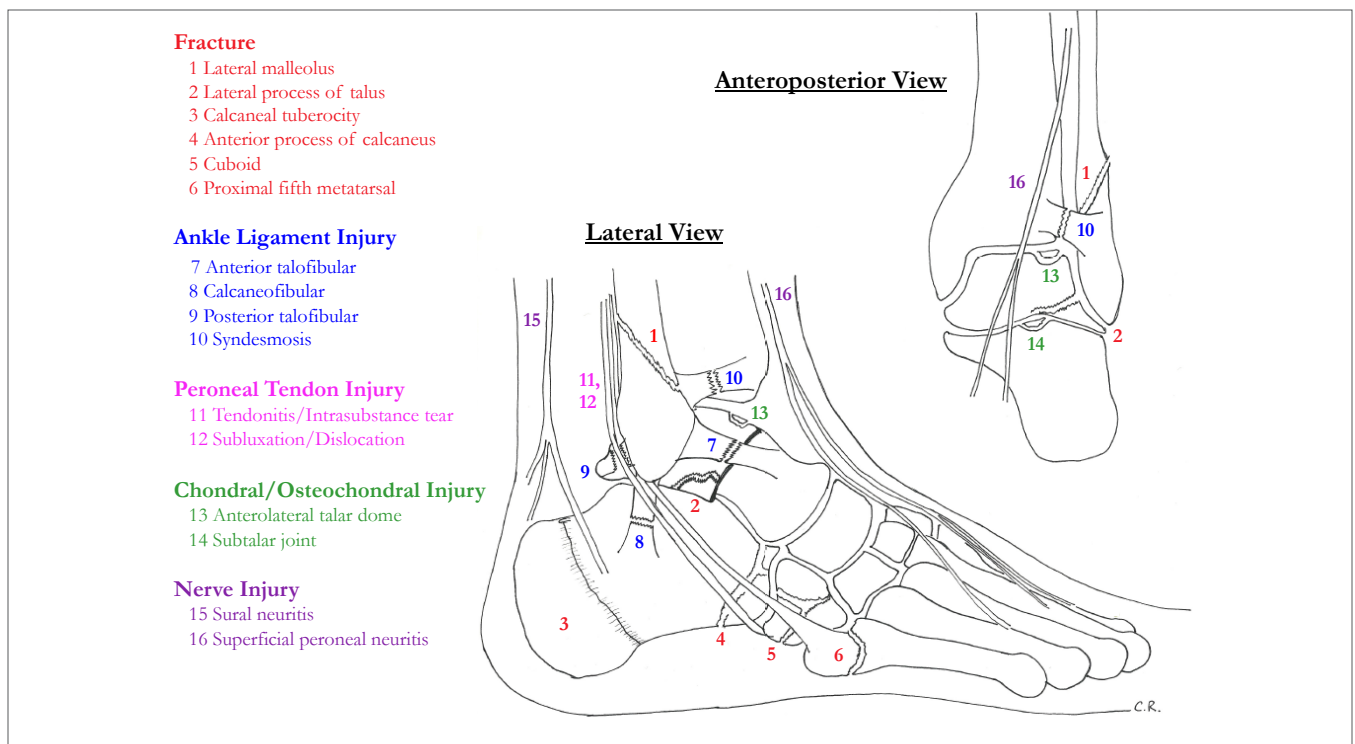


Figure 1: Anatomical locations of the injuries comprising the differential diagnosis of laterally-based ankle and hindfoot pain.

pathologies presenting this way may include calcaneal stress fractures,<sup>13</sup> peroneal tendonitis, peroneal tendon subluxation or dislocation,<sup>4,5,8</sup> ankle or subtalar osteochondral lesions,<sup>11</sup> and superficial peroneal or sural neuritis.<sup>14</sup>

## CLINICAL EVALUATION

Examination of the lower extremities should proceed from inspection, to palpation, then ROM, and provocative tests. Side to side comparison of the limbs can aid in the assessment of changes in tissue texture, asymmetry, restrictions to motion, and tenderness to palpation. Table 1 lists specific provocative maneuvers useful in the evaluation of laterally-based ankle and hindfoot pain.

Fractures are typically tender to direct palpation and cause substantial local edema. Specific foci for palpation include the lateral malleolus,<sup>15</sup> lateral process of the talus,<sup>6</sup> tuberosity and anterior process of the calcaneus, the cuboid, and the proximal fifth metatarsal.<sup>3,13</sup>

Chondral and osteochondral injuries may result in tenderness to palpation along the joint line and can possibly produce a clicking or locking sensation of the joint when the patient performs ROM.<sup>16,17</sup> Anterolateral talar dome lesions may be indicated when tenderness is present along the anterolateral ankle<sup>1</sup> while tenderness over the sinus tarsi may indicate injury within the subtalar joint.<sup>11</sup>

Lateral ankle ligament sprains may also exhibit tenderness to direct palpation. A concomitant positive anterior drawer test (Figure 2) indicates ankle joint instability from high grade ligament disruption.<sup>1</sup> Pain immediately superior to the ankle joint during a squeeze test (Figure 3) can signify a syndesmotic injury.<sup>18,19</sup>

If palpation along the peroneal tendons elicits pain, peroneal tendon inflammation or a peroneal tendon tear may be present.<sup>8</sup> Subluxation or dislocation of the peroneal tendons is present when the tendons visibly displace around the posterior margin of the lateral malleolus as the foot is dorsiflexed and everted, then reduce as the foot is plantar flexed and supinated (Figure 4).<sup>20</sup>

Nerve injuries can be evaluated through assessing atrophy of the extensor digitorum brevis (indicating superficial peroneal neuritis, or SPN), anhidrosis, vasomotor paralysis, pain, and lost or diminished sensation.<sup>21</sup> Tinel's sign may also indicate SPN or Sural nerve injuries if it is present along the anterolateral or posterolateral ankle, respectively.<sup>21</sup>

## DIAGNOSTICS

Low-grade lateral ankle ligament complex sprains do not always require imaging, however, radiographs are often unnecessarily ordered for this injury.<sup>22</sup> The Ottawa ankle rules were developed to inform clinicians of when radiographs are indicated to rule out ankle and foot fractures in acute



Figure 2 Clinical photograph of an Anterior Drawer Test.



Figure 3 Clinical photograph of a Syndesmosis Squeeze Test.



Figure 4 Clinical photograph of a Peroneal Tendon Subluxation Test.

injury.<sup>7,23,24</sup> Although they address medial ankle and midfoot pain as well, the Ottawa ankle rules state that radiographs are indicated if there is pain along the distal aspect of the fibula or proximal fifth metatarsal, if the patient is unable to bear weight for four steps immediately after the injury and during a clinical examination, and/or if pain and swelling are present about the ankle.<sup>7,24</sup>

As with plain radiographs, the use of CT, MRI, and nerve conduction studies is based upon the clinical findings. Table 1 lists the diagnostic modalities appropriate for each item in the differential diagnosis.

## TREATMENT

Minor lateral ligament complex or ankle syndesmosis sprains in an otherwise clinically stable ankle can be initially treated without further work up.<sup>25</sup> The initial management consists of PRICE treatment in conjunction with oral or topical NSAIDs for 3-7 days.<sup>26</sup> Crutches can be used during times of substantial pain, but early mobilization, functional rehabilitation, and weight-bearing to tolerance are known to prevent chronic instability and tend to hasten return to work.<sup>1,25,27</sup>

Functional rehabilitation exercises include range of motion therapies with Achilles tendon stretching, muscle strengthening, and proprioceptive training.<sup>1,7,25</sup> Osteopathic manipulative therapies such as muscle energy and counterstrain techniques can be incorporated to increase ROM while decreasing pain and edema, as previously shown in patients with first-degree ankle sprains.<sup>28</sup> A single session of OMT performed upon initial evaluation which targets patient-specific somatic dysfunction findings has been shown to provide immediate improvement in pain, edema, and range of ankle motion when compared to a control group at a one week follow up.<sup>28</sup>

In a painful but otherwise clinically stable ankle and hindfoot, a trial of OMT is warranted when signs of somatic dysfunction are present.<sup>28</sup> Techniques such as counterstrain and muscle energy directed at rebalancing ligamentous tension or diminishing muscle hypertonicity should be considered.<sup>28</sup> OMT may be primary or adjunctive treatment in this setting (Table 1).

The initial treatment for fractures, ligament and tendon injuries, osteochondral lesions and nerve lesions should be PRICE with strictly no weight-bearing on the affected foot.<sup>3,5,10,12,13,29,30</sup> Specialty referral to a sports medicine physician or orthopedic surgeon should also be considered. When a fracture is suspected, sparing use of NSAIDs is advised due to the potential for impairment of bone healing.<sup>27</sup>

**Table 1: Differential diagnosis of laterally-based ankle and hindfoot pain: Work-up, provocative maneuvers, and treatment protocols**

Injury Type	Provocative Maneuver	Diagnostic Test	Initial Management
<b>Somatic Dysfunction</b>			
Restricted Fibulotibial Joint Motion	Ankle dorsiflexion and plantarflexion	Palpation of restricted fibulotibial joint	• OMT
<b>Fracture</b>			
Lateral Malleolus	TTP* lateral malleolus <sup>15</sup>	Three-view ankle radiographs* <sup>15</sup>	<ul style="list-style-type: none"> <li>• PRICE</li> <li>• NWB<sup>5</sup> on affected extremity</li> <li>• Specialty referral</li> </ul>
Lateral Process Talus	TTP anterior / 1 cm inferior to lateral malleolus <sup>3,6,13</sup>	<ul style="list-style-type: none"> <li>• Three-view ankle radiographs</li> <li>• If negative, CT<sup>13</sup></li> </ul>	
Calcaneal Tuberosity (Acute or Stress Fracture)	TTP with medial/lateral compression of tuberosity	<ul style="list-style-type: none"> <li>• Axial view radiograph of heel (Harris view)</li> <li>• If negative or joint involvement suspected, CT</li> </ul>	
Anterior Process Calcaneus	TTP 3 cm anterior and 1 cm inferior to lateral malleolus <sup>3,13</sup>	<ul style="list-style-type: none"> <li>• Three-view ankle and three-view foot radiographs</li> <li>• If negative, CT<sup>3</sup></li> </ul>	
Cuboid	TTP just proximal and superior to tuberosity of proximal fifth metatarsal	<ul style="list-style-type: none"> <li>• Three-view foot radiographs‡</li> <li>• If negative, CT<sup>12</sup></li> </ul>	
Proximal Fifth Metatarsal	TTP with direct palpation of proximal fifth metatarsal <sup>10</sup>	Three-view foot radiographs <sup>10</sup>	
<b>Ankle Ligament Injury</b>			
Anterior Talofibular	Positive anterior drawer test with ankle in 20 degrees plantar flexion <sup>1</sup>	<ul style="list-style-type: none"> <li>• Three-view ankle radiographs</li> <li>• If recurrent or clinically unstable, MRI<sup>11,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• NWB with ankle immobilization for 2 weeks</li> <li>• Then, if stable and painless, initiate functional rehabilitation and OMT</li> <li>• If unstable to drawer test, or pain persists, maintain NWB and seek specialty referral</li> </ul>
Calcaneofibular	Positive anterior drawer test with ankle in 20 degrees dorsiflexion, and a positive Inversion stress test <sup>1</sup>	MRI	
Posterior Talofibular	Positive Anterior drawer test with gross anterior instability due to high grade injury <sup>1</sup>	MRI	
Syndesmosis	Compression of fibula and tibia at mid-calf elicits pain above ankle joint (squeeze test) <sup>18,19</sup>	<ul style="list-style-type: none"> <li>• Weight-bearing three-view ankle radiographs</li> <li>• If negative, MRI<sup>1,30</sup></li> </ul>	
<b>Peroneal Tendon Injury</b>			
Tendonitis / Intrasubstance Tear	Pain with palpation along course of peroneal tendons <sup>8,20</sup>	MRI <sup>8</sup>	<ul style="list-style-type: none"> <li>• Ankle immobilization with weight bearing for 4 weeks</li> <li>• If no improvement, specialty referral</li> </ul>
Subluxation/Dislocation	Tendons visibly displace around lateral malleolus with ankle dorsiflexed/everted		<ul style="list-style-type: none"> <li>• Ankle and foot immobilization</li> <li>• NWB</li> <li>• Specialty referral</li> </ul>
<b>Chondral/Osteochondral Injury</b>			
Anterolateral Talar Dome	TTP anterolateral ankle <sup>1</sup>	<ul style="list-style-type: none"> <li>• Three-view ankle radiographs</li> <li>• If lesion present, CT</li> <li>• If lesion absent but symptoms persistent, MRI<sup>16</sup></li> </ul>	<ul style="list-style-type: none"> <li>• NWB with ankle and foot immobilization</li> <li>• Specialty referral</li> </ul>
Subtalar Joint	TTP inferior and anterior to lateral malleolus <sup>11</sup>	<ul style="list-style-type: none"> <li>• Three-view foot radiographs</li> <li>• If negative, CT<sup>11</sup></li> </ul>	
<b>Nerve Injury</b>			
Sural Neuritis	Positive Tinel's sign along posterolateral ankle <sup>20</sup>	<ul style="list-style-type: none"> <li>• Electromyography<sup>31</sup></li> <li>• Ultrasonography<sup>14</sup></li> <li>• Nerve conduction<sup>14</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Physical Therapy for 2 weeks</li> <li>• If no improvement, specialty referral</li> </ul>
Superficial Peroneal Neuritis	Positive Tinel's sign along anterolateral ankle <sup>21</sup>	<ul style="list-style-type: none"> <li>• Electromyography<sup>31</sup></li> <li>• Ultrasonography<sup>14</sup></li> <li>• Nerve conduction<sup>14,32</sup></li> </ul>	

**KEY**

\*Tenderness to Palpation  
 †AP, Oblique, and Lateral views

\*AP, Lateral, and Mortise views  
 †Nonweight-bearing

<sup>1</sup>Non-contrast CT of ankle and foot with 2 mm slices  
<sup>5</sup>3.0 Tesla non-contrast MRI of ankle and foot with 3 mm slices

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