



Musculoskeletal Case No. 7, September 2000

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Presenting Symptoms: Acute right lateral ankle swelling, painful popping and ankle weakness

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Estimated Level of Difficulty: Moderate

Appropriate Audience: Residents and practicing physicians

Learning Objectives: After completing this educational activity, participant will be able to (1) formulate a differential diagnosis for lateral ankle pain, (2) revise the diagnosis according to available historical, examination and evaluation data, (3) classify the injury type according to an available classification scheme, (4) predict outcome and prognosis based upon the injury characteristics and type, (5) perform the appropriate diagnostic and physical examination testing, and (6) interpret imaging for associated pathology or other injury.

History

A 27-year-old right-handed recreational athlete presents with acute right posterolateral ankle pain while rollerblading. His current symptoms began while rollerblading 6 days prior to presentation. He recalls the onset of pain while moving through a right-sided turn. The skating surface was smooth and his skates had not hit any obstacles. He had only been blading for 10 minutes without discomfort or fatigue. The pain was abrupt in onset, associated with an obvious "popping" sensation, and forced him to immediately stop the activity and sit down. He indicates the area of maximal discomfort by placing his hand over the posterolateral aspect of his right ankle, about the region of the lateral malleolus. He reports that his lateral ankle had swollen by the time he had removed his roller blade, only minutes after the injury. He was able to stand and walk, but had a sense of "instability and weakness", without significant pain. He has had recurrent painful "snapping" of his ankle since the injury, including when walking on level ground. He has no pain at rest.

- *Prior to continuing, please develop a differential diagnosis and list each possible diagnosis in order of likelihood.*
- *Is there any additional information regarding the clinical history that might be helpful in clarifying your differential list or changing its order of priority?*

Commentary I

Differential Diagnosis:

1. The acute onset of the injury as well as the location of the pain are compatible with a sprain of the lateral ankle ligaments. The rapid swelling would suggest a more severe injury to these structures. His maximal pain, however, may be somewhat more posterior than expected and he does not report the typical "turning in" mechanism for lateral ankle sprains.



2. The ongoing "painful snapping" sensation raises suspicion for a recurrent soft tissue subluxation, loose body or articular subluxation. It would be important to try to reproduce these symptoms on examination and to question him further on what activities reproduce this complaint.
3. The region of his maximal discomfort overlies the peroneal tendons. Therefore, peroneal tendon rupture or partial tear is possible. Overuse injury and tendonitis are less likely given the acute symptom onset.
4. Given the dramatic onset of his pain and the acute, painful "popping" sensation, it will be important to rule out a bony lesion. Possibilities include a fracture of the anterior process of the calcaneus, lateral or posterior process of talus fracture, distal fibular or fibular malleolus, or cuboid subluxation.
5. You should also consider peroneal tendon rupture or tear.

History, continued

He presented to a local urgent care center the same day as his injury and was told he had an "ankle sprain". Despite air-cast splinting, NSAIDs and icing he continues to have symptoms and was referred for further evaluation. His swelling has improved with icing and elevation. His most significant complaint at this time is the recurrent "snapping". This occurs daily especially with stair climbing, but also with simple straight line walking. Wearing the ankle splint has not appreciably impacted the frequency of the snapping. He is apprehensive with gait due in combination to a feeling of "instability" as well as to avoid the painful snap. He is also able to reproduce the snap with non-weight bearing range of motion of his ankle.

Review of Systems:

He denies systemic symptoms, sensory abnormalities or weakness. He has no significant pain at rest or disturbed sleep.

Exercise History:

Rollerblading is a new recreational activity for him. However, he does jog about 15 miles per week. There has been no significant change in his overall activity level.

Past Medical History:

He has no prior history of ankle pain, is otherwise healthy and is on no medication other than the NSAID. He has not had any chronic musculoskeletal problems.

- *If necessary, revise your differential diagnosis based on the additional clinical history.*
- *On which details of the physical examination should you focus at this point?*

Commentary II

To assess for lateral ankle ligamentous injury, palpate the anterior talofibular (ATFL), calcaneofibular (CFL) and posterior talofibular ligaments (PTFL) for tenderness. Provocative maneuvers include the talar tilt and anterior drawer which stress the CFL and ATFL, respectively. The tibiofibular squeeze test and the ankle dorsiflexion-eversion stress test can be used to help determine if there has been an associated injury to the syndesmosis (high ankle sprain) which is reported to occur in 1-10% of ankle injuries involving an external rotation force. Other important areas to assess in the evaluation of a lateral ankle



pain are the posterior edge and tip of the lateral malleolus, the base of the fifth metatarsal, and the cuboid bone (from the Ottawa ankle rules). Pain in these areas or with syndesmosis stress testing should prompt early radiographic evaluation to rule out fracture and inferior tibiofibular joint diastasis or tibia avulsion fracture which is associated with 10-50% of syndesmosis injuries.

1. The course of the peroneal tendons should be examined for tenderness, swelling or defect. These muscles can be actively stressed by resisted eversion in dorsiflexion or plantarflexion or they can be passively stretched with inversion combined with plantarflexion.
2. An attempt should be made to reproduce the “snapping” sensation. Observe for changes in the normal surface anatomy during active and passive range of motion as well as with muscle resistance testing. Given to the pain involved with occurrence of this symptom this testing should be done after all other less obviously involved areas are evaluated and all findings should be compared with the contralateral, asymptomatic limb.
3. A painful os peroneum (diastasis or synovitis) may ensue after strong inversion injury or direct trauma causing pain and tenderness that is maximal distal to the fibular malleolus. Suspected injury here can be further characterized with oblique radiographs, tomographs or MRI.
4. Sinus tarsi syndrome involves pain and palpable tenderness overlying the region of the sinus tarsi in the antero-lateral ankle. This syndrome is often associated with an inversion mechanism. Radiographs are normal and diagnostic/therapeutic anesthetic and corticosteroid injections can be undertaken to confirm and treat this condition if suspected.
5. Evaluate the gait.
6. A screening neurologic examination of the involved limb should be done. However the history in this case does not suggest a neurologic injury.

Physical Examination

The patient presents as a well-developed, thin male in no apparent discomfort. There are no pain amplification behaviors.

Inspection of the involved foot and ankle at rest reveals normal surface architecture. His swelling has resolved. There is no echymosis.

Palpation is significant for tenderness posterolateral to the fibular malleolus, overlying the peroneal tendons. The fibula itself is non-tender as is the fifth metatarsal base. The anterior talofibular ligament and calcaneofibular ligaments are non-tender.

Provocative testing including the dorsiflexion-external rotation stress test and tibiofibular squeeze test do not elicit pain in the region of the tibiofibular syndesmosis. Talar tilt and anterior drawer are not associated with increased translation/motion as compared with the non-involved extremity, nor do they elicit discomfort.

Gait is both antalgic and apprehensive. He volitionally ambulates “stiff-legged” in order to avoid the painful snap that seems to occur during the later part of stance phase at approximately heel off.



Screening neurologic examination is normal. There are no abnormalities in muscle strength, sensation or reflex examination.

- *At this point, review your differential diagnosis and revise as appropriate.*
- *Are there additional observations on physical examination that might be helpful in narrowing your differential list?*

Commentary III

The physical examination rules out a simple lateral ankle sprain. As expected there is no syndesmotic injury, nor does there appear to be a major bony injury. The area of maximal tenderness corresponds to the region of his initial complaint and overlies the peroneal tendons just posterior to the lateral malleolus. The examination is consistent with peroneal tendonitis, superior peroneal retinacular injury, and/or peroneal tendon rupture or tear. The examination should focus on these possibilities as well as attempting to recreate the “snapping.”

Physical Examination, continued

Direct manual resistance to peroneal muscle activation does not reveal any strength deficits compared with the opposite leg. Passive stretch of the peroneal tendons is only mildly uncomfortable. Resisted eversion of a dorsiflexed ankle reveals a significant abnormality. This test, often done with the patient in the prone position for ease of testing, can reveal subluxation of a peroneal tendon over the posterior aspect of the lateral malleolus. Comparison with the opposite ankle reveals that this is only present on the involved side. The patient indicates that this reproduces his feeling of “instability” and discomfort.

- *If necessary, revise your differential diagnosis based on the additional physical findings.*

Clinical Impression

The patient most likely suffered an acute rupture of the superior peroneal retinaculum at the time of injury. He now is experiencing recurrent subluxation episodes of one or both peroneal muscle tendon(s) due to the loss of the restraining function of the superior peroneal retinaculum.

Lateral ankle sprain and peroneal tendon tear or rupture are unlikely given the lack of physical examination findings.

- *What diagnostic tests would you order at this time?*

Commentary IV

Due to the dramatic onset of the complaint, plain radiographs of the affected ankle were ordered to rule out any associated bony pathology. Traumatic peroneal tendon subluxation can be associated in a small percentage of cases with a posterolateral flake avulsion off the fibula. This lesion occurs as a result of the forceful detachment of the superior peroneal retinaculum from the posterolateral fibular periosteum. The underlying fibrous rim of the fibular groove as well as an osseous fragment may become detached. The mortise X-ray view (internal rotational oblique view) provides the best view of the fibula and will usually show this abnormality if present. High acute tensile forces through the peroneus brevis tendon can result in avulsion fracture of the fifth metatarsal tuberosity (base). Therefore



foot x-rays should be ordered if physical examination reveals focal tenderness suggestive of this injury, which was absent in this case.

Test Results

Plain radiographs (AP, Lateral, Mortise views) were normal. There was no associated fibular flake fracture.

- *If necessary, augment or change the clinical impression based on the test results.*
- *What additional diagnostic testing would you order?*

Commentary V

MR imaging may be helpful to characterize the injury further (see final discussion) and to rule out any concomitant tendon tear or subtle bony injury. It may be most useful acutely to help determine prognosis based on injury type. Given the apparent failure of conservative treatment in this case and the likely need for surgical intervention, MRI was not utilized. In skilled hands ultrasound examination may help detect peroneal tendon subluxation and/or tears. This is especially useful when in-office physical examination fails to reveal the tendon subluxation (up to 50% of cases) despite the high clinical suspicion of such.

- *What is the impact of the additional test results on the final diagnosis?*
- *Considering all the data from the history, physical examination and laboratory studies, what is/are your final diagnostic impression(s)?*

Final Diagnostic Impression

- *Acute dislocation of one or both of the peroneal muscle tendon(s) (most often the peroneus longus) with recurrent painful tendon subluxations during gait.*
- *No evidence for an associated fibular flake fracture.*
- *Apparent failure of non-operative management.*

Commentary VI

The diagnosis of acute peroneal tendon subluxation/dislocation can be challenging due to acute swelling and protective guarding. If suspicion of bony injury is low or has been excluded with appropriate imaging then early management of acute lateral ankle pain can follow general PRICE principles. Once "cooled down" in a few days the ankle can often be reexamined, and a more thorough evaluation looking for tendon subluxation, ligamentous injury or instability can be completed. Acute non-operative treatment regimens for confirmed peroneal tendon subluxation are controversial. Options include air-cast splinting, compressive sleeve with or without heel lift, horseshoe felt pad about the lateral malleolus combined with a compressive sleeve, orthotics with lateral flange or lateral heel wedge, and casting in mild plantarflexion for 4-6 weeks.

- *What treatment would you now initiate for this patient?*

Commentary VII

Given the frequency of his recurrent painful subluxation episodes (daily with normal gait) despite air cast splinting, early surgical referral was offered.



Surgical treatment:

A superior peroneal retinacular and peroneal tendon sheath detachment was identified utilizing a 3 cm longitudinal incision just posterior to the fibular head. Careful attention must be made to identify and retract the sural nerve. The superior retinaculum and peroneal tendon sheath was divided in line with the incision and the area of retinacular detachment from the posterior fibular periosteum was inspected. The fibrous rim and underlying bone was intact. The fibular groove was normal in its depth, and contained the tendon of the peroneus brevis muscle. The peroneus longus tendon was not well-seated and freely subluxed anteriorly over the posterior edge of the fibula with dorsiflexion and eversion. The peroneal retinaculum was repaired using four drill holes and sutured directly to its fibular attachment after stripping of the periosteum. The peroneal tendons were free to glide within their sheaths and could no longer be subluxed from their anatomic positions.

Post-op care:

The patient remained in a Robert Jones dressing with the foot in dorsiflexion and slight eversion for 2 days. After inspection of the wound site confirmed appropriate early healing, a short leg non-weight bearing cast was placed with the foot in neutral. He remained non-weight bearing for 2 weeks. At two weeks sutures were removed and a cast reapplied to allow touch weight bearing for 4 more weeks. At 6 weeks post-op he was placed in a CAM walking boot and a gentle daily range of motion exercise routine was initiated. He was allowed to bear weight as able and begin a more active, progressive physical therapy program by 8 weeks. At 3 months from surgery he had regained his active range of motion and passive stretch compared with the non-affected side. Proprioceptive training, strengthening of ankle support musculature and attention to any lower limb or trunk biomechanical asymmetries were addressed at this time. A walking/ light jogging program was initiated.

Clinical outcome:

He had no post-operative subluxation episodes and returned to his prior level of recreational sport activity by 4 months post-op.

Additional rehabilitation considerations:

1. In some cases a water aerobic/ water walking program may be a beneficial early exercise routine especially if land based exercise is not tolerated.
2. Sports psychology referral should be considered if appropriate.

Final Discussion

In the acute phase, peroneal tendon subluxation is a diagnostic challenge due to swelling, guarding and generalized lateral ankle pain. As a result the condition may be misdiagnosed as a common lateral ankle sprain with the retromalleolar pain being attributed to posterior talofibular ligamentous (PTFL) injury. However, PTFL injury is not common and traditional teaching dictates that it cannot occur in isolation without also injuring the anterior talofibular and calcaneofibular ligaments. This more extensive injury pattern would present with a different clinical history and physical examination than the one reviewed here. Additionally, the inversion mechanism of injury is not typically reported in acute peroneal tendon subluxation, although the two conditions can coexist.



The etiology of acute peroneal tendon subluxation is thought to be due to a strong, reflex contraction of the peroneal muscles in an already dorsiflexed ankle. An ankle that becomes forced into dorsiflexion as might occur when a ski or skate tip is caught or during aggressive cutting in basketball or tennis may also cause the injury. The force generated by the peroneal muscle contraction leads to the disrupted superficial peroneal retinaculum. Chronic subluxation may occur after failed conservative treatment of an acute injury and in habitual or voluntary dislocators. Individuals with a shallow fibular groove anatomic variant may be predisposed to this type of injury (the groove is concave in 82%, flat or convex in 18%).

A classification scheme was originally described by Eckert and Davis and subsequently modified by Oden to four types, all with associated anterior peroneal tendon displacement: (1) elevation of the superior peroneal retinaculum (SPR) at its fibular attachment; (2) complete tearing of the SPR; (3) avulsion fracture of the posterolateral fibular by the SPR; (4) avulsion of the SPR from its calcaneal attachment. It has been suggested in the literature that some prediction of recovery and response to treatment can be made based upon the type and acuity of the condition. In cases of acute type I injuries (51% of reported cases), nonsurgical treatment in the form of immobilization (air cast or short leg casting for 6 weeks) may be successful. In the chronic state or if type II-IV injury is present, surgical management is usually necessary. Concomitant partial tendon tearing (more commonly of the peroneus brevis tendon) may also force surgical consideration. Imaging (MRI and plain radiographs) may provide sufficient information to accurately type the injury, although their role in this regard has not been proven. A brief trial of immobilization after acute injury may be warranted based upon the individual demands of the patient, however, recurrent dislocations are common (40%) despite the best nonsurgical management.

Numerous surgical procedures have been described. Selection is done in part based upon the involved anatomy and the expertise of the surgeon. All have an almost uniformly good to excellent results.

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