CUBOID SYNDROME is a condition involving some degree of disruption of the normal structural congruity of the calcaneo-cuboid (CC) joint. The condition is associated with several clinical terms for midfoot pathology, including cuboid fault syndrome, dropped cuboid, subluxed cuboid, and lateral plantar neuritis. The literature suggests that cuboid subluxation is associated with a lateral ankle sprain mechanism, occurring most often with a combination of inversion and plantar flexion. The inversion ankle sprain is the most common athletic injury, which accounts for 10-15% of all sport participation time lost to injury.

Cuboid subluxations and dislocations are rare. The majority of such cases reported in the literature have involved long distance runners and ballet dancers. CC joint dysfunction following a traumatic episode usually results from a dislocation or subluxation injury, but foot pain and chronic instability of the lateral column can result from overuse. The symptoms of cuboid syndrome are comparable to those of a lateral ankle sprain but infrequently present edema or ecchymosis.

Table 1 provides a summary of potential clinical findings associated with CC joint pathology, which can develop with or without an acute injury. The athletic trainer can play a vital role in the identification and successful management of this condition.

### Case Report

An 18-year-old female freshman NAIA Division II basketball player (5'11", 165 lbs) reported acute left foot pain after a preseason practice session. She described the pain as being a dull aching along the lateral aspect of the foot. She reported having experienced a traumatic episode three weeks earlier. The initial mechanism of injury was foot plantar flexion and inversion while pivoting during a practice drill. She experienced an immediate, transitory sharp shooting pain that was localized over the lateral aspect of the foot, distal to the lateral malleolus. She continued to play and did not seek any medical treatment until she could no longer play through the throbbing pain three weeks later. She had a history of medial longitudinal arch sprains related to pes planus. Her pain was greatest in a weight-bearing position, primarily during the push-off phase of the gait cycle. No edema, ecchymosis, or deformity was observed. Pain was elicited by palpation over the CC joint and the styloid process of the 5th metatarsal, and in response to compression and tuning fork tests. X-rays were negative. A physician...
placed the athlete in a walking boot for immobilization, and NSAIDs for 7 to 10 days were prescribed. The athlete was instructed to remain in the walking boot and was restricted from all sports activities until bone scan results became available. To maintain cardiovascular fitness, the athlete performed aquatic therapy exercises and stationary cycling sessions 5 days per week. At a two-week follow-up appointment, the bone scan was reported to be negative and the athlete was cleared to resume all sport activities. Another follow-up appointment was scheduled for one week later. After the two-week period of weight bearing activity restriction, the treatment program included analgesic modalities, cardiovascular fitness maintenance, foot intrinsic muscle strengthening, ankle strengthening, and gastrocnemius and hamstring flexibility exercises. The athlete was fitted for orthotics and a felt pad (1/4-inch thick, 1-inch wide, 3 inches long) was placed directly beneath the cuboid to provide stabilization (Figure 1). She was cleared to return to sports participation after the second follow-up appointment and did not experience any subsequent problems.

**Anatomy**

The cuboid is located in the midfoot between the calcaneus, 5th metatarsal, navicular and lateral cuneiform. The CC articular surfaces form a saddle joint that plays a role in dissipation of force at the mid-foot.\(^8,9\) The CC joint has marked stability, primarily due to the congruency of its articular surfaces and reinforcement from ligaments and tendon attachments.\(^4,8,9\) It is stabilized on the plantar aspect by the long plantar ligament, the plantar CC ligament, and the peroneal longus tendon. It is stabilized on the dorsal aspect by the dorsal CC ligament, the dorsal cuoneo-cuboid ligament, the dorso-metatarsal ligament, and the dorsal cubideo-navicular ligament, and on its medial aspect by the bifurcated ligament. The dorsal CC ligament is the key stabilizer on the lateral aspect of the joint.\(^8\) CC joint function is highly integrated with that of the talo-navicular and subtalar joints, which collectively transfer forces between the hind foot and the forefoot during walking and running.\(^1,7\) The CC joint plays an important role in locking the forefoot for increased rigidity during the push-off phase of the gait cycle. During the push-off phase, the CC joint is subjected to forces imposed by the body weight and contraction of the gastro-soleus complex. Furthermore, the cuboid functions as a peroneus longus tendon stabilizer where it passes beneath the foot.\(^1,8\)

**Mechanism of Injury and Clinical Findings**

There is much speculation and disagreement within the literature regarding the direct cause of this injury. It is agreed that when a force is applied to the CC joint, it is unable to carry or dissipate the cuboid dislocates or subluxates toward the plantar surface of the foot. Most speculate that the cause is linked to high energy trauma and/or inversion plantar flexion motion. Excessive pronation or pes planus has been linked to the condition, although Marshall and Hamilton\(^1\) reported seeing the condition in all foot types. In addition to foot pronation, the pull of the peroneus muscle group on the cuboid,\(^3\) tight heel cord structures, and a dynamic overload particularly following an injury to the lateral structures (anterior talofibular ligament, peroneal tendons) can lead to the disruption of normal weight distribution through the forefoot thus leading to cuboid subluxations.\(^1,7,10-11\) Dysfunction of the CC complex leads to instability during push-off of the propulsive phase of the gait cycle.

An athlete with CC joint instability will have difficulty with lateral and side-to-side movements,\(^7\) complain of the “inability to work through the foot,”\(^2\) and avoid forceful push-off during gait.\(^1,7\) The athlete may present pain that is located in the midfoot, which may radiate distally along the 4th and 5th metatarsals or on the plantar aspect of the foot toward the medial longitudinal arch and may also present anterior or lateral ankle pain.\(^1\) The modest amount of literature pertaining to the topic suggests that cuboid subluxation

![Cuboid Pad Placement](image_url)
does not present edema or ecchymosis.\textsuperscript{1,7} Diagnosis is generally made on the basis of history and physical findings.

**Conservative Treatment Options**

Initial treatment may include manual reduction of the displaced cuboid by an individual trained in extremity manipulation. Prior to reduction, deep effleurage massage of the peroneal muscle group and gastro-soleus complex may facilitate relaxation. Repositioning of the articular surfaces of the CC joint is performed with the patient in a prone position. The clinician manually cups the patient’s foot and applies pressure to the planter surface of the foot with the thumbs. While forcefully thrusting the foot into plantar flexion, the clinician’s thumbs push the cuboid dorsally.\textsuperscript{6} Maintenance of normal CC joint alignment may be facilitated by padding beneath the cuboid or custom-fitted orthotics. Marshall and Hamilton\textsuperscript{1} suggest the application of a 1/8” felt pad to the planter surface of the cuboid with a modified longitudinal arch taping technique. NSAID administration, or cortisone injection in some cases, reduces inflammation associated with the condition.\textsuperscript{1,2,13} The athlete should avoid vigorous weight bearing activities that place stress on the lateral column for at least two to three days following CC joint reduction.\textsuperscript{1,2} Upon return to normal functional activity, a plantar cuboid pad that is secured by tape may reduce the risk of further injury.\textsuperscript{7,15} Tape strips that span the CC joint may be incorporated with a lateral ankle taping procedure to provide additional support. In addition to gastro-soleus and hamstring stretching exercises, heel lifts (less than 1/2” thick) can be placed in the patients shoes to reduce the load placed on the lateral column by the gastro-soleus complex.\textsuperscript{1,7} Patients should be instructed to wear low-heeled shoes and avoid going barefoot during activities of daily living.

**Summary**

The athlete was able to return to her normal level of competition without any subsequent complications. Protective taping was performed for the remainder of her season. Consistent with published observations reported by other clinicians, the athlete demonstrated excessive pronation and gastro-soleus inflexibility.\textsuperscript{1-7,10-11} She reported symptoms similar to those associated with a lateral ankle sprain.\textsuperscript{1,6} and her injury was not diagnosed until symptoms had persisted for several weeks. Cuboid syndrome is often unrecognized and misdiagnosed, due to a mechanism of injury that is similar to the lateral ankle sprain,\textsuperscript{7} nonspecific clinical findings,\textsuperscript{1,3-4} and lack of a universally accepted etiology.\textsuperscript{1,5} Knowledge of the anatomical structure and biomechanical function of the CC joint must be combined with the acquisition of a thorough injury history to recognize the existence of cuboid syndrome.\textsuperscript{13} The condition usually responds favorably to conservative treatment and protective taping, with surgical intervention only necessary for chronically recurrent subluxations of the CC joint.\textsuperscript{12}

**References**


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