Physical Rehabilitation & Sports Medicine
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The Cuboid Syndrome

The cuboid syndrome consists of a subluxation of the cuboid at the cuboid-calcaneal joint and the cuboid-navicular-lateral cuneiform joint whereby the cuboid is 'locked' in a more medial rotated and plantar position (everted). This condition is most often seen in the athletic population (ballet, basketball, running,..). It can be caused by inversion trauma, but also by overuse such as excessive 'sur les pointes' movements with ballet dancers.

Possible injury mechanism:

A sudden reflex-contraction of the peroneus longus (that passes in the peroneal sulcus on the plantar side of the cuboid) in response to an inversion trauma, causes a rotational force on the cuboid. This rotational force pulls the lateral side of the cuboid dorsal- lateral and the medial side of the cuboid medial – plantar resulting in an everted position of the cuboid. (Fig. 1).The cuboid can stay 'locked' in this position and become a source of pain and mechanical derangement. Another injury mechanism involves repetitive peroneus longus contractions during for example 'sur les pointes' movements. They can cause progressive laxicity of the interosseus ligaments of the calcaneo-cuboid joint and/ or in the cuboid-lateral cuneiform-navicular joints, predisposing the cuboid to a subluxation.

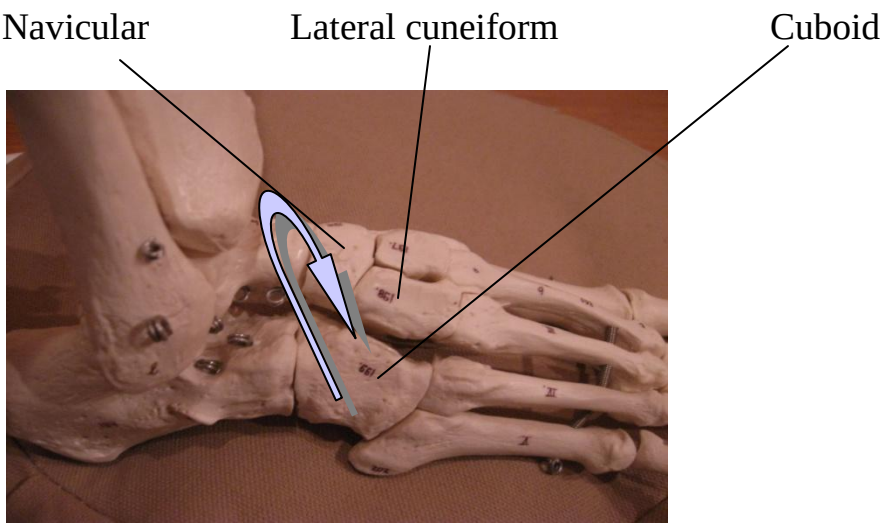

Fig. 1: Direction of cuboid subluxation

Presentation:

A patient with cuboid syndrome will usually complain of pain on the dorsal or plantar side of the cuboid area with some referred pain into the 4th and 5th ray. Pain can also refer to the plantar medial foot arch. Pain is provoked with walking, running and jumping. The patient might also complain of weakness during the push off phase while running and walking together with a feeling of 'instability' with possible ankle 'giving way'.

Physical examination:

During the physical examination we often observe a slight limp, with pain during the propulsion and push-off phase. During the inspection of the dorsal side of the lateral foot we sometimes see an indentation at the location of the cuboid: when palpating just lateral from the lateral cuneiform and the lateral border of the navicular a 'step' or sharp 'drop' can be felt. (Fig 2& 3). This finding is not present on the non-involved foot. Sometimes a 'fullness' can be felt on the medial side of the cuboid location on the plantar side.

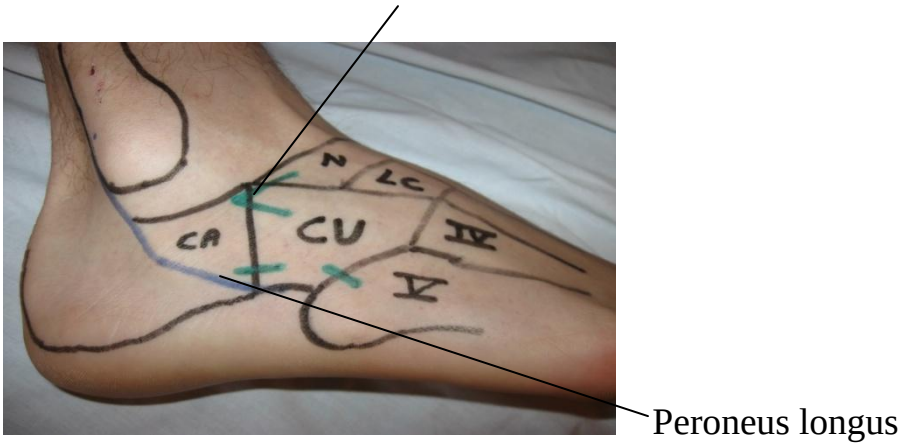

Fig. 2: Surface anatomy of the lateral foot: blue: peroneus longus; green bifurcate lig, calcaneo-cuboid lig and cuboid -MT 5 lig.

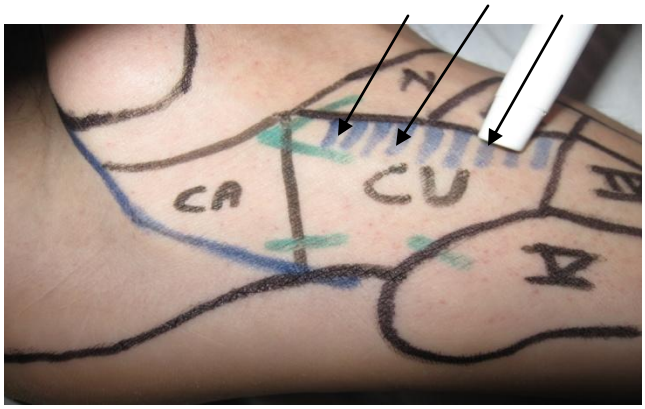

Fig. 3: location of the indentation (blue stripes)

Toe walking and/ or hopping on one foot often reproduces patient's lateral foot pain. In case the pain cannot be provoked during the physical examination we ask the patient to return for a follow up examination immediately after pain is provoked during his/her sports activity. PROM testing: all forefoot movements (abduction & adduction; flexion & extension; pronation& supination) can provoke patient's lateral foot pain. During accessory joint testing we find a decreased joint play at the cuboid-calcaneal joint and/ or at the cuboid-navicular-lateral cuneiform joint. (Fig 4&5). These accessory joint tests are not reliable when patient is guarding secondary to pain. Resistive ankle plantar flexion combined eversion (peroneus longus contraction) can be painful. Passive ankle dorsiflexion combined inversion (peroneus longus stretch) can also reproduce patient's pain. Palpation: there is usually a focal tenderness directly over the cuboid and over the surrounding interosseus ligaments.

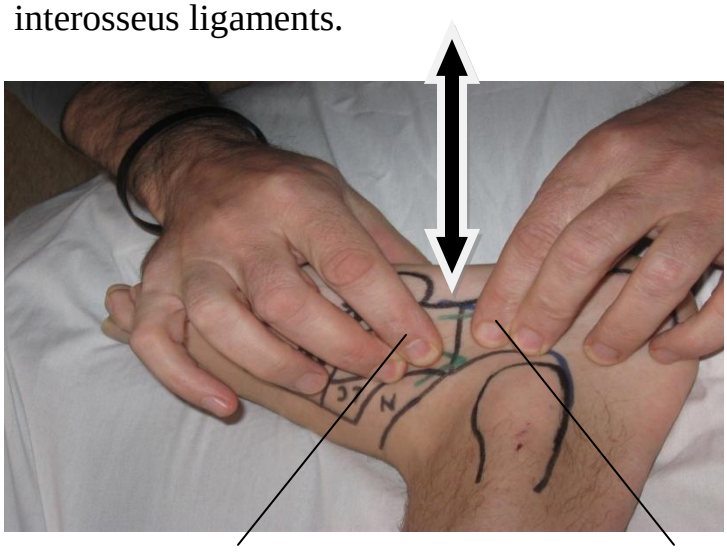

Fig 4: Accessory joint play testing for the cuboid-calcaneal joint (the joint line lies perpendicular to the plantar surface). Patient is in side lying. The left hand stabilizes the calcaneal trumpet; the right hand moves the cuboid dorsal and plantar to assess the joint play

moving hand on cuboid

stabilizing hand on calcaneal trumpet

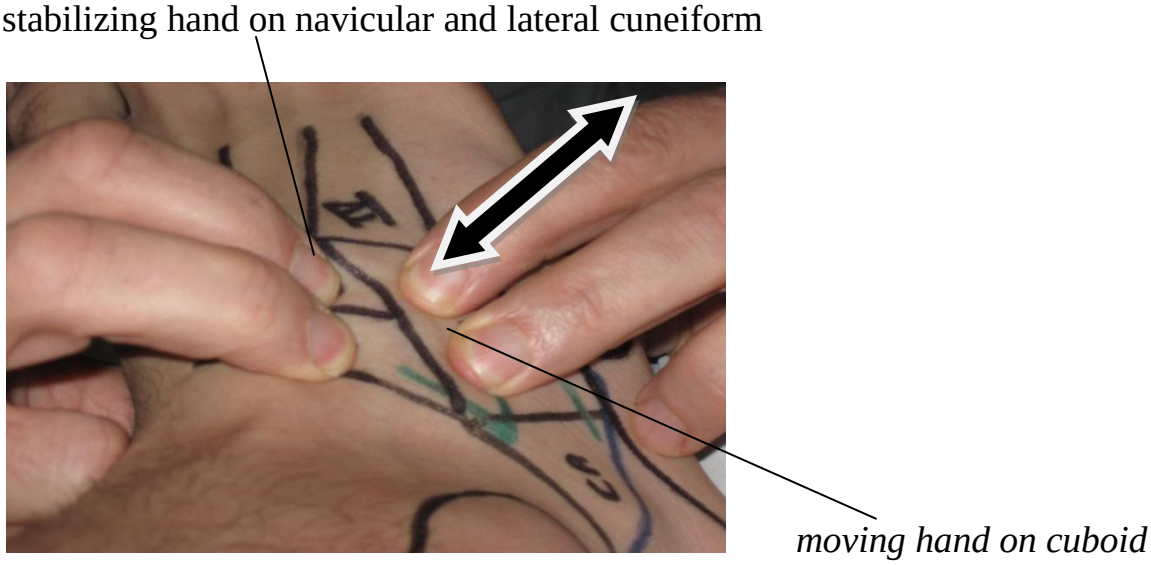

Fig 5: Accessory joint play testing of the cuboid-navicular-lateral cuneiform joint (this joint line lies perpendicular to the local curvature of the dorsum of the foot). Patient is in supine. The stabilizing hand stabilizes navicular and lateral cuneiform; the mobilizing hand moves the cuboid back and forth parallel with the joint line to assess the amount of joint play.

Some differential diagnosis are:

Sinus tarsi syndrome; tarsal coalitions, stress fractures; sprains of bifurcate ligaments, sprains of the cuboid- metatarsal 4&5 lig; peroneus longus tenosynovitis; peroneus brevis insertion tendinopathy; subluxing peroneal tendons, extensor dig brevis sprains; forefoot arthritis, sural nerve entrapment; superficial peroneal nerve entrapment; lateral plantar nerve entrapment, etc.

Treatment:

1. ***Reducing the subluxation by mobilization (Fig5&6)***

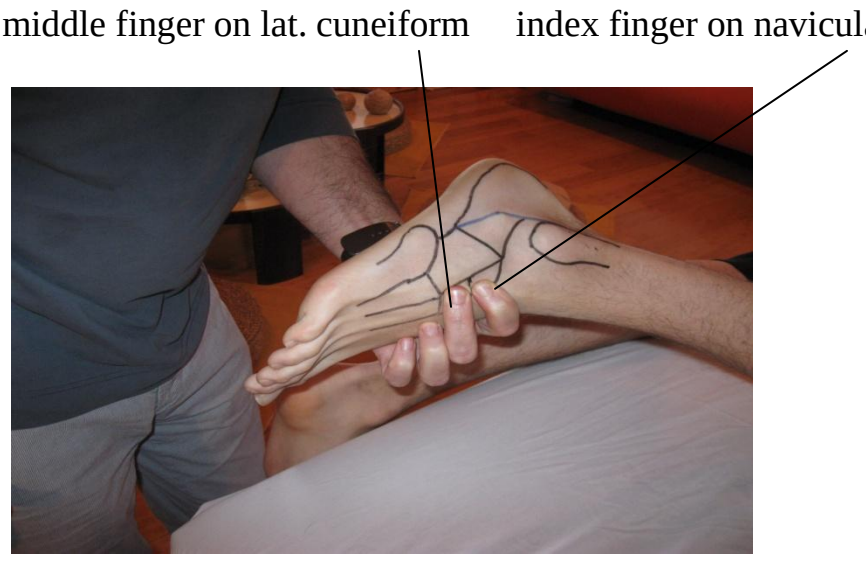

Fig 5. Finger placement of the stabilizing hand on the dorsal foot

Fig 6: Mobilization of the cuboid. The left hand is the stabilization hand; the right hand is the mobilization hand. You could also put a small sandbag underneath the stabilization hand (not shown)

Patient lies prone with the hip in slight internal rotation to bring the cuboid-lateral cuneiform-navicular joint perpendicular to the table; the index finger of the stabilization hand rests on the dorsal side of the navicular bone and the middle finger stabilizes the dorsal side of the lateral cuneiform; this stabilizing hand rests on the table; the thenar eminence of the mobilizing hand is placed on the plantar side of the cuboid (as medial on the cuboid as possible) and mobilizes the cuboid in a dorsal direction (perpendicular to the table) at the end of the movement we provide an inversion spin on the cuboid. After this mobilization the previously positive tests are re-tested. In case there is no marked improvement we proceed with the manipulation described below.

2. ***Reducing the subluxation by manipulation*: (Fig. 7)**

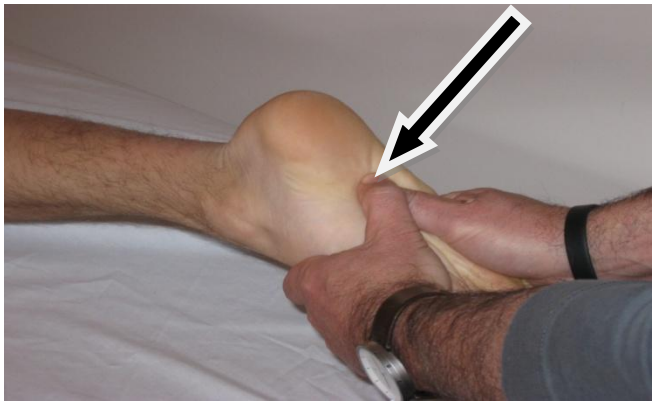

Fig 7. Cuboid Whip : with thumbs on medial side of cuboid apply force dorsal and slightly lateral to promote an inversion rotation of the cuboid.

Patient is prone with the knee flexed to about 70 degrees (to decrease tension on the superficial peroneal nerve). The stabilizing hand stabilizes the navicular and lateral cuneiform from dorsal; the thumb of the mobilizing hand is placed on the plantar side of the cuboid (as medial as possible). This thumb position is reinforced by the other thumb. Apply some traction via the 4^{th} and 5^{th} metatarsals by leaning back. Perform a high velocity low amplitude manipulation with both thumbs in a dorsal and slightly lateral direction (cuboid inversion) while the knee is further extended (up to 60˚) and the foot is plantar flexed. In most cases patient feels a 'pop' followed by an immediate improvement. The previously painful tests are now re-tested and are markedly less painful in the event that the manipulation was successful. This reduction is then maintained with a cuboid pad (see below)

3. ***Maintaining the reduction by using a cuboid pad***: a piece of 4 mm thick felt is cut in the shape of the cuboid and is kept in place with tape under the cuboid bone, ensuring that it doesn't come in contact with the adjacent bones. This creates a dorsally directed force on the cuboid with every step. This augmentation can eventually be incorporated in an orthotic.
4. ***Gradual strengthening foot and ankle muscles (including intrinsics)***
5. ***Stretching peroneus longus***
6. ***Proprioceptive training***

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