Asia-Pacific Chiropractic Journal

Treatment of Cuboid Syndrome utilising Chiropractic Care, Applied Kinesiology (AK) and adjunct techniques: A case report

Jacqueline M Reiser

Objective: The objective of this paper was to determine the effectiveness of Applied Kinesiology techniques and other AK based techniques in the treatment of acute right foot pain.

Clinical Features: A 42-year-old woman presented with acute right foot pain that remained local after a workout the previous day.

Intervention and Outcomes: Manual muscle testing (MMT) along with AK and chiropractic-based techniques were performed to locate and treat fixations and neuromuscular inhibitions. In the conclusion of one visit, the patient's right foot pain was fully reduced.

Conclusion: In addition to chiropractic care, the use of MMT and AK-based techniques demonstrated a full recovery in a single visit. This case report visualises a successful treatment of cuboid syndrome.

Research benefiting cuboid syndrome solely and with one specific technique would benefit future treatments of this condition.

Indexing terms: Chiropractic; Applied Kinesiology; Cuboid Syndrome; Lateral Foot Pain; Manual Muscle Testing.

Introduction

Cuboid Syndrome is a common condition that arises throughout the offices of specific musculoskeletal providers. Although common, cuboid syndrome tends to be misdiagnosed, leading to improper rehabilitation and overall treatment. (1) This can be attested to by the fact that this condition falls into the category of a 'syndrome' which is defined as '*a recognisable complex of symptoms and physical findings which indicate a specific condition for which a direct cause is not necessary understood*'. (2)

> *... the cuboid typically subluxates in either a dorsal or plantar position in which the specific manipulation of the bone is position dependent ...'*

Cuboid syndrome is a disruption or subluxation of the calcaneocuboid joint articulation resulting in dysfunction of its normal structural congruity. (3) This syndrome is also linked to other terms for lateral midfoot pathology including, peroneal cuboid syndrome, locked cuboid, subluxed cuboid, cuboid fault syndrome, and dropped cuboid. (3, 4)

The origin of Cuboid Syndrome can be a result of the following: lateral ankle sprains, excessive body weight, inadequate recovery, ligament laxity due to repetitive foot and or ankle traumas, training on uneven surfaces, improper footwear, structural genetics, and can occur at random. (4, 5)

Thirty-eight to forty-five percent of all athletic injuries are accounted for as lateral ankle sprains. (1) This gives them the title of the most common injury in sport. Lateral ankle sprains are a result of excessive inversion and plantar flexion of the ankle. Upon proper treatment and rest, 40% of patients who experienced this type of injury also had residual symptoms. (6)

There are no precise signs and symptoms that determine the exact diagnosis of cuboid syndrome. Rather, a variety of multiple indications could rule in a magnitude of diagnosis. Such as, specific pain located in the medial arch and the 4th metatarsal, and/or directly over the cuboid. Other indications include, pain along the *peroneus longus* tendon, (6) and/or pain with resisted passive and active inversion and eversion of the foot and ankle. (4, 5, 6)

Since the exact mechanism of injury could vary from an acute injury, residual pain, or at a random occurrence, cuboid syndrome may be misdiagnosed or treated incorrectly. Conditions such as personal tendonitis, cuboid stress fracture, *fibularis* tendon subluxation, and *extensor digitorum brevis* tendonitis can all present in the same manner as cuboid syndrome and need to be considered as differential diagnoses. (7)

Diagnosis is based on history, with no definitive imaging techniques that could rule in CS. (1, 7) Since Cuboid Syndrome is poorly understood and misdiagnosed, healing time can be dependent on patient's symptomatic presentation.

The purpose of this paper is to describe Applied Kinesiology (AK) treatment and interventions for a patient with acute right cuboid syndrome (CS). To note, short term effects of treatment were assessed. Further research is needed in order to determine long-term effects AK may have on individuals with CS.

Case Report

Patient History

A 42-year-old female presented with a chief complaint of pain in the right foot with difficulty walking. The patient stated that upon waking up that day, she had severe pain in the upper and lateral portion of the dorsum of her right foot. The patient mentioned that she did not recall a particular instance where she hurt her foot. Rather, she stated that the workout the previous day had repetitive jumping and cutting. The patient participates in an exercise activity known as CrossFit.

CrossFit is described as a high-intensity workout that involves repetitive exercise with minimal recovery between movements. CrossFit emphasises a focus on cardiovascular, anaerobic, weight lifting and functional movements as part of the exercise regime.8 The patient disregarded getting new footwear. The patient noted that she tends to tie her shoelaces more tight than loose. The patient circled the upper lateral portion of her right foot on the pain location chart that was given.

The patient described the pain as a deep ache when putting any pressure on the foot. She also described the pain as sharp and stabbing at rest and when putting pressure on the foot. During the appointment, the patient scaled the pain at a 6/10, with a score of 10 being the worst pain possible. The patient reported a 7/10 at worst, and 2/10 at its best. The patient noted that the pain was worsened by walking or standing for any given period of time. The patient stated 200mg of ibuprofen in the morning made the pain better. She also stated that keeping off the foot entirely improved the pain.

At the time of the visit the patient recorded their pain as a 6/10. The patient stated that they were not currently taking any prescription medication or supplements. The patient noted her overall health to be excellent. Along with eating a diet high in protein and equal carbohydrates and fats, she attends CrossFit classes 3-4 times weekly.

The patient has been receiving Chiropractic treatments the past two years for wellness care. The patient noted that she had a skin lesion removed from her left calf a week prior to the visit. A family history of cancer on both maternal and paternal sides was noted.

Chiropractic examination

The patient attended on 10 August 2023 for examination and chiropractic treatment. There was no advanced imaging taken.

Range of Motion examination

The patient's range of motion was measured with a goniometer. The patient's active eversion was measured at 9°, inversion 20°, dorsiflexion measured at 10°, plantar flexion 45°. Full active dorsiflexion is 20°, plantar flexion 40-50°, inversion 23°, 12° version. (9)

Patient reported pain on the upper lateral aspect of the foot during passive and active eversion and dorsiflexion. Isolated range of motion of the cuneonavicular and calcaneocuboid joints was also evaluated. There was also a feeling of stuckness in the joints when moving them in the plantar direction.

Palpatory/Objective findings

Palpatory tenderness over the right cuboid was noted. Palpation revealed slight swelling around the right cuboid. Palpatory tenderness was measured on a scale of 1-10 with a score of 1 meaning little to no pain while a score of 10 means maximum pain. Palpatory tenderness was also noted over the 5th metatarsal dorsal surface. No colour changes noted. No temperature differentials to note.

Palpatory tenderness was also noted over the *peroneus longus tendon* and dorsal calcaneocuboid ligament. Palpation of the *gastrocnemius* and *soleus* showed no positivemfindings. A 128 hz tuning fork was struck and placed directly over the cuboid, above the cuboid, below the cuboid, and at the dorsum of the foot. All these findings were scaled 7/10. A positive test would induce pain upon placement of vibration of the tuning fork over the area of injury, which could indicate a stress fracture. (1)

Orthopaedic exams- Foot/Ankle

Patient had a negative Morton's test and ankle dorsiflexion test. These tests determine if a Morton's neuroma or other predisposing factors such as subluxation or stress fractures of the foot. (10) Anterior and Drawer tests were negative. If positive it would indicate tear in the anterior or posterior talofibular ligament or rule in a possible subluxation of the talus. (12)

The single leg hop and heel/toe raise testing were positive, indicating the patient was unable to put full body weight on right foot and perform both actions. The patient was unable to fully stand on the right foot without holding on to the side of the treatment table for support. These two tests were difficult or impossible to perform due to pain in the cuboid or lateral aspect of the foot. (7)

Techniques utilised

Applied Kinesiology (AK) Manual Muscle Testing

Throughout this patient's care, Applied Kinesiology (AK)/Manual Muscle Testing (MMT) was used to evaluate and determine treatment outcomes. The International College of Applied

Kinesiology (ICAK) defines Manual Muscle Testing as the nervous system's ability to adapt the muscle to meet the changing pressure of the examiner's test (ICAK).

With the use of Manual Muscle Testing (MMT) and other overall diagnostic standards, AK utilises specific MMT in order to assess structural, chemical, and mental aspects of one's overall health. (13, 14) Injury and/or inflammation in specific joints, spinal levels, and other bodily parts can result in impaired strength in specific muscles. (14) Therefore, it is important for the practitioner to have a deep understanding in anatomy, physiology, biomechanics, and neurology.

When an individual is able to adapt to the changes of pressure, the muscle remains facilitated. (14, 15) In contrast, when the individual cannot adapt to the changes of pressure, this is known as inhibition. (14, 15) Understanding facilitation and inhibition gives the practitioner a somatic reflection throughout different neurological pathways by means of MMT, (16) therefore leading to proper diagnosis and treatment.

When MMT is used in the clinical and the research setting, it is important to consider the following:

- The tester's contact point on the patient should be the same each time.
- The tester's direction of force should be the same each test.
- The body position of the tester should be in an engaged position.
- The tester should avoid preconceived results that could affect the outcome of the test
- The tester should avoid MMT over regions of acute pain, debilitative disease, local pathology, and inflammation. (13)

Applied Kinesiology was the primary technique and evaluation tool used during the treatment of this patient. Within AK, a multitude of techniques are incorporated. During this patient visit, Therapy Localisation (TL), Injury Recall Technique (IRT), Shock Absorber Protocol, Sacro-Occipital Technique (SOT) category blocking, soft tissue-based techniques, specific muscle correlated feet adjustments, and Chapman Reflex integration were all used well.

Neuro-Emotional Technique (NET)

Neuro-Emotional Technique (NET) is founded on the principle of being recognised as an '*mind body technique*', meaning it has the ability to positively affect one's mental/emotional state and overall physicality. Using MMT, NET can help identify different psychosomatic physiological responses in one's nervous system.

This technique emphasises the concept of consistent, dormant, or unresolved trauma which can contribute to the way in which one lives. Dr Scott Walker describes NET as a system that integrates principles of a multitude of health modalities and professionals including, traditional Chinese pulse assessment, cognitive behavioural psychology principles, acupuncture theory, and muscle testing. (17) Regardless if an event is a physical trauma to the body, or mental, the body can hold on to the physiological response of that trauma. The body's response to stress in both current and past events can cause neurochemical changes that can alter how the body heals. Therefore, having potential to elicit pain in regions of the body that is not localised to the focal point of the original pain. (18)

This technique was utilised to determine any current or past stressors that may be contributing to the acute onset of foot pain.

Frequency Specific Micro-current (FSM)

The use of Frequency Specific Micro-current (FSM) was also used in the patient's treatment. Instead of numbing the region of pain, FSM works to restore cellular homeostasis. Utilising principles of biological resonance and biophysics, FSM delivers currents through two different channels paired with two specific frequencies along a specific area of the body. Channel A

targets the condition while channel B targets the tissue. This specific treatment results in the change of cell signalling which ultimately changes the function of the cells. (19)

> This is due to the principle 'A current closer to the cellular current of the body can overcome electrical resistance of injured or inflamed tissue, restore cellular homeostasis, and facilitate tissue regeneration'. (20)

Function and pain are directly correlated. Improvement in function results in reduction of pain. FSM was utilised to reduce pain in the lateral foot.

Quantum Neurology (QN)

Quantum Neurology® utilises light therapy (GRT Light) with specific neurological activation techniques. This is done in order to strengthen and restore one's nervous system in order to function at its ultimate ability. Dr George Gonzalez created Quantum Neurology on the foundation of finding the neurological pattern created by an injury. This is known as NeuroExpression™.

NeuroExpression™ is defined as '*The neurological pattern that is created by an injury, illness or condition*'. (12) Healing the root of the issue can ultimately heal the cascade of other pain patterns that may present in each case. Quantum Neurology® Rehabilitation was used to activate specific myotomes and address any sensory or motor changes that may be associated with the right foot pain.

Diversified technique

Diversified technique is the foundation of the chiropractic profession. Diversified technique is a manual technique that provides a high-velocity and low amplitude force into a specific region of the body. (22) This can result in an increase in function and overall quality of life. This technique was well utilised in adjusting the right foot and at the L5/S1 region.

Chiropractic and AK treatment

The patient was seen August 23, 2023 for an appointment length of 40 minutes. During this visit, the doctor documented the patient's initial objective and subjective findings. Afterwards, the doctor utilised principles of AK and chiropractic to find and correct imbalances.

The doctor utilised Ocular Lock23 to determine a right lateral C2 subluxation. Using a facilitated right *pectoralis major clavicular* (PMC), the patient was instructed to move their eyes to the right. This weakened the PMC. With their eyes to the right, the patient therapy localised (TL) (23) the right C2 vertebrae. This facilitated the PMC. The doctor contacted the C2 vertebrae with their right index finger. The doctor laterally flexed the patient's head to the right and rotated it to the left and applied a diversified Chiropractic adjustment. In addition to its high velocity-low amplitude (HVLA), the specific line of drive was lateral to medial and superior to inferior.

The Doctor utilised MMT to measure the strength of the right ankle. MMT was performed on the following right ankle muscles: *peroneus tertius*, *peroneus longus* and *brevis*, *tibialis posterior*, and *tibialis anterior*. The *tibialis anterior* showed facilitation. The *peroneus tertius*, *peroneus longus* and *brevis*, and *tibialis posterior* were unable to withstand the change in pressure. Therefore, they were documented as inhibited.

The doctor then approximated the muscle belly of the *tibialis anterior* with both thumbs to challenge the Neuromuscular Spindle Cells. (23) The MMT was then inhibited. This is indication that the *tibialis anterior* was functioning properly and could be used as an indicator muscle through the treatment. The doctor utilised the *facilitated tibialis anterior* as an indicator muscle during the use of the shock absorber test (SAT). (23) With a closed fist, the doctor applied an anterior to posterior (AP) force on the ankle mortise joint. The previously strong *tibialis anterior* muscle test was now inhibited. After waiting a few seconds, the *tibialis anterior* proceeded to facilitate when MMT.

This test indicates that there was a subluxation present in the ankle. It is important to note that the SAT exam is only used on diarthrodial joints. (23) MMT of the neck flexors was then utilised to determine if the talus had subluxed anterior and superior. MMT showed inhibition of the neck flexors tested as a group. To confirm this finding, the doctor utilised the extra-spinal subluxation challenge. (23) Using an inhibited *peroneus tertius*, the doctor applied slight traction of the talus posterior and inferior. This resulted in momentarily strengthening of the *peroneus tertius*.

Using both thumbs, the doctor contacted the first and fifth metatarsals. The doctor tissue pulled anterior to posterior, and superior to inferior over the skin until contact was made on the right talus with both middle fingers. Elbows were closed together and a traction was applied with a scooping motion. MMT of the neck flexors were now facilitated and the extra-spinal subluxation challenge of the talus was no longer testing. (24) MMT of the *peroneus longus* and *brevis* and *peroneus tertius* were facilitated post adjustment. The *tibialis posterior* still tested inhibited.

To ensure that all ankle muscles tested were facilitated, the doctor treated the Chapmans Reflex (23) of the right *tibialis posterior*. The doctor contacted the anterior Chapman reflex located on the abdomen 2" (5cm) above the umbilicus and 1" (2.5cm) from the midline bilaterally. The doctor simultaneously applied firm rotary pressure over these two points for 30 seconds. The doctor then waited to feel the pulses synchronise for 30 seconds. This was repeated three times before the pulses synchronised.

The posterior Chapman reflex was then treated bilaterally with contact on the back between 11th and 12th Thoracic vertebrae laminae. The same procedure was repeated as the anterior chapman reflex. Synchronisation of the posterior Chapman's reflexes was accomplished three times. The right tibialis posterior was retested and did not facilitate.

The lack of facilitation of the right tibialis posterior directed the doctor to test low back and/or pelvic disruptions. The patient was treated for a right category 3 (CAT 3)25 pelvic fault. The previously strong right hamstring MMT weakened when the doctor applied anterior to posterior lift on the right Anterior Superior Iliac Spine (ASIS). This was done while simultaneously pushing the L5 spinous process to the side of ASIS contact. While laying prone, the doctor placed one block under the right trochanter slightly facing toward the left shoulder. The other block was placed under the left ASIS. The doctor then palpated the L5 spinous process for pain.

When the patient stated they felt pain on palpation, the doctor moved the thick portion of the right block inferiorly. The thin tip of the SOT block was pointed at the 11 o'clock position when pain was felt. While the patient rested on the blocks, the doctor checked for a Sacral Respiratory Fault. (23) Using the right hamstring as a strong indicator muscle, the doctor had the patient hold their breath on full inspiration while MMT the right hamstring. This resulted in weakness.

Weakness on full inspiration indicates a right expiration fault. The patient was instructed to hold their breath on full inspiration while the doctor MMT the right hamstring while challenging the sacral apex in multiple vectors. The doctor indicated that an anterior to posterior thumb contact on the sacral apex caused facilitation. The doctor held this contact while the patient repeatedly went through 3-5 full phases of expiration breathing patterns. Correction was determined when the patient no longer weakened to a full inspiration. The doctor then rechecked the tenderness of the L5 spinous process. There was no pain indicated. The doctor continued to move the base of the right SOT block inferiorly and checked for L5 tenderness. Tenderness was reported when the tip of the block was at the 9 o'clock position.

While the patient laid on the blocks, the doctor instructed the patient to TL their right iliolumbar ligament. The doctor then pushed the talus headward and observed weakening of the right hamstring. This indicated the need for Injury Recall Technique25 (IRT). The Doctor proceeded to rub along the iliolumbar ligament while dorsiflexing the right talus. After IRT, the

right hamstring no longer weakened to the IRT challenge. Pain was no longer indicated when palpating the L5 spinous. The right tibialis posterior was facilitated after the conclusion of this specific treatment.

Since the cuboid is not considered a diarthrotic joint, the SAT could not be utilised. Instead, the doctor MMT the *tensor fasciae latae* (TFL). Inhibition of this muscle can indicate that the cuboid has subluxed laterally. The doctor used their right thumb to pull the tissue lateral to medial over the cuboid. Their lateral hand was placed over the right thumb for additional support. The doctor then straddled the patient's foot, placing it firmly between their thighs. The doctor dorsiflexed the foot, and applied a medial to lateral, superior to inferior thrust. (24) Upon adjustment, the TFL was now facilitated.

Quantum Neurology was utilised to evaluate the strength of the lower body myotomes and pubic bone function. The patient's knees were bent at a 90° angle with feet flat on the ground. The Doctor contacted the inside of the patient's knees while the patient was asked to resist abduction. The patient could not. While the patient TL'ed the right pubic bone while this action was performed again. Full facilitation was met. The doctor placed a GRT light™ (12) at the patient's brain stem for additional support. Using an arthrostim (26) the doctor contacted the right pubic bone while instructing the patient to squeeze their fist with both knees. The doctor applied anterior to posterior pressure with the arthrostim. After correction, full facilitation was met.

Bilateral testing of the lower body myotomes (L1-S1) was conducted. Full 5/5 muscle contraction was present bilaterally. The S1 myotome peroneus tertius showed inhibition with deep touch, and hot and cold pressure over the right foot. The doctor used the flat tip of an arthrostim over the lateral aspect of the foot and entire dorsum of the foot to apply deep pressure.

Ice wrapped up in a towel was pressed into the lateral aspect of the foot, and on the dorsum. A warm heated towel was then used to replicate the same procedure. Both challenges of temperature and pressure were no longer causing inhibition after treatment.

Frequency Specific Micro-current (FSM) was utilised to reduce overall pain and swelling in the lateral foot. The specific frequencies that were used included: Channel A: 40 (inflammation), 124 (torn and broken), 30 (irritation), 970 (emotional component). Channel B: 100 (ligaments), 396 (nerves), 142 (fascia), 77 (connective Tissue), 191 (tendons). The current was set as alternating (+/-) with waveform set to gentle. The current intensity was set to 300uA. Each pair of frequencies ran for a total of two minutes each. Total treatment time was 40 minutes. One pad was attached above the lateral malleolus. The other pad was attached on the side of the right foot between the cuboid and the fifth metatarsal.

NET was utilised last in the treatment procedure. The patient TL'ed to the lateral foot which resulted in weakening of the straight arm MMT. This was negated by the doctor TL'ing the patient's neurovascular point for emotions which is the forehead.25 The straight arm MMT showed weakening when the emotion of anger was verbalised. With their left hand, the patient contacted the lateral right rib cage with where the liver is located. This was done while holding the right hand on their forehead while processing the anger. After, the emotion no longer weakened the straight arm muscle test. The TL to the lateral foot no longer resulted in weakness.

Chiropractic/Applied Kinesiology outcomes

Specific notes were taken through the course of the patient's care. Utilising SOAP (Subjective Objective Assessment Plan) notes allowed for proper documentation and progression of the patient's care. Within this well written documentation, explanation of procedures, exam findings, AK and QN procedures, and the patient's progression of care was noted. After the 40-minute

visit, the patient had significant results. The patient had full pain free passive and active range of motion restored in the right foot/ankle. The single leg hop/heel toe raise exams were negative, and the patient was able to put full pressure on the right foot. Palpatory tenderness over the peroneus longus tendon, dorsum of the 5th metatarsal, and the dorsal calcaneocuboid ligament were decreased (2/10). Swelling around the right cuboid had decreased. The patient was able to lace up her shoes, and walk out the office door. A week later, the doctor was informed that the pain never returned.

Discussion

The purpose of this case report was to determine the effects of AK treatments and Chiropractic care on managing the pain of a patient with acute Cuboid Syndrome. In this particular case, the acute right foot pain was likely caused due to shoe tightness and repetitive jumping and cutting from the previous day. This is backed up by the fact that the patient did not report any previous lower leg injuries. What also needs to be noted is, the patient had surgery to remove a skin lesion on the left calf the week prior. The patient did not report any post surgical pain or biomechanical issues in the left leg. Yet, subconscious compensation in overall bio-mechanics could have played a role in the right foot pain. Therefore, a full-body approach to care was initiated.

The patient responded immediately to AK treatments and chiropractic care. This is supported by the changes in the pre and post objective and subjective findings. This includes decreased palpatory tenderness in given areas, full passive and active range of motion restored, and reduction in swelling around the right cuboid. The patient also had negative orthopaedic exams after the treatment. This includes a negative single leg hop and heel toe raise. Since the diagnostic standards of cuboid syndrome are not a universal standard, it can be determined that acute conservative care was the appropriate management for this patient. This can be supported by negative tuning fork tests, the mechanism of injury, acute vs. chronic pain, objective findings, and negative orthopaedic tests.

There was no advanced imaging needed for this case. Cuboid Syndrome is based mainly on patient history and physical examination. Advanced imaging such as MRI and CTs may not determine a diagnosis. (27) This is due to normal variations that exist between the surrounding tissue and the calcaneo-cuboid joint. (27, 28) Although these images may show minor subluxations of the calcaneo-cuboid joint with some swelling, findings may come back normal. (28)

Using X-Ray initially can be helpful in diagnosing stress fractures, (1) tumours, and other abnormalities when lateral foot pain is present. (7) Based on the research, treatment and diagnosis still heavily relies on the providing medical professional.

Although cuboid subluxation can be determined based on palpation and other objective findings, passive combination joint movements can also be of use including, supination, and pronation. (5, 29)

In addition, using the accessory dorsal and plantar glides of the cubonavicular and cuneocuboid joints can also lead to a better understanding of the type of cuboid subluxation present. Plantar subluxations have a decreased dorsal glide (5) while dorsal subluxations have a decreased plantar glide. (5)

Based on the literature, the cuboid typically subluxates in either a dorsal or plantar position in which the specific manipulation of the bone is position dependent. Plantar cuboid subluxation tends to be more common in the literature presented than dorsal cuboid subluxation. Yet, according to the literature, the biomechanics of the nature of injury is technically the same. The most common injuries causing cuboid syndrome are lateral ankle sprains and overall overuse injuries. (1)

The cuboid can be forced into closed compact position (5) when there is forceful plantarflexion, inversion, and adduction occurring. This occurs from the contraction of the *peroneus* long tendon. (30) This action causes a rotational force (6) which subluxates the cuboid to a plantar or dorsal position. (29) This also results in the subtalar joint being prone to positional changes due to the force and contraction of this muscle. (28)

The most popular treatment method for Cuboid Syndrome is manipulation. Based on the literature, there are four main types of cuboid manipulation.

- Cuboid Squeeze: While the patient is in a prone position, (4) the ankle is plantar flexed to its maximum capacity. (1) The doctor places a double thumb contact on the cuboid bone while adding slight axial distraction. (29) The doctor then will press 'squeeze' the bone in a dorsal to plantar lateral direction. (1)
- Cuboid Whip: While the patient is prone, the patient's knee is flexed from a 70–90° position. (4) The doctor places both thumbs on the plantar aspect of the cuboid with other digits interlacing the dorsum of the foot. (7) The doctor then applies maximal plantar flexion while distracting the foot while extending the lower leg simultaneously to achieve low amplitude and a high velocity. (28) This is done multiple times until the doctor feels the plantar muscles relax and full joint lockout. A plantar to dorsal thrust in the lateral direction is applied on full plantar flexion. (29)
- Dorsal Subluxation Manoeuvre 1: The patient is in a supine position with the foot hanging off the table. The doctor contacts the 4th metatarsals dorsally while wrapping both thumbs on the plantar forefoot. (29) The doctor will then distract the joint with slight plantar flexion while the foot hangs off the table. This allows for the cuboid to move from the dorsal to plantar position with the help of weight and gravity. (5)
- Dorsal Subluxation Manoeuvre 2: The patient is seated on the floor with the knee flexed to 90° while holding their distal fibula and tibia. (29) The doctor distracts the fourth and 5th metatarsals while their superior hand applies a dorsal to plantar thrust. (5)

The number of treatments needed can be a reflection of the length of time an individual has suffered with this condition. Pain duration of 1 week correlated with one or two manipulations, pain and symptoms present for a month would suggest three to four manipulations over time. (31)

During the manipulation, an audible pop or click may be heard during the procedure. (4) This audible is not a defining outcome that the bone has been successfully manipulated. (1) Utilising changes in subjective and objective observations pre and post treatment is more rational and can lead to a better understanding of treatment and healing progression. Studies have reported that patients may have an immediate relief of pain and change of symptoms upon manipulation. (1, 4)

Manipulation of the cuboid should not be done if there is persistent swelling, (5) ecchymosis, (4) and damage to ligaments. (29)

Returning to sport or daily life activities may occur after manipulation if the patient is asymptomatic. (1) If pain is persisting, or additional support is needed, additional therapies have also been utilised as successful treatment options. Utilisation of taping techniques and cuboid padding help to support the medial longitudinal arch (4) to prevent the cuboid from subluxating due to the counterforce of the peroneus longus. (31)

Poor foot biomechanics can play a role in pain management of cuboid syndrome. Utilising a neutral orthotic can help prevent excessive foot and ankle pronation, (32) while initiating proper joint function. In cases where the pain results in life alterations such as difficulty with ambulation or other daily life events, immobilising the foot and ankle should be suggested. Immobilisation can be achieved through the use of a orthopaedic boot with a potential for a crutch or cane. (4)

Passive physiological mobilisation of the cuboid has been an essential treatment for cuboid syndrome recovery. This technique paired with manual stretching (32) and strengthening (5) helps improve range of motion in the ankle mortise joint while decreasing overall pain. (3) Utilising modalities that question the coordination and proprioception of the injured foot help lead to proper therapy. Wobble board exercises (29) and standing heel raising ball squeezes can help improve this notion. (33)

Although there is no standard protocol for physical therapy interventions for cuboid syndrome, following the The National Athletic Trainers' Association (NATA) guidelines for athletic ankle sprains can be considered. Concentric and eccentric specific ankle exercises paired with ankle strengthening exercises are considered a universal protocol for rehabilitation. (34) Intensity and duration of rehabilitation is practitioner dependent.

Though conservative treatment options have shown positive outcomes, surgical procedures are considered an option of last resort. (5) There is no universal agreement between the length of time conservative care should be attempted before surgical intervention is needed. Lewson et al (6) utilised manipulations, taping, custom orthotics, and physical therapy for 16 months before calcaneo-cuboid ligament reconstruction was decided. Although manipulation is the most popular treatment for CS, it is not always utilised. Of the studies that did not use manipulation as one of their conservative treatment options, the surgical decision ranged from five months (36) of failed conservative treatments to two years (35) of failed conservative treatments.

There is some evidence that supports chiropractic management in the treatment of cuboid syndrome. Kurman et al used HVLA cuboid adjustments on toggle board with additional taping, and specific rehabilitation exercise to reduce lateral foot pain over an extended period of time. (37)

Using HVLA talus and cuboid adjustments manually has also shown to increase mobility and stability in patient with chronic sprained ankles. (38) HVLA adjustments specific to the lower foot have also been shown to improve gait by reducing pain and increasing strength and flexibility. (39) There is little to no specific studies on Chiropractic care and the treatment of cuboid syndrome. Rather, treatment of CS is grouped in with studies pertaining to Chiropractic treatment and lateral ankle sprains.

Conclusion

In conclusion, this case report demonstrates a variety of AK and chiropractic therapies for treating cuboid syndrome. More research is needed with AK and chiropractic treatment options for cuboid syndrome treatments. More research should also be done one treating cuboid syndrome solely and not grouped in with general foot pain, also more research should also be conducted utilising one specific technique.

Jacqueline M Reiser
DC
Private practice of Chiropractic
Austin, TX
jacquiereiserdc@gmail.com

Cite: Reiser JM. Treatment of Cuboid Syndrome utilising Chiropractic Care, Applied Kinesiology (AK) and adjunct techniques: A case report. Asia-Pac Chiropr J. 2025;6.2. www.apcj.net/AK-Abstracts-2024-25/#ReiserCuboid

References

1. Patterson S. M. (2006). Cuboid syndrome: a review of the literature. Journal of Sports Science & Medicine, 5(4), 597–606.
2. Calvo F., Karras B. T., Phillips R., Kimball A. M., Wolf F. Diagnoses, syndromes, and diseases: a knowledge representation problem. AMIA ... Annual Symposium Proceedings. AMIA Symposium, 2003, 802.
3. Mazerolle S. M. Cuboid syndrome in a college basketball player: a case report. International Journal of Athletic Therapy and Training,12(6), 9-11, 2007.
4. Durall CJ. Examination and treatment of cuboid syndrome: a literature review. Sports Health: A Multidisciplinary Approach (SPH). 2011;3(6):514-519.
5. Adams E., Madden C. Cuboid subluxation: A case study and review of the literature. Current Sports Medicine Reports 8(6):p 300-307, November 2009.
6. Lewson E. B., Pulsifer, M. S. E., & Mallette J.P. Cuboid sling: A novel surgical repair of cuboid syndrome and literature review. Foot & Ankle Surgery: Techniques, Reports & Cases, 1(4), 2021.
7. Jennings J, Davies GJ. Treatment of cuboid syndrome secondary to lateral ankle sprains: a case series. J Orthop Sports Phys Ther. 2005 Jul;35(7):409-15.
8. Claudino J.G., Gabbett T.J., Bourgeois F. et al. CrossFit overview: systematic review and meta-analysis. Sports Med - Open 4, 11. 2018.
9. Brockett, C. L., & Chapman, G. J. Biomechanics of the ankle. Orthopaedics and trauma 30(3), 232–238, 2016.
10. Bhatia M. & Thomson L. (2020). Morton's neuroma - Current concepts review. Journal of Clinical Orthopedics and Trauma, 11(3), 406–409.
11. Moore M. B. The use of a tuning fork and stethoscope to identify fractures. Journal of Athletic Training, 44(3), 272–274, 2009.
12. Miller AG., Myers SH., Parks BG., Guyton GP. Anterolateral drawer versus anterior drawer test for ankle instability: a biomechanical model. Foot & Ankle International. 2016;37(4):407-410.
13. Schmitt W., Cuthbert S. Common errors and clinical guidelines for manual muscle testing: "the arm test" and other inaccurate procedures. Chiropractic & Osteopathy, 16, 16, 2008.
14. Rosner A., Cuthbert S. Applied Kinesiology: distinctions in its definition and interpretation. Journal of Bodywork and Movement Therapies. 16. 464-87. 10.1016/j.jbmt.2012.04.008, 2012.
15. Oliveira D. G., Oliveira G. M., Kirkwood R. N. Clinimetric properties of the applied kinesiology manual muscle test in adults with and without pain: a methodological study. Journal of Chiropractic Medicine, 21(4), 260–269. https://doi.org/10.1016/j.jcm.2022.03.003
16. Schmitt W. Quintessential applications DVD; The Neurological Rationale for a Comprehensive Clinical Protocol Using Applied Kinesiology Techniques, 2005, AKSP, Chapel Hill, NC
17. Karpouzis F., Pollard H., Bonello R. A randomised controlled trial of the neuro emotional technique (NET) for childhood attention deficit hyperactivity disorder (ADHD): a protocol. Trials 10, 6 (2009).
18. Bablis P., Pollard H., Rosner A. Stress reduction via neuro-emotional technique to achieve the simultaneous resolution of chronic low back pain with multiple inflammatory and biobehavioural indicators: A randomized, double-blinded, placebo-controlled trial. Journal of Integrative Medicine, 20(2), 135–144, 2022.
19. Thompson R., Kaplan S. Frequency-specific microcurrent for treatment of longstanding congenital muscular torticollis. Pediatric Physical Therapy 31(2):p E8-E15, April 2019.
20. McMakin C. The resonance effect: how frequency specific microcurrent is changing medicine. North Atlantic Books, 2017.
21. Gonzales G., et al. Quantum Neurology. elevate your practice with quantum neurology, we make neurology easy., 2018, https://quantumneurology.com/
22. Dubuc É., Pagé I., Boucher P. B. Brousseau D., Robidoux S., Blanchette, M. A. Chiropractic techniques and treatment modalities included in academic programs: A survey of chiropractic educational institutions. The Journal of Chiropractic Education, 36(2), 84-92, 2022.
23. Walther D. "Applied Kinesiology: Synopsis. 2nd ed., Triad of Health Publishing" 1988. 60-61, 115-116, 171-173, 331,403
24. Gregor J. Applied Kinesiology: Fundamental Applied Kinesiology Course. 2015.75-80.
25. Schmitt W., McCord K. Quintessential Applications A(K) Clinical Protocol, HealthWorks! Publishing, 2005. 24,27, 28

26. Godwin P., Reisbig M.,Walter J. "ArthroStim." ArthroStim. N.p., n.d. Web. 25 Febuary 2024.

27. Brandon K., Patla C. Differential diagnosis and treatment of iliotibial band pain secondary to a hypomobile cuboid in a 24-year-old female tri-athlete, Journal of Manual & Manipulative Therapy, 21:3, 142-147, 2013.

28. Julien P., Ravenall R. p 229-232 Update 2010 The Podiatry Institute, Tucker GA

29. Mooney M., Maffey-Ward L. Cuboid plantar and dorsal subluxations: assessment and treatment. J Orthop Sports Phys Ther. 1994 Oct;20(4):220-6. DOI 10.2519/jospt.1994.20.4.220.

30. Matthews ML., Claus AP. Two examples of 'cuboid syndrome' with active bone pathology: why did manual therapy help? Man Ther. 2014 Oct;19(5):494-8. DOI 10.1016/j.math.2013.11.007. Epub 2013 Dec 19. PMID: 24405785.

31. Newell SG, Woodle A. Cuboid syndrome. Physician and Sports Medicine, 1981;9:71-76.

32. Zirm, R., Update 1997, p 171-175 The Podiatry Institute, Tucker, GA

33. Patla C., Lwin J., Smith L., Chaconas E. Cuboid manipulation and exercise in the management of posterior tibialis tendinopathy: a case report. International Journal of Sports Physical Therapy, 10(3), 363–370, 2015.

34. Kaminski T., Hertel J., Amendola N., et al. National Athletic Trainers' Association. National Athletic Trainers' Association position statement: conservative management and prevention of ankle sprains in athletes. Journal of Athletic Training, 48(4), 528–545, 2013.

35. Horner K., Fiala K. Calcaneocuboid ligament complex reconstruction for cuboid syndrome in a 14-year-old athlete: a case report. JBJS Case Connector 11(4): e21.00198, October-December 2021.

36. Lunati M., Wilson J., Kukowski N., Mautner K., Labib S. Isolated calcaneocuboid instability- a unique diagnostic modality and innovative surgical technique: A case report. Foot & Ankle Surgery: Techniques, Reports & Cases. 1. 100037. 10.1016/j.fastrc.2021.100037, 2021.

37. Kurman K., Romanelli A. (2021). Calcaneonavicular coalition: a case study of non-operative management in an adult patient. The Journal of the Canadian Chiropractic Association, 65(3), 350-9.

38. Gillman S.F. The impact of chiropractic manipulative therapy on chronic recurrent lateral ankle sprain syndrome in two young athletes. Journal of Chiropractic Medicine, 3(4), 153– 159, 2004.

39. Russell B., Hoiriis K., Hosek R. Walking gait before and after chiropractic care following fifth metatarsal fractures: a single case kinetic and kinematic study. Journal of Chiropractic Medicine, 17(2), 106–116, 2018.