

Ganglion cyst of the foot treated with electroacupuncture: A case report

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Objective: *To present the clinical management of a ganglion cyst presenting on the dorsolateral aspect of the foot.*

Clinical Features: *A 45-year-old female cyclist complaining of ganglion cyst following training period.*

Intervention and Outcome: *Patient was treated with high-frequency electroacupuncture in four consecutive sessions over four weeks, and reported resolution of the cyst following therapeutic intervention.*

Conclusions: *Ganglion cysts of the foot are relatively rare connective tissue tumours with variable treatment approaches. Electroacupuncture may be a novel and non-invasive conservative approach for the treatment of ganglion cysts. Further evaluation of the efficacy of such treatment is warranted.*

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KEY WORDS: ganglion, acupuncture, foot, cyclist

Objectif : *présenter la gestion clinique d'un kyste ganglionnaire se manifestant sur l'aspect dorsolatéral du pied.*

Caractéristiques cliniques : *une cycliste de 45 ans se plaint de kystes après l'entraînement.*

Intervention et résultat : *la patiente a été traitée par électropuncture à haute fréquence en quatre séances consécutives sur quatre semaines. Le kyste a disparu après l'intervention thérapeutique.*

Conclusions : *les kystes ganglionnaires au pied sont des tumeurs des tissus conjonctifs relativement rares nécessitant des approches de traitement diverses. L'électropuncture peut être une nouvelle approche conservatrice non invasive pour le traitement des kystes ganglionnaires. Une évaluation plus poussée de l'efficacité d'un tel traitement s'avère nécessaire.*

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MOTS CLÉS : ganglion, acupuncture, pied, cycliste

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Introduction

Ganglion cysts are rather common benign cystic tumours which originate from connective tissue such as joint capsules and tendon sheaths, and less commonly within bone. Electron microscopy demonstrates randomly oriented, multi-directional sheets of loose collagen layers composing the wall of the ganglion, which contain focal areas of mucinous degeneration.¹ Ganglion cysts contain high-viscosity fluid comprised mainly of hyaluronic acid; with glucosamine, globulins and albumin also present.^{1,2,3} The origin of the ganglion are highly theorized. Pre-existing intra-articular joint pathology, joint stress leading to mucoid degeneration of adjacent extra-articular connective tissue, and joint stress stimulating mesenchymal cells to secrete mucin are most commonly warranted within the literature.¹

Early literature suggests that 7-11% of ganglia within the body are located in the foot and ankle area, to which they are the most common soft tissue tumours in this region.^{2,4} To date, there are no reports of foot or ankle ganglion cysts within the chiropractic literature. Anatomically, the majority of ganglion cysts within this region are located on the dorsum of the foot (48-66%), with a greater preponderance in females.^{2,5,6,7} Patients seeking care for these cysts generally complain of local pain and tenderness, and less often paresthesia when compressing a lo-

cal nerve. Footwear often exacerbates cyst compression and symptoms. When pain is present, patients will often consider it to be an annoyance and of low intensity, rather than debilitating in nature.⁸

The natural history of ganglions is unknown, and few well conducted studies have evaluated the resolution of untreated ganglions. Studies have reported 8-50% spontaneously resolve in adults over approximately 2 years.^{1,2,8,9} The treatment methods for ganglion cysts have proved inconsistent and variable. It is predicted that aspiration therapy has a success rate of only 30-50%, with greater chance of reoccurrence than surgical excision.^{2,10} Sclerosing treatments have also been used for the treatment of ganglia in the foot. However, joint damage risk via sheath connections amongst the ganglia and tendon or joint capsules has led most authors to not recommend such injections.⁹ Surgical excision remains the gold standard for the treatment of ganglion cysts, and appears to have significantly lower reoccurrence rates as compared to conservative therapy, cited as 11% to 63% respectively in a comparative study of 63 ganglions.² However, reoccurrence rate ranging from 7-43%^{2,10,11} are cited in the literature, and is likely attributed to imperfect excision and surgeon experience^{2,10,11}.

This case report illustrates the conservative management of a ganglion cyst of the dorsolateral aspect of the



Figure 1 and 2

Images depict the ganglion cyst located on the dorsolateral aspect of the foot, located distal and medial to the base of the 5th metatarsal. The cyst was measured at 1.5 by 1.5cm when the patient initially visited the sports chiropractic clinic. The arrows represent the superior, inferior, medial and lateral borders of the cyst. Two needles were inserted into the cyst during treatment, from the medial and lateral direction (as indicated by the arrows).



Figure 3

Following 4 treatments with the sports chiropractor, the ganglion cyst located on the dorsolateral aspect of the right foot had resolved. The outline represents where the ganglion cyst had originally presented.



Figure 4

This image shows a comparative view of the dorsolateral left foot in the patient.

foot using electroacupuncture. The report also outlines epidemiology and pathophysiology of ganglion cysts and management procedures, as well as the theoretical bases and literature application of electroacupuncture.

Case

A 45-year-old female patient presented to a sports chiropractic clinic with the complaint of a ganglion cyst on the dorsal aspect of the right foot, located distal and medial to the base of the fifth metatarsal. She had been training for a charity cycling ride that entailed riding 200km over two days. She reported that this was her first time training as a cyclist and the first time she road “clipped into the pedals”. To unclip from her bike she used the right leg to initiate the mechanism, which entailed internal rotation of the ankle. The patient also stated that she sustained a minor fall on her bike, but did not recall any pain in her foot. The patient noticed the cyst during the last weeks of training and stated that the cycling shoes may irritate the cyst but otherwise did not notice it.

Upon physical examination, a hard soft tissue nodule was noted on the dorsum of the foot. It measured 1.5cm by 1.5cm in diameter (see Figure 1 & 2). It was not painful with palpation and the patient had no limitations in ankle range of motion. Lower limb neurological examina-

tion was normal, and no parasthesia was present over the dorsum of the foot.

The patient was treated with four sessions over four weeks consisting of high frequency electroacupuncture, commencing ten days following the 200km bike ride. She ceased to ride for the duration of the treatment and thereafter. During the treatment, 4 needles were used (40mm length, 0.3mm diameter). A single needle was inserted into Stomach-36 (ST-36), which is located on the anterior aspect of the lower leg, distal to the anterior crest of the tibia within the tibialis anterior musculature. Another needle was inserted into Liver-3 (LR-3), which is located on the dorsum of the foot, between the first and second metatarsals. Two needles were then inserted into the cyst on opposite sides and stimulated for 15 minutes at 5Hz.

At 11 days following the final electroacupuncture treatment, the patient reported that the ganglion cyst was no longer present (see Figure 3).

Discussion

The vast majority of ganglion cysts are located on the dorsum of the wrist, but also occur within the palm of the hand, and the dorsum of the foot.^{5,12} Early literature suggests that 7-11% of ganglia within the body are located in the foot and ankle region. Ganglion cysts have been identified as the most common soft tissue tumours

in this region, accounting for 30-40% of total lesions.^{2,4,5,6} The majority of ganglion cysts within this region are located on the dorsum of the foot (48-66%), with a greater preponderance in females.^{2,5,6,7} There are conflicting opinions within the literature regarding age of onset, but appear to occur most commonly between the third and sixth decades.^{6,13} The pathogenesis of ganglion cysts is largely unknown. Hoefman in 1876 first proposed ganglia arose due to metaplasia of cells within or surrounding ligaments, joint capsules, and tendon sheaths with mucin production.¹⁴ Most authors suggest that they are the result of myxoid degeneration of connective tissue at sites of capsular stress.^{7,13} Pontious retrospectively analyzed 63 cases of ganglia at the foot and ankle, in which 33% of patients indicated a history of trauma to the area. In the case presented, constant friction within the cycling cleats and repeated trauma when initiating the unclipping mechanism may have resulted in capsular stress on the dorsolateral aspect of the foot, and is a suspected mechanism for the ganglion cyst formation.

Ganglion cysts often communicate with surrounding tissue. Rozburch and colleagues first described a lower extremity ganglion tissue classification, and identified 42% within the tendons, 36% within the joints, and 19% not traceable to a specific structure. Particularly within the tendons, the fibularis tertius and fibularis brevis are the most prevalent, with cases also noted at tibialis anterior, flexor digitorum longus, extensor digitorum longus, and tibialis posterior.^{7,13} When arising from within the joints, the tarsometatarsal, metatarsophalangeal and calcaneocuboid are common origin points.^{7,13} It is suggested that these areas are most subject to continuous physical stress preceding myxoid degeneration.

Few well conducted studies have evaluated the resolution of untreated ganglions. Studies which have reported 8-50% spontaneous resolution in adults are limited by study follow-up duration, loss of patient to follow-up, and poor study design.^{1,2,8,9} Dias and colleagues conducted a long term follow-up of 236 patients comparing surgical excision, aspiration with or without steroid injection, and no intervention. Within the no intervention group, 42% demonstrated spontaneous disappearance within the 6 year follow-up. The average timeline for resolution was not provided. Interestingly, patients who did not receive treatment were significantly less satisfied with care although no significant differences in pain, stiffness, or

weakness were noted between the groups.¹⁴ The data on spontaneous resolution of dorsal foot ganglia is guarded, as literature stems primarily from cases of ganglia on the dorsal wrist. Therefore, the natural history and spontaneous resolution rates of ganglion cysts within the dorsal foot require further investigation.

The treatment of a ganglion cyst is initially conservative. Recommendations for padding and change in footwear are often recommended.⁷ Non-surgical treatments include aspiration, steroid injection, or a combination of aspiration with steroid injection. The most popular conservative form of treatment is aspiration followed by various amounts and types of steroid injection.¹¹ This intervention is theorized to remove fluid from the cyst and promote scar formation to limit future communication with the degenerative joint capsules or tendons. A retrospective analysis of 40 patients undergoing conservative injections compared steroid, aspiration, and aspiration with steroid intervention. Pontious revealed 62.5% of patients to have reoccurrence of ganglion, with no significant difference between injections received. Aspiration in combination with steroid injection has not provided any greater effectiveness, which may be expected as there is no evidence to support the presence of inflammatory mediators within the acellular cyst.¹ Although reoccurrence rates are generally high, the risk during aspiration intervention remains low, including low risk of local skin infection and increased pain.¹⁴ Techniques designed to increase inflammation to enhance scarring and closing of the potential space were postulated early in the literature, such as sclerosing therapy.⁹ Currently, this intervention is not recommended due to potential damage within the communicating joints and tendons.

Following failed conservative treatment, surgical excision is often recommended for the painful cyst.⁷ Surgical excision of foot ganglion does appear to have significantly lower reoccurrence rates as compared to non-surgical interventions, cited as 11% and 63% respectively in a comparative study of 63 ganglions.² A retrospective analysis of surgical excision specifically targeted 54 ganglion cysts of the lower extremity. Satisfaction amongst patients receiving primary excision was high (83%), and a 10% recurrence rate was determined.¹³ The average time to reoccurrence was 1 year. This investigation did not compare surgical and non-surgical interventions. Following surgical excision, reoccurrence rates ranging

from 7-43% are cited in the literature, likely attributed to imperfect excision.^{2,10,11} Removal of the degenerative capsular or tendon tissue as well as the cyst requires thorough excision procedures. Surgeon experience also appears to impact the recurrence rates.¹⁴ Due to a tendency for short follow-up evaluation, the reoccurrence rate may indeed be higher than currently depicted in the literature. A randomized prospective trial is required to accurately compare the reoccurrence rates amongst non-surgical and surgical intervention.

Surgical excision remains the gold standard for the treatment of ganglion cysts. However, excision protocols come with greater risk (than aspiration therapy) such as increased pain and stiffness, infection, scarring, and permanent or temporary neurological damage. However, patients perception of cosmetic or malignancy concerns may explain increased satisfaction following surgical excision regardless of rate of pain resolution.^{1,8} At this time, treatment approaches for ganglion cysts of the foot provide variable and inconsistent results.

Acupuncture is defined by the World Health Organization (WHO) as “to puncture by needle”, however many application techniques exist, including that of electric or electroacupuncture. Generally speaking, acupuncture performed by a well-trained professional is safe and adverse reactions are minimal. The availability and practicality of acupuncture are also important factors, in which it is considered a simple and convenient intervention. The WHO also states that acupuncture could “serve as a valuable alternative treatment for many conditions in which modern conventional treatments are unsuccessful”. Within the WHO acupuncture review of controlled clinical trials; analgesia, protection against infection, and regulation of various physiological functions are considered therapeutic mechanisms.

The effectiveness of acupuncture analgesia is well established within controlled clinical trials. Electroacupuncture literature supports the analgesic effects and short-term decreases in pain threshold mediated via humoral factors.^{15,16} These analgesic effects appear to be greater than those following manual acupuncture.¹⁷ Following the continued demonstration of effectiveness, a standardized protocol including site, frequency, intensity, duration, and stimulation intervals can be recommended for the treatment of different disorders.

The treatment of ganglion cysts with electroacupunc-

ture is an innovative approach. To the knowledge of the authors, only a single case report investigating the utilization of electroacupuncture for the treatment of a ganglion cyst located on the dorsal wrist is available in the literature.¹⁸ In this report, a two-needle (50mm length, 0.3mm diameter) acupuncture technique was utilized. The first needle was inserted through the ganglion towards the wrist joint, and the second needle was inserted at Large Intestine-11 (LI-11), which is located over the lateral epicondyle of the elbow. Electrostimulation at a high frequency of 5Hz was then applied to the needles and intensity increased to maximum patient tolerance. The technique was repeated over four treatments in two weeks, and significantly reduced the size of the cyst. Patient follow-up at one year confirmed no reoccurrences or complaints, and complete resolution of the ganglion cyst. The authors credited the improvement to either “natural resolution, fluid leakage, or specific local effects of electroacupuncture”.¹⁸ The authors included potential explanations for the theoretical basis of acupuncture effectiveness to be attributed to acute local vasoconstriction and vasodilation from mediator release of bradykinin, acetylcholine and leukotrienes, or endorphin and corticosteroid release. In the case presented, it cannot be definitively concluded that ganglion cyst resolution was attributed to the acupuncture intervention or spontaneous resolution over time. However, the electroacupuncture intervention may have induced fluid leakage and corticosteroid release as cited in the previous case report.

Conclusions

Ganglions are the most common soft-tissue tumours found within the ankle and foot.⁶ The origin of ganglion cysts are highly theorized, and include pre-existing intra-articular joint pathology, joint stress leading to mucoid degeneration, and joint stress stimulating mucin secretion.¹

A wide variety of treatment options for ganglion cysts likely result from frequent presentation to medical practitioners and lack of fully satisfactory mode of treatment.¹ The ideal intervention strategy must be targeted to minimize symptoms and reoccurrence, while limiting associated risks. Following subsequent research, electroacupuncture may serve as a valuable and safe alternative treatment for ganglion cysts, a condition which demonstrates variable effectiveness of conventional treatment methods.

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