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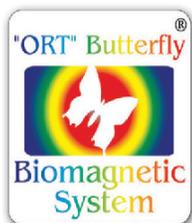
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Komentarz ten jest moim osobistym świadectwem zadowolenia z produktów biomagnetycznych „Ort Butterfly”, których używam od 20. lat! Zastanawiam się, zwłaszcza nad fenomenem poduszki (określenie nie jest przypadkowe) zwyczajnie; nie wyobrażam sobie snu i wypoczynku bez magnetycznej „Ort Butterfly” – pod głową! Jej ergonomiczny, przyjazny dla głowy i szyi kształt sprawia, że wysypiam się „po królewsku”. Zabieram ją również ze sobą w bliższe i dalsze podróże! Czyż gdyby była to zwyczajna poduszka, fundowałbym sobie dodatkowy bagaż? Wychwalam więc ją od zarania, polecam i rekomenduję, bo jest tego warta! Bez niej nie wyobrażam sobie prawdziwie relaksacyjnego snu i błogiego, kojącego wypoczynku! Dziękuję, że ją Pani stworzyła!

J. Szew. Działdowo (maj 2020)

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Physiotherapeutic procedure in a patient after the first artificial heart implantation in Poland – SynCardia Total Artificial Heart (TAH)



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Evaluation of the effectiveness of the treatment of selected conservative methods of hallux rigidus and hallux limitus with consideration of orthopedic supplies – review of the literature

Ocena skuteczności leczenia wybranych metod zachowawczych palucha sztywnego i ograniczonego z uwzględnieniem zaopatrzenia ortopedycznego – przegląd literatury

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Abstract

Introduction. Hallux rigidus and hallux limitus are characterized by limited range of motion of the first metatarsophalangeal joint in the sagittal plane.

Aim of the study. The purpose of this study was to present the possibilities and evaluate the effectiveness of conservative treatment of hallux rigidus and limitus with consideration of orthopedic supplies based on the available literature.

Material and methods. The available literature was analyzed based on English-language databases PubMed, Scopus, ScienceDirect, Medline and others, using the Google Scholar search engine. Twenty-one articles were analyzed out of 51 retrieved by the above method. Publications no older than 21 years were used as search criteria using the following keywords: hallux rigidus, hallux limitus, orthopedic supplies, physiotherapy, orthopedic insoles, surgical treatment, conservative treatment.

Results. After analyzing the papers, it was not possible to find a clear answer to determine which conservative treatment of hallux rigidus is the most effective, while each of the mentioned methods brings benefits to the patient.

Conclusions. Contemporary studies indicate that conservative treatment methods for hallux rigidus and limitus are effective. Both orthopedic insoles, drug treatment and physiotherapy provide relief from pain. When a patient is referred for surgery, the doctor has a choice of different treatment methods depending on the stage of the hallux rigidus.

Key words:

hallux rigidus, hallux limitus, conservative treatment, surgical treatment

Streszczenie

Wstęp. Paluch sztywny (ang. *hallux rigidus*) i paluch ograniczony (ang. *hallux limitus*) charakteryzuje się ograniczeniem zakresu ruchomości pierwszego stawu śródstopno-paliczkowego w płaszczyźnie strzałkowej.

Cel pracy. Celem pracy było przedstawienie możliwości oraz ocena skuteczności leczenia zachowawczego palucha sztywnego i ograniczonego z uwzględnieniem zaopatrzenia ortopedycznego na podstawie dostępnej literatury.

Materiał i metody. Przeanalizowana została dostępna literatura w oparciu o anglojęzyczne bazy danych PubMed, Scopus, ScienceDirect, Medline oraz inne, wykorzystując wyszukiwarkę Google Scholar. Analizie poddano 21 artykułów spośród 51 wyszukanych powyższą metodą. Jako kryterium wyszukiwania przyjęto publikacje nie starsze niż 21 lat, używając następujących słów kluczowych: paluch sztywny, paluch ograniczony, zaopatrzenie ortopedyczne, fizjoterapia, wkładki ortopedyczne, leczenie chirurgiczne, leczenie zachowawcze.

Wyniki. Po przeanalizowaniu prac nie udało się znaleźć jednoznacznej odpowiedzi pozwalającej stwierdzić, która z metod leczenia zachowawczego palucha sztywnego jest najskuteczniejsza, natomiast każda z wymienionych przynosi korzyści dla pacjenta.

Wnioski. Współczesne badania wskazują, że metody leczenia zachowawczego palucha sztywnego i ograniczonego są skuteczne. Zarówno wkładki ortopedyczne, leczenie farmakologiczne i fizjoterapia przynoszą ulgę w dolegliwościach bólowych. W przypadku skierowania pacjenta na zabieg chirurgiczny lekarz ma do wyboru różne metody leczenia zależne od stadium palucha sztywnego.

Słowa kluczowe:

paluch sztywny, paluch ograniczony, leczenie zachowawcze, leczenie chirurgiczne

Introduction

Hallux rigidus is characterized by a restriction of the range of motion of the first metatarsophalangeal joint in the sagittal plane, the cause being the progressive formation of osteophytes [1]. Osteophytes on the dorsal side contribute to the narrowing of the joint crevice and lead to severe pain in the foot area. This process leads to a change in gait mechanics and a significant reduction in the patients' quality of life [2, 3]. The entity affects 1 in 40 people over the age of 50, and women are more often affected [4]. The etiology of hallux rigidus is not clarified in the literature. A history of trauma is considered the most common cause of unilateral hallux rigidus. In addition, frequent repeated microtrauma or metabolic and inflammatory causes such as rheumatoid arthritis, gout, and seronegative arthropathy can cause degeneration of the joint [5]. Physical examination of the patient reveals painful swelling of the MTP (metatarsophalangeal) joint with limitation of dorsiflexion. The patient typically reports stiffness and pain, which worsens when performing MTP dorsiflexion, such as walking up stairs or running [6]. Discomfort during walking is greatest when the heel is lifted and the toes are detached. Pain in plantar flexion is due to stretching of the long toe extensor over the dorsal osteophytes. Patients may also exhibit hypertrophy in the first interphalangeal joint as a reaction to limited dorsal flexion of the first MTP. Additionally, numbness and paresthesias may occur due to compression of the dorsomedial cutaneous nerve between the dorsal osteophytes and the footwear. Normal MTP motion consists of about 75° of dorsiflexion and 35° of plantar flexion. Patients with hallux rigidus have a reduced range of motion, with noticeable differences between the healthy and affected limb. Evaluation of the severity of hallux rigidus is based on X-ray examination. It should be performed in anteroposterior (AP), oblique and lateral standing positions. In the first of the above-mentioned variants, reduced joint space with flattening, widening of the head of the metatarsal bone and with subchondral sclerotization can be assessed. The lateral projection shows dorsal osteophytes over the base of the proximal phalanx and metatarsal head, along with narrowing of the joint space. Computed tomography and MRI are not necessary for evaluation [7]. When conservative treatment fails to relieve pain, surgical correction of a hallux rigidus is necessary. Surgical treatment can be divided into joint-sparing and joint-sacrificing. Cheilectomy is an example of a joint-sparing technique that has proven very effective in the early stages of hallux rigidus. For the advanced stage, the gold standard is MTP arthrodesis. A hallux limitus, unlike a hallux rigidus, which is defined as pain associated with arthritis, is a functional pain. The cause of the pain is soft tissue compression among other things: contracture of the gastrocnemius muscle or an elevated and long first metatarsal bone. When the foot in a patient with a hallux limitus is examined in plantar flexion, there is usually increased dorsiflexion of the toe because the gastrocnemius muscle is relaxed. It is worth bearing in mind that there may be cases of overlapping features of both conditions. To correct a hallux

limitus, it is possible to perform a recession of the gastrocnemius muscle if it is compressed, or a shortening or plantar flexion osteotomy of the metatarsal head with or without recession of the gastrocnemius muscle [8].

Aim of the study

The aim of this study was to present the possibilities and evaluate the effectiveness of conservative treatment of stiff and hallux limitus with consideration of orthopedic supplies based on the available literature.

Material and methods

The available literature was analyzed based on English-language databases PubMed, Scopus, ScienceDirect, Medline and others, using the Google Scholar search engine. We analyzed 21 articles out of 51 retrieved by the above method. Publications no older than 21 years were used as search criteria using the following keywords: hallux rigidus, hallux limitus, orthopedic supplies, physiotherapy, orthopedic insoles, surgical treatment.

Results

After analyzing the papers, it was not possible to find a clear answer to determine which conservative treatment method for hallux rigidus is the most effective. On the other hand, it is worth noting that in the case of the initial stage of hallux rigidus, conservative treatment brings the expected results and surgical treatment should be considered when the patient continues to experience pain despite non-surgical treatment.

Discussion

According to Baumhauer, conservative treatment of hallux rigidus is based on the use of orthopedic supplies. orthopedic supplies are designed to limit movement in the first MTP joint, this provides cushioning and pressure distribution on the ground. The carbon fiber insole provides coverage for the entire foot, while the Morton extension does not cover the MTP joint of the little toe, which is beneficial for young and active patients. The carbon fiber insole is covered by a soft fabric insole, which provides comfort and cushioning. Pain symptoms are less when patients wear shoes with a rigid sole, while they worsen when patients wear sneakers or sandals, whose soles are thin and flexible. Therefore, to prevent compression of dorsal osteophytes, shoes with high and wide toes should be used, and a rocker sole can also be used [7]. Non-operative treatment for many patients can be effective. In a retrospective review of 772 patients, Grady et al. investigated that 47% of patients improve after the use of orthopedic supplies, but they are generally not well tolerated and the withdrawal rate is high [9]. Welsh et al. conducted an observational study in 32 patients who were treated with an insole orthosis (X-line®); the follow-up lasted 24 weeks. The results of this study suggest that a commonly used orthosis design can provide a reduction in mechanically induced pain in the first MTP joint to a level that is considered an adequate analgesic response to treatment. [10]. Steroid and hyaluronic acid injections into the first MTP joint may provide

temporary relief. Pons et al. studied that there is an improvement in pain and function after three months of steroid and hyaluronic acid injections. The group taking hyaluronic acid showed improvement in walking pain after 28 and 56 days [11]. In the case of a hallux limitus, Funga et al. conducted a study to evaluate the applied forefoot orthosis on foot function, pain and pressure distribution on the sole. Participants were advised to wear the orthosis with athletic shoes for 4 weeks. The results that were obtained were 94.7% experienced an improvement in foot function and pain, with 63.2% reporting complete resolution of pain at the end of the 4-week study. The foot function index improved significantly from 43.0% at the beginning of the study to 11.0% after the orthosis was applied ($p < 0.001$). Likewise, pain scores on a visual analog scale decreased from 4.87% to 1.18% ($p < 0.001$). This method appears to be an attractive solution for patients who are reluctant, ineligible for surgery, or dissatisfied with existing treatment options [12]. Tom Reilly et al. conducted a clinically based study to evaluate and present techniques for self-strengthening of the foot and joint mobilization in combination with extracorporeal shock wave. The following effects can be seen in subjects who performed the exercises presented by the authors. First, potential results include a reduction in the progression of angulation of the hallux valgus, there was an improvement in the straightening of the MTP joint, and there was a reduction in pain during weight-bearing exercises. Because there was less pain in the MTP joint and the range of motion improved, a better gait pattern was obtained, reducing unnecessary stress on other parts of the foot. According to the authors, the expected minimal complications after manual and therapeutic exercises should also be taken into account. Patients may complain of fatigue and muscle soreness after exercise. When lifting the heel as the patient approaches full range of motion, pain may occur. In some cases, it is possible to experience arthritic irritation due to loading of the first MTP joint. Manual therapy, especially stretching of the joint, is well tolerated by patients. As for the use of shock wave, it can be introduced into the treatment protocol, as this technique increases blood flow to the joint and helps reduce pain. During its use, it is not recommended to take anti-inflammatory agents due to the theory that inducing inflammation can partially explain the mechanism of shock wave therapy. The authors used topical application of ice and paracetamol to relieve pain [13]. Seda Cira et al. conducted a study that compared the effectiveness of mud and paraffin therapy as an adjunct to exercises performed at home by patients with a hallux rigidus. After analyzing the data, they reached the following conclusions, namely, in the final analysis, significant improvements were obtained for all parameters at the end of the treatment and during follow-up and the treatment proved highly effective. No significant differences were observed between exercise therapy and the use of mud or paraffin. These methods have similar effects on the treatment of hallux rigidus. However, a controlled trial is needed to confirm the results [14]. Braile et al. carried out treatment with adipose tissue-derived mesenchymal stem cells in a 50-year-old man with a painful grade II hallux rigidus. This method was used because

previous conservative treatment (non-steroidal anti-inflammatory drugs, hyaluronic acid injections) had not been successful. The conclusion was that injection of the aforementioned cells improved the patient's symptoms and function after 9 months of follow-up [15]. A study by Hadianfard et al. that aimed to compare the effectiveness of corticosteroid injection and prolotherapy for patients with a hallux rigidus proved that both methods were equally effective. Improvement after 8 weeks was determined by the Visual Analogue Scale (VAS) test and the Manchester-Oxford Foot Questionnaire (MOXFQ) [16]. A case study by Karabicak et al. examined how kinesiotaping combined with regular exercise aids in the treatment of a hallux rigidus. The level of pain the patient experienced decreased significantly immediately after kinesiotaping. The patient was taped five times during the 15-day therapy. The patient's total change on the VAS scale was measured as a decrease of 4.4 at rest and 5.9 in activity. In addition, the therapy provided improved range of motion and strength [17]. In a study conducted, Teoh et al. showed that after minimally invasive dorsal hallux rigidus cheilectomy (98 feet), the mean VAS score improved from 8.0 before surgery to 3 after surgery. The mean MOXFQ index score decreased from 58.6 before surgery to 30.5 after surgery. It took 5.3 weeks for the swelling to subside. There were also 2 wound infections and 2 delayed healings. There were transient nerve paresthesias in 2 patients and permanent numbness in the dorsomedial aspect of the cutaneous nerve in other 2 patients. 12 patients underwent reoperation, 7 of them had arthrodesis of the metatarsophalangeal joint and 4 had repeat cheilectomy, 1 open bone removal [18]. Hickey et al. conducted a study on isolated arthroscopic cheilectomy. They concluded that the use of a high-torque, low-speed drill and arthroscopic wound debridement resulted in high patient satisfaction and low complication rates during the follow-up period. The average follow-up period was 4.69 years [19]. According to Alvarez et al, dorsal cheilectomy with arthroscopy of the metatarsophalangeal joint of the hallux rigidus in an early stage (grade 1,2 and selected grade 3), can reduce postoperative pain, stiffness and scar formation. The advantage of the arthroscopic technique over open techniques is that it allows more targeted cleaning of the cartilaginous surface, removing loose bony debris and thickened synovial membrane, which can play a role as pain generators after surgery. Patients who have undergone dorsal cheilectomy using the arthroscopic technique can bear weight in a hard sole shoe without restrictions on MTP flexion and extension of the toe [20]. Endoprosthesis and arthrodesis of the first metatarsophalangeal joint are the main surgical treatment options for advanced hallux rigidus. A meta-analysis done by Hwan Park et al. showed that endoprosthesis and arthrodesis of the first metatarsophalangeal joint led to similar clinical outcomes relating to patient satisfaction, reoperation rates and complications. In contrast, pain was significantly less after arthrodesis. Confirmation of the aforementioned conclusions requires further studies of high methodological quality [21].

Conclusions

Modern research indicates that conservative treatments for hallux rigidus and limitus are effective. Both orthopedic

supplies, drug treatment and physiotherapy provide relief from pain. When a patient is referred for surgery, the doctor has a choice of different treatment methods depending on the stage of the hallux rigidus.

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