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The treatability of "growing pains" in children - a mini review

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Abstract

Aim: Growing pains in children is not an uncommon condition. Relative local overuse, reduction of bone strength, reduction of pain threshold, hypovitaminosis D and abnormal foot postures have all been found to be associated with the condition. Yet the etiology of the condition has not been completely determined. At present, there is no standard treatment protocol of the condition. As the growing pains in children tend to disappear with age, many health care practitioners opt not to treat the condition or dismiss the patient on the ground that he or she would get better with time. The present mini-review aims at reviewing the current treatment approaches and recommendation.

Methods and materials: A manual search in the PubMed has been made, using the keywords growing pains in children, treatment, orthoses and vitamin D, for treatments of growing pains in children.

Results: A search of literature reveals a well-implemented muscle stretching program as the first line treatment. In spite of the rather equivocal findings from the numerous studies regarding the efficacy of foot orthoses, their success in reducing pain and symptoms related to growing pains cannot be denied. The prescription of foot orthotics is clinically advocated. Also, supplementation of vitamin D3 is suggested for children with hypovitaminosis D, as it has been found that the majority of children with growing pains have a low serum 25-hydroxyvitamin D level.

Conclusions: Children with growing pains should be assessed for their serum vitamin D level and their foot postures. Supplementation of vitamin D3 and foot orthoses may improve the signs and symptoms of patients, when indicated.

Introduction

Growing pains in children is not uncommon. The prevalence varies with studies, ranging from 2.6% to 49.4% [1,2]. It is estimated that as many as 15% of school-age children experience episodic limb pains [3]. The variation in prevalence is largely due to the differences of sampling methods, ill-defined general criteria for inclusion and exclusion [1] and whether the ascertainment was by questionnaires or by questioning children or their parents [4]. In a validated community-wide Australian study conducted in 2008, the prevalence rate of growing pains is 37% in children aged between four to six years [5]. In spite of frequent presentation in pediatric clinics, growing pains remains mysteriously understood or misunderstood in terms of etiology, pathogenesis and diagnosis [1,6,7].

Despite over nearly two century of reported history and extensive discussion, growing pains is still ineffectively managed [1,8,9]. Many health care professionals regard growing pains in children as untreatable or that it is unnecessary to treat, as patients would eventually outgrow the pains.

The objective of this article is to review the very common views of growing pains in children relating to the passive approach in treatment from three perspectives:

1. normal accompaniment with natural child growth
2. self-limiting without any detrimental effects
3. unavailability of effective management

The literature is also reviewed to elucidate the current management of the condition in children.

Methods and material

A manual search in PubMed was conducted, using the key words, growing pain in children, treatment, foot orthoses and vitamin D. Also, the reference of the relevant papers was hand-searched for papers, in relation to etiology, pathogenesis and treatment of growing pains in children. The papers were then reviewed for effective treatments.

Results

The search in PubMed, using the keywords growing pains in children and treatment on the 15th May 2016 revealed 449 papers. Manual review of the papers showed 27 papers in English and 6 in foreign languages. Using the keywords of growing pains in children and orthoses and growing pains in children and vitamin D yielded 5 and 12 references, of which only three and four were relevant respectively.

Chiropractic treatment [10], stretching exercises [9], supplementation

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of vitamin D3 [11-13] and selenium [14] and foot orthoses [15-23] have all been reported to provide a varying degree of treatment success. The reference on oral selenium is in Swedish and we cannot thus comment [14]. A case series showed that chiropractic treatment is effective in managing the symptoms related to growing pains [10]. It involves a 2¾-year girl and a 3½-year boy with complaints of "growing pains" that awaken them at night for several months. Following a trial of spinal manipulative therapy (SMT) (i.e. 3 visits scheduled over a 3-week period for the girl and 4 visits over a period of 14 weeks for the boy), the children's symptoms are resolved. As only two cases have been reported so far, the evidence supporting its use in the condition is thus low.

Discussion

Nature of "Growing Pains"

Growing pains, a well-recognized term since 1823 [24], is used to describe episodic but recursive and unexplainable nocturnal (or late evening) musculoskeletal pains of non-articular origin in the lower extremities of pediatric patients [25]. The condition chiefly affects young children or adolescents between the ages of 3 to 12 years [2,3] with the peak at 6 years [6]. Growing pains are not the commonest at the period of the most rapid growth [25]. Indeed, the commoner sites of growing pains do not tally with the sites of maximal growth [6,25]. The symptoms related to growing pains are almost bilateral [8] and are largely localized at the anterior ankles, posterior heels, thighs, calves, shins, popliteal fossae or around patellae [7,8].

There is no evidence in the literature that support the notion that growing pains are statistically associated with child's rapid growth as originally thought [6,8]. The term of "growing pains" is imprecise and somewhat misleading as the pain may not correlate with the natural growth of growing children. Relative local overuse and reduction of bone strength and pain threshold have been implemented as causes of the condition [11]. Also, abnormal foot postures [26,27] and hypovitaminosis D [11-13] have been found associated with the growing pains in children.

It is of utmost important that "growing pains in children" should not be regarded as ordinary non-specific leg pains. Growing pains attacks and its associated symptoms should be appreciated and should not be left unattended by default.

Clinical presentation

Growing pains is clinically self-limiting and resolves by itself at the end of childhood. It is intermittent with pain-free periods from weeks to months [25]. Generally speaking, the pains are of mild intensity and short duration, lasting from minutes to hour. The pains generally subside gradually within 30-minutes [28,29]. The episode usually is nocturnal or occurs late in the day or evening. In the mornings and during the pain-free intervals, the children exhibit normal daily activities as if nothing happens at night [6-9].

Growing pains, however, could present in a form of severe pain. The children can be awakened by pain at night. In a study series, 43% of children have attack at least once a week; 52% of them require medications to relieve pain [29]. The disastrous pain might occur daily for more than six months [7]. Despite the benign prognosis, frequent episodes exert significant impact on the child including chronic medications, absences from school, reduced levels of daytime activities, anxiety and emotional or family disturbances [4,25,28]. The clinical considerations of "growing pains" are thus much more than the pain alone.

For the sake of the whole family in terms of quality of life and psychological wellness [28], it is worthwhile to search for possible effective interventions either to manage the episodic attacks prophylactically or, at least, to alleviate their profound consequences.

Proposed management

Numerous modalities have been devised in medical literature to manage growing pains and/or ameliorate its associated symptoms. Analgesics such as paracetamol, acetaminophen and non-steroidal anti-inflammatory drugs (NSAID) are commonly suggested [8]. Leg rubs or massage and hot compress are widely advocated and frequently practiced by parents [1,28]. However, their efficacy is inconsistent and debatable [1]. In addition, the publication is replete with dietetic application of calcium, magnesium, selenium and vitamin C and D [8,11-14]. Except for vitamin D, the use of nutritional supplements is based on reiterated opinions which are insufficiently validated by currently available scientific evidence.

Vitamin D supplementation

To date, several studies have concluded a high prevalence of vitamin D deficiency or insufficiency in children with nonspecific lower-extremity pains [11-13]. Severe vitamin D deficiency is defined as serum levels of 25-OH-D <10.0 ng/mL and vitamin D deficiency as <20.0 ng/mL [30]. A prevalence study [11] conducted in Korea includes 140 children (87 boys, 53 girls) with average age 5.2 years (range 2-15) presenting with nonspecific (*i.e.,* without valid causes) lower extremity pains. Serum 25-(OH)-D levels are found <10 ng/mL in 5.7% of children, 10 to <20 ng/mL in 51.4%, 20 to <30 ng/mL in 37.9%, and ≥30 ng/mL in only 5.0%. It indicates nearly 60% of children with growing pains are in a state of vitamin D deficiency. In another study including 120 children with growing pains, vitamin D deficiency is noted in 104 (*i.e.,* 86.6%) [12]. The findings reveal a positive association between vitamin D deficiency and growing pains in children and adolescents.

Muscle stretching is evidenced by one randomized controlled trial (RCT) for the treatment of children with growing pains [9]. In the treatment group, parents are taught a muscle stretching program for quadriceps, hamstrings and gastro-soleal groups of muscles. All stretches are practised twice a day in the morning and evening for 10-minutes per set. In the control group, reassurance, leg-rubs and acetyl-salicylic acid are delivered. The RCT reveals a statistically significant difference between the treatment (n=18) and control (n=16) groups of children aged 5 to 14 years. However, the findings are weakened by dual reasons. Firstly, the sampling sizes are small with no support by statistical power calculation. Secondly, examiners are non-blinded and the results might possibly be biased.

Foot orthotic intervention

Foot orthoses is an in-shoe orthopedic mechanical device. It has been extensively debated in literature for managing pediatric disorders through controlling the foot structure of the children [31-34]. The essence of foot orthoses is the emphasis of the importance of dynamic inter-relationships of foot joints during gait [15,23,35-37]. The biomechanical principles in which foot orthoses work remain contentious [38-41]. However, previous systematic reviews revealed favourable therapeutic outcomes when foot orthoses are prescribed to manage abnormal foot pronation and its associated pathological conditions [16-18,36] with high levels of efficacy [19,20] and patient's satisfaction [21].

A number of studies have concluded that the use of foot orthoses

of various designs and approaches are beneficial for children with excessively pronated foot posture [22,42-46]. Few are specifically focused on growing pains [47,48]. The drawback of these works includes statistical insufficiency, non-randomized study design, small sample sizes, no control group and inference relied on clinical observation or impression.

Recently, however, several meticulously designed studies [7,26,27] have been published. All reports the benefits of using foot orthoses to control excessively pronated foot posture in children with growing pains. A series of A-B-A-B type of single-case experimental designs (SCEDs) in clinical practice is conducted to evaluate the effects of custom-molded foot orthoses to correct over-pronation on growing pains amelioration [26]. The strength of the study is the ability of directly highlight the causality between orthotic treatment and symptoms related to growing pains without the necessity of large sample sizes. Foot orthoses is clinically proven to be efficacious in reducing the frequency and severity of growing pains in children aged 7 to 10 years with over-pronated foot posture [26].

Another robust investigation attempts to further explore the etiological relationship between poor foot structural posture and the presence of growing pains [27]. In this randomized control-matched cohort trial, the navicular heights of young children aged 4-6 years with and without growing pains are found to be significantly different at 1.33mm. The group with growing pains has a larger navicular drop with reference to subtalar joint neutral position when weight-bearing. However, the correlation of foot posture and growing pains is weakened argumentatively by the clinical detectability of irrelevant small difference [1,7].

In a recent study, twenty children with average age of 9.1 ± 2.3 years complaining of growing pains have been prescribed custom-molded foot orthoses to control over-pronation of the foot [7]. The average calcaneal pitch angles of the left and right measured on the x-ray are 16.4° and 17.1° respectively. The correction angle of foot orthoses is determined according to the angular measurement of the resting calcaneal stance phase (RCSP). No child has a normal RCSP (*i.e.,* ≤ 2°). The respective averaged RCSP of the left and right are -6.4° and -8.1°. Pain frequency is decreased from 12.4 ± 10.6 per month before treatment to 8.9 ± 11.0 per month after 1-month treatment and 5.4 ± 8.5 after 3-months treatment. Degree of pain in the most complained sites was evaluated by using visual analog scale (VAS). They are 6.3 ± 2.0, 3.6 ± 2.5 and 2.4 ± 2.0 pre-treatment, 1-month post-treatment and 3-months post-treatment respectively. The findings show statistically significant improvements in pain degree and frequency after one and three months of treatment [7]. In other words, foot orthoses effectively control growing pains of children with over-pronated foot structure.

In short, current published studies with varying degrees of success lend a support the anatomical theory of etiology of growing pains pioneered by Hawksley [49] over 60 years ago. Further studies are encouraged to determine the manner in which foot orthoses works.

Conclusions

Growing pains should not be regarded as a natural phenomenon accompanying natural growth. Despite the fact that the condition is benign in nature and patients generally outgrow their pain, growing pains should be treated, as the condition not only cause pain on the patients but also raise cause concern on the parents. Review of the literature has shown that growing pains in children are treatable. Regular muscle stretching of lower legs is found to be the first-line treatment. Supplementation of vitamin D3 and/or foot orthoses are reckoned as potential modalities for treatment of growing pains in children when indicated. Therefore, children with growing pains should be assessed for their serum vitamin D level and their foot structural postures.

Conflict of interest

None of the authors declare any conflict of interest.

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