Hallux Valgus; Have We Figured It Out? A Case Report And Literature Review

M U Christmas

Citation

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Abstract

A thirty-two-year-old female presented to the Orthopaedic outpatient department with a two year history of worsening pain and deformity to the right great toe which was initially being aggravated by her recreational activities of jogging and hiking but was now being aggravated by simply walking. She was assessed as having symptomatic Hallux valgus of the right great toe. She was offered surgical correction and a Mitchell's osteotomy was performed. At three months follow up she was pain-free and functioning well in her regular shoe wear.

INTRODUCTION

Hallux valgus, commonly called the bunion deformity, is the most common deformity of the first metatarsophalangeal joint. This deformity occurs in women approximately ten times more frequently than in men and is also significantly higher in persons who wear shoes than in those who do not (1). Can an assumption therefore be made that wearing tight, pointed-toed shoes that women often wear causes hallux valgus deformity? Hallux valgus deformity occurs even in unshod populations (2). In addition, many individuals who wear high-fashion footwear with short box or narrow points never develop this deformity of the first toe. It appears then, that the issue is more complex than simply a problem of footwear but rather one of multifactorial origin. Years of research have attempted to identify the possible causes responsible for bunion deformity, however there are still numerous procedures being described in an effort to address this single toe pathology. A case is presented and discussed with emphasis being placed on the possible etiologies and associated factors of this great toe deformity.

CASE REPORT

A thirty-two year old female presented to the Orthopaedic outpatient department with a two year history of worsening pain and deformity to the right great toe which was initially being aggravated by her recreational activities of jogging and hiking but was now being aggravated by simply walking. The pain she described was primarily medial eminence pain of the right great toe and admitted that she was unable to wear high-heeled pointed-toed shoes. She now wore soft sneakers for comfort while at work. She gave no history of trauma and had no family history of foot deformities. On examination, a mild hallux valgus deformity of both feet was observed, however, the deformity of the right foot was more marked than that of the left foot. The overall posture of the foot appeared normal with no lesser toe deformities. She demonstrated a mild antalgic gait with left lower limb preference but there was no evidence of abnormal ground contact or early heel rise. In the seated position, the range of motion of the ankle, subtalar, transverse tarsal, and metatarsophalangeal joints was all within normal limits. No abnormal callus formation was noted beneath the metatarsal head or the medial aspect of the great toe. The first metatarsocuneiform joint did not demonstrate any hypermobility. She was assessed as having symptomatic Hallux valgus of the right great toe and was investigated with plain radiographs (figure 1). She was offered surgical correction and a Mitchell's osteotomy was performed (figure 2). The alignment was maintained with Kirschner wires (figure 3). She was followed up in the outpatient department where the wires were removed at six week and serial x-rays demonstrated union of osteotomy. She was referred to physiotherapy for range of motion exercises. At three months follow up she was pain-free and functioning well in her regular shoe wear. Her range of motion at the first metarsophalangeal joint was forty degrees of plantar flexion and sixty-eight degrees of dorsiflexion. At six months, she was back to fast walking and light jogging three times weekly.

Figure 1

Clinical photgraph and anteroposterior radiograph showing Hallux valgus: Hallux valgus angle: 30° (blue lines), Intermetatarsal angle: 16° (blue and red lines)

Figure 2

Clinical photograph (intraoperative) showing correction of Hallux valgus with Mitchell’s osteotomy and fixation with cross Kirschner wires

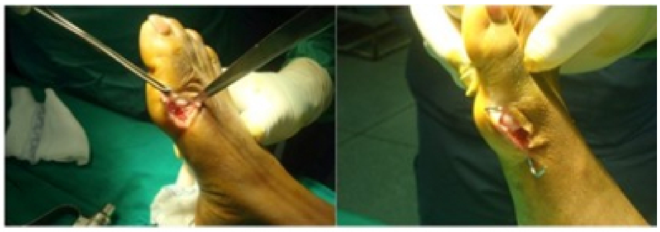
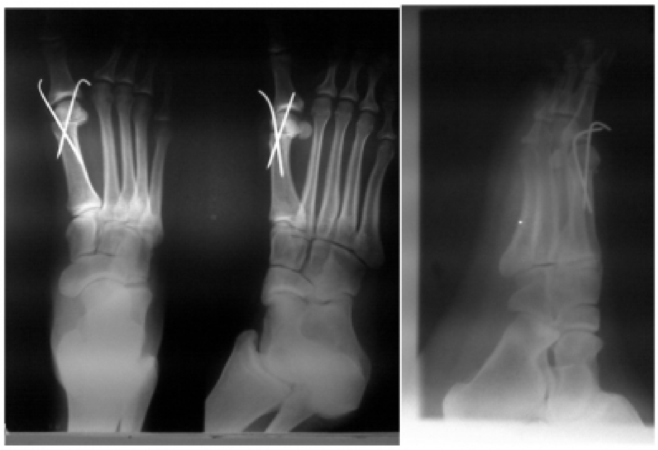


Figure 3

Plain radiographs (AP lateral and Oblique) showing K-wire fixation after corrective Mitchell's osteotomy



DISCUSSION

Hallux valgus (HV) is a common foot deformity seen in orthopaedic surgical practice and much is written in a diverse literature about its pathoanatomy (3-5). Despite frequent mention of such a common pathology, relatively few studies are available, much of which consists of empirical data that addresses the incidence and prevalence of this deformity. A precise estimate of the prevalence of HV is therefore difficult to ascertain. In a systemic review and meta-analysis performed by Nix et al, they found a prevalence of 23% in adults aged 18-65 years and 35.7% in the elderly (6). They also demonstrated a consistently higher prevalence among females, 30%, when compared to males, 13%. The authors concluded that HV prevalence is clearly higher amongst females and increased with age (6). Similarly, Gould et al found that the incidence increased with age, with rates of 3% in persons aged 15-30 years, 9% in persons aged 31-60 years, and 16% in those older than 60 years (7). They also reported a higher incidence in females versus males, with a ratio of 2:1 to 4:1 (7). Whether this finding indicates a truly increased incidence in the female population or whether it reflects differences in footwear remains unclear. There is evidence to show changes in posture, joint kinematics, and plantar pressure as age increases and these are associated with a greater risk of hallux valgus (8). However, age as a single factor has been a poor predictor of hallux valgus angle (9).

Shoes have been an important part of dress from the beginning of civilization, primarily for the role of protection of the foot. Francesca et al in a review article of high-fashion footwear, noted that footwear, over time, has evolved from the soft restriction-free shoes to more rigid high-fashion footwear in the Western population. They also noted an increase in foot deformities with this change in footwear over time (10). In addition, a man's shoe conforms to the outer aspects of the foot and does not compress or constrict the foot therefore resulting in a much lower prevalence in males. The authors felt that restrictive shoe wear could be responsible for foot deformities over decades in the Western population (10). Corrigan et al in a study of sixty feet in thirty patients found that there was a direct association between increased first metatarsal loading and a valgus moment (11). In addition, Phillips et al performed a pilot study to determine whether relocation of the heel under the counter of a fashion high-heeled pump could change the degree of pronation of the foot during the gait cycle (12). The authors suggested that one of the reasons that high heels may contribute to the formation of hallux valgus is that there is pronation during propulsion when wearing them. They showed that foot stability and by extension foot function were influenced by the position of the centre of the heel (12). High heels therefore are commonly blamed for hallux valgus. While foot deformities have been seen in unshod populations, the prevalence is significantly less (2). The causal relationship between rigid, pointed-toe, high-heeled, high fashion shoe wear and Hallux valgus deformity however has been difficult to prove. The prevalence of hallux valgus in women who wear shoes with a narrow toe-box or a high heel does not approach 100%. The uncertainty still remains as to whether shoe wear is a primary extrinsic causal factor or a secondary aggravating factor for progression of this pre-existing foot deformity.

Dancing and excessive walking and weight bearing have been implicated in the development of hallux valgus. In ballet, for instance, maintaining the ‘‘en pointe’’ stance forces the foot into abduction and increases the relative valgus force on the first metatarsophalangeal joint (MTPJ). In addition, forcing a turnout leads to pronation of the foot with abduction of the hallux and an increase valgus force on the joint (13). Although dancers put a great deal of stress through the first MTPJ, suggesting that repetitive trauma may give rise to this great toe deformity, there is still no proven link that dancing causes bunions (13, 14). There are differences in metatarsal loading of the hallux in person of varying weights however, no clear link has been established between hallux valgus and obesity. Frey et al studied 1411 normal and overweight individuals and reported that there was an increased likelihood of hallux valgus if the individuals were in fact of normal weight (15). Menz et al also found that individuals with hallux valgus had a lower Body Mass Index (BMI) (16). Nguyen et al studied six hundred patients with hallux valgus and found that a higher BMI was inversely associated with presence of hallux valgus in women with the strongest inverse association observed in those with BMI $\geq$ 30.0 or more compared to those with normal BMI. In addition, the authors found that among men, those with a BMI between 25.0 and 29.9 had an increased likelihood of developing hallux valgus compared to those with a normal BMI. The authors attributed these findings to overweight or obese women being more likely to wear less constrictive footwear (17).

There is evidence to suggest that valgus forces increase at the first MTPJ with a tight Achilles tendon postulating that a tight Achilles tendon can predispose to hallux valgus (18-20). However other studies have found no association and there is no evidence that failure to address Achilles tendon tightness results in a higher recurrence of hallux valgus (21, 22). Intrinsic etiology such as genetic predisposition has been implicated in the etiology of bunion deformity of the great toe. Pique-Vidal et al constructed three-generation pedigree charts from 350 patients with hallux valgus and found that approximately 90% of people with hallux valgus reported a positive family history suggesting that the condition is compatible with autosomal dominant inheritance with partial penetrance (23). Similarly Coughlin et al found that Eighty-six (83%) of 103 patients with hallux valgus had a positive family history for hallux valgus deformities (24).

Several potential intrinsic factors such as metatarsal primus varus, metatarsal length, metatarsal articular morphology, and extrinsic factors such as pes planus, planovalgus have all been evaluated for relationships with hallux valgus deformity (25-30). Although some authors have found associations, No causal relationships have been established (27). Some associations are still poorly understood and therefore it remains unclear whether these factors caused or have been caused by the valgus deformity. Other contributing functional factors such as first ray hypermobility and insufficiency of the static and dynamic stabilizers of the first metatarsophalangeal joint have been written about and once again, there was an inability to demonstrate which came first (31-33). At present, the most that can inferred from the literature, is that a pes planus deformity changes the biomechanical reaction forces across the joint and an individual with such a deformity plus hallux valgus is at risk of a more rapid progression of the hallux valgus deformity.(34)

CONCLUSION

Hallux valgus is a very common but complex foot deformity. It is not a single deformity, but rather a range of deformities of the first ray often accompanied by deformities and symptoms in lesser toes, varying in severity, suggesting that several factors may be responsible. More than one hundred techniques have been introduced for the correction of hallux valgus suggesting there is no established ideal operation. This may stem in part from the fact that the etiology and pathogenesis has not been truly elucidated. Decades of debate have failed to settle the importance of intrinsic versus extrinsic causes in the etiology of hallux valgus. Clearly, the issue is more complex than simply a problem of footwear. Although much research has been done to define the multifactorial origin of hallux valgus and the effect of those factors on surgical outcomes, the quality and strength of this evidence have been variable. Inheritance and sex are important, but other anatomical and biomechanical factors, such as anatomical metatarsal variants may have an important role as well (34). There is no strong evidence to support or disprove the role of pes planus or first-ray instability in the development of hallux valgus. Much has been written on poor footwear as a risk factor, and yet few people who wear high-fashion narrow short box shoes develop hallux valgus. . Large-scale population studies of sufficient scientific levels are therefore needed to possibly establish the interplay of the various intrinsic and extrinsic factors common to any given foot. This may then lead to an optimal treatment protocol for hallux valgus in the future.

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