

CASE REPORT

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Hallux Valgus Following Osteochondral Fracture of the Proximal Phalanx: A Case Report and Review of Literature

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ABSTRACT Hallux valgus is the deformity of the big toe with the first metatarsophalangeal joint in static subluxation laterally accompanied by medial deviation in the first metatars. Factors playing a role in the development of hallux valgus are separated as extrinsic and intrinsic. Following trauma, hallux valgus deformity is extremely rarely seen. When it does occur after trauma to the foot, especially to the first row, the deformity usually progressively worsens. Fractures to the big toe metatarsophalangeal joint region are extremely important in this respect. When fractures in this region, which first appear to be simple fractures, are not treated, they can lead to advanced stage deformities that require complex surgical procedures. Various types of post-traumatic hallux valgus deformities have been reported in literature as case reports. We present a hallux valgus case which developed after an osteochondral fracture at the base of the proximal phalanx secondary to trauma.

Keywords: Hallux valgus; trauma; first metatarsophalangeal joint

Deformity of the big toe with the first metatarsophalangeal (MTP) joint in static subluxation laterally accompanied by medial deviation in the first metatars is known as hallux valgus (HV). Pronation of the big toe is added to the pathology with progression of the process.¹ Factors playing role in the development of HV are separated as extrinsic and intrinsic. Of the extrinsic factors, the use of footwear and over-loading of the foot are usually held responsible. Intrinsic factors include genetic predisposition, gender, ligament laxity, age, metarsus primus varus deformity, variations in the first metatars anatomy and joint surface, tarso-metatarsal joint morphology, contracture of the Achilles tendon, advanced pes-planus deformity, widespread neuromuscular diseases and hindfoot acquired deformities secondary to posterior tibial tendon rupture.

HV deformity may be accompanied by various inflammatory arthritic conditions such as rheumatoid arthritis.² Post-traumatic HV deformity is an ex-

tremely rarely seen condition. Various types of post-traumatic HV deformities have been reported in literature as case reports. We present a HV case that developed associated with an osteochondral fracture at the base of the proximal phalanx following trauma.

CASE REPORT

A 32-year-old female with no known disease presented at the orthopaedic polyclinic in February 2019 with the complaint of pain in the big toe of the left foot, which increased especially when wearing shoes. The patient was a housewife and it was learned that the pain had worsened in the last year and she now has difficulty walking. On physical examination, she was seen to have HV deformity together with pronation of the big toe on the left foot and a bunion was observed over the painful region (Figure 1). No pain or restricted movement was seen in the first MTP joint with passive movements and it was observed that the deformity could be cor-

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FIGURE 1: Clinical photograph of the left foot of the patient showing hallux valgus deformity and big toe pronation.

rected passively. The patient had no similar complaint in the right foot and the deformity was unilateral. It was learned that the family history was negative.

Standing plain anteroposterior radiographs were taken of both feet and in the radiological evaluation a bone fragment was determined medial of the MTP joint at the base of the proximal phalanx of the big toe of the left foot together with HV deformity (Figure 2). HV angle was measured as 28.2° in the left foot and 11.6° in the right foot. Intermetatarsal angle (IMA) was measured as 13.7° in the left foot and 6° in the right foot (Figures 3A, Figure 3B). On the sesamoid radiograph of the left foot, sesamoid luxation was determined (Figure 4). Fol-



FIGURE 2: Bilateral standing antero-posterior (AP) radiographs. Hallux valgus deformity and osteochondral fragment at the base of the proximal phalanx can be seen in the left foot. There is no similar deformity in the right foot.

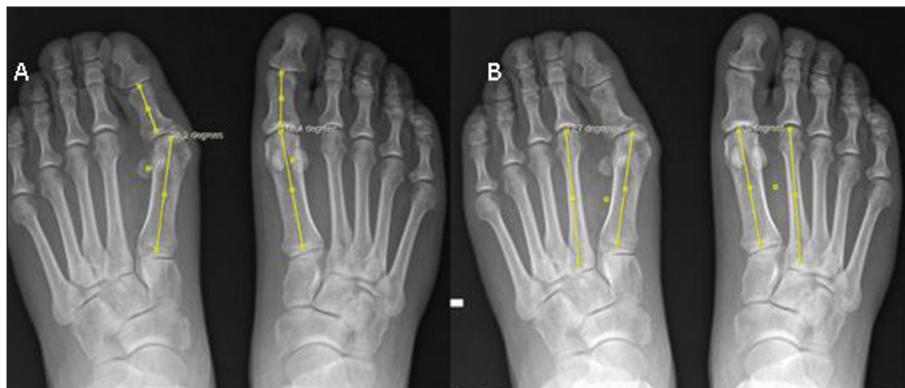


FIGURE 3: A) Bilateral standing antero-posterior (AP) radiographs showing the hallux valgus angle (HVA) measurements of each foot. **B)** Bilateral standing AP radiographs showing the intermetatarsal angle measurements of each foot.

lowing the radiological evaluation, the patient was questioned about trauma history. The patient stated that approximately 20 years earlier big toe of left foot was injured after an iron bar fell onto it but no intervention was made other than wound care. After all etiological factors were excluded, it was considered that the deformity had started after this trauma and had progressed over time.

Following the evaluations, she was decided to undergo surgery. First a longitudinal incision was made in the first web space (Figure 5). At this stage the adductor hallucis tendon was loosened from the attachment point to the proximal phalanx then the lateral capsule and lateral suspensory metatarsos-esamoid ligament were cut, and the joint was seen to be loosened. The bursa was reached by entering with a medial longitudinal incision. The medial capsule was exposed and the capsule was opened with a longitudinal incision. Then staying medial of the sagittal groove, the medial eminence was resected. A modified Chevron osteotomy was performed and after obtaining sufficient correction in the operation, the osteotomy line was fixed with two headless compression screws. Around the osteochondral fragment was seen to be covered with fibrous tissue so the fragment was excised. The medial capsule was closed by applying plication while holding the toe in a neutral position. From postoperative day 3, the patient was mobilised with HV shoes and instructed to remain at home for 15 days. Mild joint range of motion exercises were started at the end of the first week. Great attention was paid to elevation in the first 2 weeks.



FIGURE 4: Sesamoid radiograph showing luxation of the bones.

With sufficient union observed at postoperative 6 weeks, mobilisation was then permitted with sports shoes. On the radiographs taken at postoperative 1 year, hallux valgus angle (HVA) was measured as 10.3° and IMA as 8° (Figure 6). The soft tissue oedema completely recovered and the patient reported being able to walk long distances in normal shoes with no complaints.

Patient consent was obtained prior to the study.

DISCUSSION

HV deformity following trauma is very rarely seen. When it does occur after trauma to the foot, especially to the first row, the deformity usually progres-



FIGURE 5: Intraoperative clinical photograph showing dorsal and medial incisions.



FIGURE 6: Standing antero-posterior (AP) radiograph at 1 year postoperatively, showing sufficient union in the osteotomy line and correction of the deformity.

sively worsens. In a previous study, this deformity was reported to have occurred following a fracture of the first metatarsals.³ In another study of 7 patients, bunion developed which started slowly and progressed over time following traumatic Lisfranc joint damage, and it was emphasised that there must be a level of suspicion to understand that there was trauma in the etiology. The procedure of metatarsocuneiform fusion and distal soft tissue balance was recommended at the time of diagnosis.⁴ Like these 7 patients, in the current patient, it was understood that the deformity had developed and progressed over time. Especially trauma to the first MTP joint complex is important in the etiology and this is also seen in sports injuries. A previous study of adolescent football players showed that HV developed secondary to medial collateral ligament of first MTP joint injury at 6 months after trauma to the foot while playing, and a modified McBride procedure was applied in treatment.⁵ In another study of athletes aged <18 years, it was reported that there could be medial side fractures of the base of the proximal phalanx during sports and these fractures could cause HV. Following anatomic reduction of the fracture, the valgus deformity was reported to be corrected.⁶ Although proximal phalanx stress fractures of the big toe are extremely rare, previous studies have re-

ported that HV deformities which developed secondary to stress fractures at the base of the proximal phalanx of the big toe occurred in those playing sports. While the vast majority of these were treated conservatively with immobilisation, fixation was applied in those with delayed union.^{7,8}

In a previous report of a single case, acute HV deformity developed together with 5th MTP joint dislocation and neck fracture of the 2nd, 3rd and 4th metatarsal bones secondary to foot trauma. After reduction of the other toes, the hallux deformity recovered spontaneously and was not reported to recur during the follow-up period. A reason for this was said to be the importance of the transverse tie-bar system between the metatarsal bones.⁹ It has also been shown that HV can develop following trauma other than to the foot. In a case report, post-traumatic HV was reported to have developed as a result of abductor hallucis muscle paralysis secondary to medial plantar nerve entrapment following distal tibial fracture.¹⁰

Depending on the form and location of the trauma, HV deformity can develop either acute or chronic over time. In the current case, the deformity was seen to have developed slowly over several years. This situation can cause diagnosis and treatment to be delayed. The relationship between HV and trauma to the medial of the proximal phalanx of the big toe has been clearly stated in literature. When fractures in this region, which initially seem to be simple fractures, are not treated, HVA and IMA increase with sesamoid subluxation and they can be seen to lead to deformities which are more difficult to treat and require more complex surgical procedures.

Taking into consideration the possibility that the edges of the broken fragment are irregular and the elasticity of the soft tissues have been lost due to the previous trauma, osteotomy was chosen as a direct treatment method instead of fixation of the fragment, and while preparation was made in both techniques, this prediction was seen to be confirmed during surgery. It was aimed to avoid recurrence of the deformity due to non-union and the need for revision surgery.

Although post-traumatic HV deformity is uncommon, it can occur following trauma to the foot. Therefore, injuries especially fractures to the MTP joint of the big toe are important in this respect. When a fracture at the base of the proximal phalanx is diagnosed, there must be close follow up until bone union is obtained, and if there is displacement of the fracture, fixation in the early period should be kept in mind, especially for active individuals and athletes. With simple surgery applied in the early period, it is possible to avoid late-stage complications or complicated surgeries. Otherwise, it must not be forgotten that the deformity could progress and the balance of the whole joint could be disrupted, and patients should be informed about this in detail.

Successful results can be obtained with a Chevron osteotomy in cases with a post-traumatic HV deformity detected in the late stage.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Kaan Süleyman Irgit; **Design:** Servet İğrek; **Control/Supervision:** Servet İğrek; **Data Collection and/or Processing:** Servet İğrek; **Analysis and/or Interpretation:** Servet İğrek; **Literature Review:** Servet İğrek; **Writing the Article:** Servet İğrek; **Critical Review:** Kaan Süleyman Irgit.

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