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IRREDUCIBLE DISLOCATION OF INTERPHALANGEAL JOINT OF THE GREAT TOE SECONDARY TO AN INCARCERATED VOLAR PLATE ALONG WITH SESAMOID BONE - A RARE CASE REPORT

Orthopaedics

Rajula Iswarya Junior Resident, Department of Orthopaedics, Katuri Medical College & Hospital, Guntur, NTR University of Health Sciences

Ch Pratyush* Junior Resident, Department of Orthopaedics, Katuri Medical College & Hospital, Guntur, NTR University of Health Sciences *Corresponding Author

V Madhukar Junior Resident, Department of Orthopaedics, Katuri Medical College & Hospital, Guntur, NTR University of Health Sciences

Joseph Kartheek Assistant Professor, Department of Orthopaedics, Katuri Medical College & Hospital, Guntur, NTR University of Health Sciences

ABSTRACT

Irreducible dorsal dislocation of the interphalangeal (IP) joint of the great toe due to incarcerated sesamoid and volar plate is rare with only few cases reported in literature. We report a case of a 20-year-old gentleman who presented to the emergency room with an open injury exposing the IP joint which is irreducible. The mechanism of injury might be due to combined axial and hyper dorsiflexion force, when the patient foot had an impact to a vehicle. IP joint was irreducible despite multiple attempts of closed reduction. On radiological evaluation incarceration of the sesamoid along with volar plate was identified. Intact collateral ligaments and displaced sesamoid bone along with volar plate is the main obstruction for reduction of IP joint and was a block to manipulation and reduction in the emergency room. An open surgical exploration with resection of the incarcerated sesamoid along with volar plate was done, followed by Kirschner-wire fixation of the IP joint. The operative course was uneventful. At 6 months after surgery, the patient could walk, run, and return to sports.

KEYWORDS

irreducible, dislocation, great toe, sesamoid, volar plate, toe

Irreducible dislocation of interphalangeal joint is a rare condition with only a few case reports in literature [1]. Here, we report a case with irreducible dislocation of interphalangeal joint due to volar plate along with sesamoid bone interposition, which required open reduction. A 20-year-old male had trauma to foot with an open injury with irreducible dislocation of interphalangeal joint of great toe. Intraoperatively, the interposition of volar plate with sesamoid bone over the dorsal aspect of proximal phalanx which is hindering the IP joint while reduction was identified. Displaced volar plate along with sesamoid bone was resected and great toe was reduced into the position, and the joint was stabilized with k wire. On follow-up after 6months, patient was asymptomatic and was able to perform his daily activities. The displacement of sesamoid bone with volar plate and intact collateral ligaments locks the joint in extension and obstructs the reduction of interphalangeal joint dislocation. One should have the suspicion of possibility of open reduction after 1 or 2 failed attempts of reduction [2,3]. Dorsal approach is usually advocated; medial approach can be used if there is wound over the plantar aspect

Case Report:

A 20-year-old male patient alleged to have been sustained injury to right foot due to hit by front wheel of bike. Patient sustained open injury to great toe associated with pain and unable to walk since then. Pain is sudden in onset, progressive, aggravated with movements of foot and on weight bearing and not reduced with pain killers there was no swelling at the time of injury, associated with difficulty in walking from his description of the trauma, and it seemed like the big toe suffered from an axial loading and hyper dorsiflexion injury. He visited the emergency department. A 3*2 cm transverse laceration is present over plantar aspect of right great toe exposing interphalangeal joint and tendons with contamination and active bleeding. On examination, the affected big toe was shortened and dorsomedially dislocated as compared with the contralateral side. There was tenderness at the IP joint of great toe and proximal phalanx of second toe.

Figure 1: clinical picture at the time of presentation to emergency department

Figure 2: x-ray showing dorsoposterior and oblique radiographs obtained at the emergency department. It reveals an oblique IP joint space of the right great toe with incarcerated sesamoid bone and transverse fracture of shaft of proximal phalanx of second toe

While walking, due to deformity the plantar side of the great toe was not in contact with the floor. No active and passive movements were observed at the affected IP joint. Movements at right metatarsophalangeal joint were normal. Sensations over great toe are decreased compare to other toes. Plain radiography of right foot (antero-posterior and oblique views) were obtained and showed obliquity of the IP joint line of great toe with an interposed sesamoid bone along with transverse fracture of proximal phalanx of second toe (Figure 2). After thorough wash, under aseptic conditions under local ring block trial of relocation was attempted and it could not be achieved. A diagnosis of Irreducible compound open injury and dislocation of interphalangeal joint of right great toe with closed transverse fracture of shaft to proximal phalanx of second toe was made and posted for open relocation and fixation with Kirschner-wire.

Patient was explained regarding the risks; outcome of the surgery and informed consent was taken. An surgical open exploration, resection of inter-posed sesamoid bone with volar plate and Kirschner-wire fixation of the right great toe IP joint and proximal phalanx of second toe was performed under spinal anesthesia which was uneventful.

Surgical Technique: The right great toe IP joint was approached through open injury. Intraoperative fluoroscopy confirmed the diagnosis of a dorsal IP joint dislocation with an interposed sesamoid. An interposed sesamoid bone with the volar plate was found in the IP joint space and resected (Figure 3). The IP joint was freed from the above mechanical block. A temporary fixation of the IP joint was done using Kirschner-wires. In order to hold the enlocated IP joint in its native position, a percutaneous 1mm Kirschner-wire fixation was done (Figure 4). Another 2mm Kirschner-wire was passed into the base of

proximal phalanx of second toe. C arm was used to make sure that the IP joint was in reduction and good alignment. Wound suturing was done in layers

Figure 3: This is a clinical picture depicting open exploration of the IP joint of the right great toe with an interposed sesamoid rendering the dislocation irreducible

Figure 4: intraoperative image-intensifier images of the IP joint being held in reduction by the percutaneously inserted Kirschner-wire.

Follow-Up: The patient was followed up at 2, 4 and 6 weeks postoperatively with serial X rays to ensure enlocated IP joint and to monitor wound healing. Patient recovered well and enlocated IP joint was well sustained (Figure 5). Both the K-wires were removed at 6 weeks postoperatively. Occupational therapy was advised to improve the residual stiffness. Subsequently, the patient was followed up at 3 months and 6 months postoperatively. He remained symptom-free and resumed his sports activities.

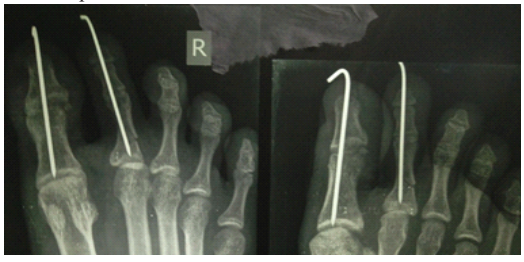

Figure 5: These are the radiographs obtained 2 weeks postoperatively showing an enlocated IP joint of the right great toe with the Kirschner-wire well placed.

DISCUSSION

Dorsal dislocation of the IP joint of the great toe is one of the rare injuries. Closed reduction of this joint is difficult to achieve due to its anatomy.

One must consider open reduction as the treatment option if multiple attempts of closed reduction fail. We have two approaches – dorsal and medial approach described in the literature. Both dorsal [4,5,6] and medial approach [7,8] has been described in the literature. Dorsal approach splitting the extensor tendon rather than its retraction yields a better surgical exposure[6].

Miki et al. [5] in their study, gave a detailed description of the anatomy of the great toe and its sesamoid. They discovered that (1) the thick plantar plate is separate from the flexor hallucis longus tendon and can easily be displaced into the joint; (2) the sesamoid is almost completely buried within the plantar plate, allowing the sesamoid-plantar plate complex to move as a single unit; (3) the plantar plate is connected to the proximal and distal phalanges by fibrous tissue, which prevents dislocation; (4) the plantar plate is not displaced into the joint space as long as connection to either the proximal or distal phalanx remains intact; and (5) the plantar plate can only be dislocated into the joint space with both proximal and distal phalangeal connections divided. With the anatomy defined as such, IP joint dislocations can then be divided into two groups. In type-I dislocations, the sesamoid-plantar plate complex slips into the IP joint, resulting in slight elongation of the great toe but no significant deformity. In type-II dislocations, the sesamoid-plantar plate complex slips into the plantar aspect of the joint and emerges dorsally with the sesamoid overriding the head of the proximal phalanx, causing a hyperextension deformity of the distal phalanx. Our patient falls into this type-II group. Clinical and radiographic examination aid us in differentiating these two groups. In type-I dislocations, the distal phalanx is in a neutral position and displays resistance to dorsiflexion and plantar flexion. Radiographically, the sesamoid is visualized within a widened joint space and the phalanges are coaxial in type-II dislocations; the distal phalanx is hyperextended and displays little resistance to dorsiflexion. Radiographically, the sesamoid is located dorsal to the head of the proximal phalanx and the distal phalanx is hyperextended. In both types of injury, reduction is difficult because of intact collateral ligaments, as was seen in our patient when he presented at our clinic
In our case as recommended by Woon [9], we decided on temporary Kirschner-wire immobilization of the IP joint for up to 6 weeks and it is also reported to have excellent long-term prognosis with least recurrence [6].

CONCLUSION

Dislocation of the IP joint of the great toe secondary to an incarcerated sesamoid and volar plate is a rare condition that requires a high index of suspicion, the following facts that are to be kept in mind during treatment are lateral x rays of toe are mandatory for diagnosis, first line of treatment is closed reduction due to its inherent anatomy and only have little chance of success when performed acutely, if it fails, open reduction using dorsal approach and excision of sesamoid bone is effective and immobilization with k-wire has proven to have excellent results. However prolonged immobilization should be avoided. Recurrence and complications are rare proving it to be very effective method of surgical management

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