SURGICAL FIXATION OF TRAUMATIC LISFRANC FRACTURE-DISLOCATION: A CASE REPORT.

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ABSTRACT

Injuries of the Lisfranc joint are among the more prevailingly missed diagnosis of midfoot injuries. This is more so when there is only subtle disruption of the joint. However, open Lisfranc fracture dislocation which is associated with high velocity injuries requires surgical intervention to restore the congruency of the tarsometatarsal joint. We present a case of a young gentleman who sustained an open fracture-dislocation of the Lisfranc joint which was treated surgically with fixation of the joint for better long-term outcome.

Keyword*: Lisfranc fracture, open reduction internal fixation, open fracture dislocation, arthrodesis*

INTRODUCTION

The term Lisfranc joint was coined by the French Napoleonic era field surgeon, Jacques Lisfranc, who described the method of amputations through this joint.[1] Circulatory compromises as well as compartment syndrome are the most devastating immediate complications for this injury. Midfoot injuries are of those involving the tarsometatarsal joint complex (TMC) and are prevalently a result of high energy injuries such as industrial, motor-vehicle and motorcycle accidents.[1] Conversely, these injuries may also happen as a result of minor twisting injuries as seen in athletes and the elderly.[2]

Myerson et al in 1986 emphasised severe morbidity associated with Lisfranc injuries which include chronic subluxation following premature removal of K-wires which later on will lead to post traumatic arthrosis.[1] The aim in management of Lisfranc injury is to ensure anatomical reduction through rigid internal fixation devices. Even subtle diastasis or subluxation can lead to poor outcome if missed and left untreated.[3] We reported the short term outcome of a case of open fracture-dislocation of the Lisfranc joint in a young gentleman, which was treated surgically.

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CASE REPORT

A 14-year-old boy presented to a district hospital following a motor bike accident. He presented with right foot pain, bleeding and right foot deformity. Upon examination of the right foot, there was a deep laceration wound measuring 6 x 1cm which was horizontally overlying the dorsal aspect of the 3rd to 5th metatarsal bones. The distal pulses were

palpable and capillary refill time was less than 2 seconds and all the toes were pink. No neurological deficit was noted. There was limitation of the right foot range of motion (ROM). Radiographs of his right foot showed a complex, divergent type Lisfranc injury (based on the Quenu and Kuss classification, 1909), with an associated TMC injury (Figure 1a and 1b).No other injuries were noted and he was subsequently referred from the district hospital to our centre.

Upon discussion, a decision was taken to treat his right foot injury in a 2-stage procedure, due the severity of soft tissue injury and the delay in transfer of the patient from the district hospital to our centre which exceed 12 hours. The first stage of the procedure was performed at the district hospital, after discussion with our centre, which consisted of wound debridement with temporary stabilization of the fracture with external fixator and K-wires. Once this was done, the patient was transferred to our centre for the 2nd stage procedure. Intravenous cefuroxime at 1.5g three times a day was administered for 5 days and daily dressing of the wound and pin sites were done. A swab culture and sensitivity (C&S) was taken which showed no growth. Infective parameters were also normal. After post trauma day 12, patient underwent the second stage of the procedure with open reduction and internal fixation of the fractures.

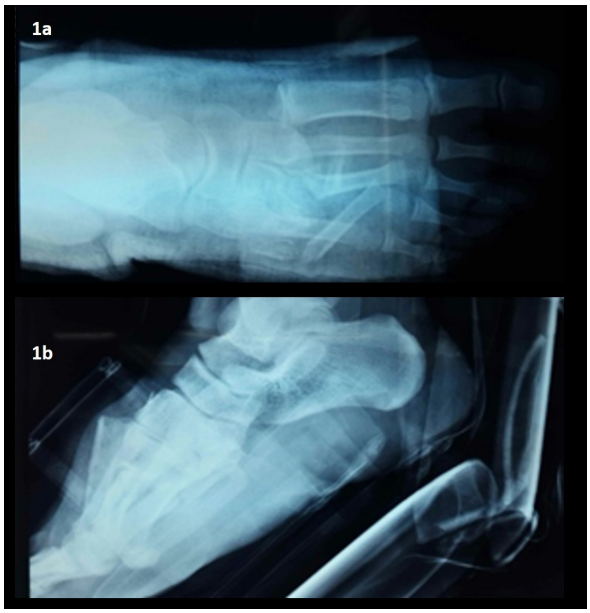

Figure 1a and 1b: Radiographs of the right foot showing Lisfranc fracture-dislocation of the 3rd to 5th metatarsal bones, taken with backslab on. (Click to enlarge)

Figure 2a and 2b: Radiographs of the right foot post open reduction and internal fixation using screws and locking plates, showing good anatomical reduction. (Click to enlarge)

As the original wound was overlying the 3rd until 5th metatarsal bones, careful vertical incisions were made over the 1st and 4th metatarsal bone in order maintain adequate skin bridge between the 2 incisions. The medial cuneiform was reduced first, followed by the 1st TMT joint and then the 2nd and 3rd TMT joints. This was achieved using 4.0mm cannulated headless screws which were countersunk. Next, the 4th and 5th MTBs were fixed with locking plates on the dorsal side. Finally, a last mini screw was inserted at the fracture of the 4th MTB head. The alignment and stability of all the TMT joints was confirmed under image intensifier and the skin was opposed with non-absorbable sutures (Fig 2a and 2b).

Post operatively, the ankle was put on below knee plaster splint in neutral position for 2 weeks until suture removal. Patient was discharged well after 5 days. ROM of ankle and foot was started after removal of the splint. However, patient was advised for non-weight bearing for at least 6 weeks before being allowed to partially weight bear on the

Figure 3: (a) The right foot at 3 months follow-up showing healing of the wounds. (shown by arrow head) , (b) Radiograph of the right foot at 6 months post removal of screws over the Lisfranc joint.

affected limb. At three months Follow-up, the fracture site has already united and patient was able to ambulate without walking aid. At six months post trauma, the patient underwent implant removal over the Lisfranc joint to allow full weight bearing of the joint and to increase ROM. Recently, at 1 year follow-up, he was able to resume his normal activities with ROM and no residual pain.

DISCUSSION

Open Lisfranc injury is not commonly seen in general orthopaedics practice and the outcome is unpredictable. In subtle Lisfranc injuries, the most significant findings on radiographs will be widening between the bases of the 1st and 2nd MTB bases. A flake at the base of the 2nd MTB, also called the 'fleck sign' can also point towards the presence of such a subtle injury.[1] Stress radiographs can also be used in making the diagnosis in the case of subtle injuries, but it needs to be done under anesthesia.

Whether it is a subtle or major dislocation, the Lisfranc joint has to be anatomically reduced so that the best functional outcome can be achieved and reduce long-term morbidities such as residual pain, reduced ROM over the Lisfranc joint and early onset navicular-cuneiform arthritis.[1] Although plaster treatment may help to get modest alignment of the joint in cases of subtle subluxations, the long-term outcome is not promising.[1]

In this particular case where there was an open fracture dislocation of the TMC with severe disruption of overlying soft tissues, immediate attention should be given to the soft tissue condition. External fixator and K-wires were used in this case to temporarily stabilize the fracture whilst waiting for soft tissue condition to improve. Fasciotomies are generally performed if compartment pressures are noted to be high particularly in such cases with severe soft tissue disruption and vascular compromise.[4] However in our case, vascular supply was noted to be intact early on.

There are continuous debates as to whether open reduction and internal fixation (ORIF) or primary arthrodesis (PA) should be done for this type of injuries. Patients with mainly bony injury are usually considered for ORIF. Bony healing is more predictable than ligamentous healing and by retaining the small fragments of the fracture, primary bone healing can occur, adding to the stability of the fixation.[1] The use of dorsal plates is preferred over transarticular screws, as transarticular screws can cause iatrogenic damage of the TMT joint cartilage and this may lead to the post traumatic arthrosis which needs to be treated with an arthrodesis as a second surgery (about 40%).[5] By using dorsal plates, this complication can be reduced and hence avoiding the need for secondary surgery for arthrodesis. In a study by Myerson et al, it was noted that applying an intermittent compression foot pump following screw fixation, can reduces limb swelling faster leading to earlier rehabilitation. [6] With regards to implants removal after ORIF for Lisfranc injuries, it is advised to do so after 4 months, as Lisfranc injuries are

commonly associated with ligamentous injuries which may take up to 4 to 5 months to heal.[1]

For patients planned for PA, they generally involve injuries which are mainly ligamentous. In view of the unpredictable and lengthy duration of ligamentous healing, PA is chosen over this group to ensure successful reduction of the TMC so as to prevent later diastasis which may occur if ORIF was done. Several studies have noted that when PA was performed for the pure ligamentous injury group, their post-operative function was much better than the ORIF group.[7,8] This can be attributed not only due to the ligamentous injury but also due to the associated severe cartilage injury of the TMT joint which favours PA over ORIF. The post-operative outcome between PA and ORIF has been reported to be 92% and 65% respectively. However, for this case, it is not appropriate to perform PA as the patient is only 14 years old and is still in a growing age. He will need a secondary stage procedure later for arthrodesis if he develops the complications of post traumatic arthrosis.

Another cause of post traumatic arthrosis following surgery is related to the adequacy of the reduction. Komenda et al commented in their study that patients who underwent arthrodesis following the primary fixation were mostly due to the inadequate reduction because the extent of the initial injury was not well appreciated during the time of initial surgery.[9] This further emphasizes the importance of achieving anatomic reduction especially in the groups who undergo ORIF as the primary surgery.

A study by Nithyananth et al on the long-term outcome of high-energy traumatic open lisfranc injuries in 13 patients, 5 out of 13 patients developed foot planus, 2 patients had spontaneous fusion of ankle joints, another 2 patients developed foot deformity due to contracture.[10] This study also emphasizes on good soft tissue management for better prognosis.

CONCLUSION

In conclusion, soft tissue management is of utmost importance when faced with Lisfranc injuries. To perform a single or 2-stage procedure depends on the extent of soft tissue injury. Anatomical reduction is imperative to achieve the best possible outcome and prevent post traumatic arthrosis. Despite our patient having Lisfranc injuries associated severe soft tissue injuries, we decided to perform a 2-stage procedure to get good soft tissue coverage with the first stage procedure, followed by second stage of primary fixation rather than arthrodesis with the aim of achieving good long-term functional outcomes in view of the patient's young age.

Acknowledgments

The authors would like to thanks Dr Ayesyah Abdullah for her technical help in preparing this case report.

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