



A Rare Polytrauma Case With Bilateral Communitated Femur Fractures With One Sided Segmental Neck and Shaft of Femur Fracture With Bilateral Trans-Scaphoid Perilunate Fracture Dislocation

Dr. Mihir Desai

M.S. Orthopedics, Department of Orthopaedics, Goa Medical College, Panaji, Goa-403202

Dr Shivanand Bandekar

Department of Orthopaedics, Goa Medical College, Panaji, Goa-403202

Dr Nandini Padte

Department of Orthopaedics, Goa Medical College, Panaji, Goa-403202

ABSTRACT

High velocity traumas are on a rise due to multiple factors in modern day Orthopedic practice. A high index of suspicion is very important in diagnosing associated injuries whenever a poly trauma patient presents to our Emergency department. We report a rare case of poly trauma in a young 30 years male patient where the patient had bilateral waist of scaphoid fractures with bilateral dorsal trans-scaphoid perilunate dislocation with bilateral diaphyseal fracture of femur with one side segmental communitated fracture of the femur diaphysis with Basicervical fracture femur. According to our review of literature there are no such cases reported where the patient had such an intensity of grievous injuries. All the fractures were stabilized within the first 72 hours with good hemodynamic stabilization of the patient. Both the scaphoid fractures were fixed with Headless Hebert Screws with reduction of intercarpal joints with additional K-wire on right side. Both the scaphoid fractures united fortunately for the patient. Left sided Femur was fixed with Intramedullary Interlocking nail. Right sided segmental Femur fracture was fixed with closed Proximal Femoral Nail which went to unite primarily without secondary Bone Grafting.

KEYWORDS

bilateral segmental femur fractures, bilateral transcaphoid perilunate fracture dislocation

Introduction

Modern day orthopedic surgeons especially in a trauma center are facing regular challenges in the form of polytrauma. There are very high chances to miss some injuries like in this case where the patient had bilateral communitated femur fractures. It was very easy for us to miss the bilateral scaphoid fractures had it not been the obvious deformity due to bilateral perilunate dislocation. Bilateral waist of scaphoid fractures is a debilitating injury associated with high rates of avascular non-union when associated with perilunate dislocation. These fractures and injuries can be easily missed when associated with other polytrauma⁽¹⁾. Moreover it is very rare to find bilateral scaphoid fractures associated with dorsal trans-scaphoid perilunate dislocation. Plain radiography is many a times deceptive for diagnosis of scaphoid fractures. Therefore, in such cases, additional CT scan is also very helpful especially to diagnose the fracture pattern and the carpal dislocation pattern⁽²⁾. This warrants an early fixation and reduction of the wrist joint to prevent non-union of scaphoid fracture and the resultant avascular necrosis. Moreover, in such high velocity injuries, which consist of bilateral femur fractures, often the diagnosis of an ipsilateral neck or trochanteric fracture can often be missed⁽³⁾. Therefore, in all femur fractures especially bilateral ones it is very important to remove x-ray of Pelvis with bilateral hips.

Various methods of fixation of scaphoid waist fracture associated with carpal dislocation have been described in literature using Kirschner wires and Headless compression Hebert Screws in a closed or open manner⁽¹⁾. We used Single Hebert screw on left side and 2 Hebert Screw on right side to effect good reduction.

Bilateral femur fractures are associated with high volumes of internal blood loss and can be life threatening at times. Even if they are fixed, they can be associated with high risk of pulmonary embolism. Therefore, early fixation should be considered

whenever the hemodynamic condition of the patient allows to prevent chances of embolism, infection and mortality rates⁽⁴⁾.

There are various treatment modalities described in literature for segmental femur fractures. That includes Open reduction and internal fixation at both the sites with compression plating, Closed Proximal Femoral Nailing⁽⁵⁾ and Dynamic hip Screw for the Basicervical part of the fracture and retrograde intramedullary nailing for the diaphyseal part⁽⁶⁾. All the techniques have a good union rate when done meticulously.

Case report

We report a case of polytrauma in a young male patient aged 30 years. The patient had bilateral communitated shaft femur fractures with right sided segmental femur fracture with basicervical neck femur fracture. Patient also had bilateral waist of scaphoid fracture with bilateral dorsal perilunate dislocation. The injury was a result of high velocity head on collision of two two-wheelers. Fortunately for the patient, he had no other life threatening head injuries or blunt abdominal or blunt chest trauma.

As a protocol which we follow for all polytrauma patients, X-ray pelvis with both hips, chest X-ray, cervical-spine X-ray-Lateral View and X-ray of dorso-lumbar spine were also taken. We also ran a FAST (Focussed Assessment of Sonography for trauma) which was normal and there was no grievous injuries to other abdominal viscera. Plain CT scan head was also done which was also normal.

X-ray of Bilateral wrist joints showed unusual injury pattern with bilateral scaphoid waist fractures and dorsal wrist dislocation. X-ray Pelvis with both hips showed Basicervical fracture neck of Right Femur. X-Ray of bilateral femur showed communitated fractures of bilateral femur diaphysis (Right communitated>Left communitation.).(figures 1 to 5).

Figure1- Anteroposterior view of pelvis with both hips showing fracture basicervical neck right femur.



Figure2- Anteroposterior view of right femur showing segmental fractures of neck with communitated shaft fracture



Figure3- Anteroposterior view of left femur diaphyseal communitated fracture



Figure4- Anteroposterior and oblique views of Right sided scaphoid fracture with transcpoid perilunate carpal dislocation



Figure5- Similar fracture pattern of Left sided scaphoid fracture with transcpoid perilunate carpal dislocation



Patient was resuscitated in the casualty department with intravenous crystalloids in the form of Ringer Lactate and Normal Saline. Since the patient was maintaining adequate Blood pressure in the Emergency Department, blood transfusion was not started. All 4 limbs were adequately splinted. A high-groin Plaster Slab was put bilaterally and a below-elbow plaster slab was put over bilateral upper limbs. These were Temporary procedures for easy mobilization of the patient upto the Operating Room. Once, other life-threatening injuries were ruled out and confirming the 6 hours of Nil-per mouth status, patient was taken to the OR. Adequate colloids including Packed Cells were kept ready after checking for the patient's blood group.

Left sided communitated Femur shaft fracture was first fixed with Static Intra-medullary Interlocking nail. As the patient had polytrauma, decision was taken to fix unilateral Femur and bilateral scaphoid fractures and perilunate dislocation. Bilateral scaphoid fractures with dislocation pose an emergency since the vascularity of scaphoid is precarious and early fixation have provided better results to prevent non-union and subsequent avascular necrosis.

For bilateral waist of scaphoid fractures bilateral Anterior approaches were taken sequentially one after the other. Both the scaphoid had similar patterns of injury with similar dorsal subluxation. Skin and subcutaneous tissues were incised taking adequate hemostasis. Flexor retinaculum was carefully incised. Stabilising ligaments in the form of Radioscaphoid and Radioscaphocapitate were identified and incised. Preliminary anatomic reduction was achieved under fluoroscopic guidance and was held by a 2mm Kirschner wire. Thereafter, a Hebert-Screw guidewire was introduced from the distal tubercle into the proximal fragment. It was sequentially drilled with Cannulated drill.

For the left side-A single headless Hebert screw was introduced under fluoroscopic guidance getting adequate compression along the fracture surfaces. After fixation, wrist got reduced and was stable.(figure8)

Figure8- Immediate post-operative fixation for left scaphoid fracture dislocation.Fixed with single Hebert Screw



For Right Wrist-Similar procedure was followed up to passing of guidewires. But here, a single Hebert-Screw seemed inadequate to get compression. Therefore, another Hebert-screw was used to get adequate compression. In addition, a single 2mm Kirschner wire was also used to reduce the dorsal perilunate dislocation and to hold it stable.(figure 9)

Figure9- Immediate Post-operative fixation for right sided transscaphoid perilunate dislocation .This side required 2 Hebert screws with an additional K-wire



Thereafter, bilaterally volar wrist ligaments were sutured back and skin, subcutaneous tissues were closed over layers.

Post-operatively, the patient was shifted to ICU till general condition stabilized. When the patient's hemodynamic condition was stabilized, decision to operate the left Segmental Femur was taken. Patient had Right sided comminuted shaft fracture femur with basicervical femur neck fracture. For the Right side, an intramedullary long proximal femoral nailing was planned. Patient was put on a traction table. Entry point was taken at greater trochanter taking care not to fracture further the basicervical part under C-Arm guidance. Once the entry point was made and confirmed on both Antero-posterior and lateral view, a guidewire was introduced negotiating both the fracture areas of the segmental part. Serial Reaming was done along the entire shaft.

A long proximal femoral nail was then introduced. Proximal 8mm compression Screw and a 7mm De-rotation screw was put. They provided adequate compression along the fracture site.

Distally, a Single Dynamic 4.9mm locking bolt were put and the procedure was completed. Fortunately, for us and the patient, the procedure was completed in a closed fashion, and there occurred no need to open either of the fracture sites. (figure7).

Figure7-Immediate post-operative bilateral femoral fixation.Right sided PFN done in a closed fashion and the comminuted fracture site not opened completely.Left sided femur fixed with intramedullary interlocking nail



The patient was kept under medical supervision for a week in our institute to look for any signs of pulmonary embolism or deep venous thrombosis. There are high risks of Pulmonary or Fat embolism after bilateral femur fracture especially when reamed intramedullary implants are used. Therefore, the patient was also started on subcutaneous Low Molecular Weight Heparin, Enoxaparin in a prophylactic dose. Isometric Quadriceps and Passive and Active Ankle pump exercises were start-

ed in the ward only from post-operative day 2.We could not mobilize the patient in any other way since all 4 limbs were involved.

For bilateral scaphoid and wrists-

A bilateral thumb-spica plaster slab was put for around 4 weeks. After that, the Kirschner wire for the left hand was removed and wrist and hand mobilization was started for both the upper limbs. X-ray at this 4 week stage revealed good alignment of the fractured fragments for both scaphoid and reduction of wrist joint. Patient had no significant pain clinically so gradual wrist active and passive mobilization were started .Patient had a good grip strength bilaterally and good range of movements bilaterally at wrist and hands at the end of 6 weeks . Thereafter, the patient was followed up every 3 weeks for taking serial radiographs of scaphoids and bilateral femora. Both the scaphoid showed union at the end of almost 12 weeks, both clinically and radiologically.

For bilateral femur fractures-Left side fracture was limited only upto diaphysis. Therefore, we started knee mobilization for left side at the end of 3 weeks after doing good static quadriceps exercises. Left side femur fracture showed signs of union by 8 weeks and showed complete radiological union by almost 14 weeks.(figure10).

Figure10- Mid-followup X-rays of bilateral shaft femur at 4 months.Good amount of callus is seen.



Patient was made to walk on the Left side with support only after both the scaphoid showed signs of union so that he can hold the walker since fracture femur on the right side was going into delayed union.

Right femur basicervical fracture part showed union by 14 weeks. (figure11)

Figure11- Mid-follow up results at 4 months showing union at fracture neck femur side.



Diaphyseal fracture was slow to unite. But eventually it united by 5 months. There were lot of comminuted fragments which eventually consolidated and showed good callus.(figure10).

Follow-up period-The patient is still under our follow-up from last 18 months and is walking full weight bearing without

support with good range of movements in bilateral wrist and bilateral hips and knees (figures14 and 15).

Figure14- Follow-up at 6 month showing good Range of motion at wrist joints.



Figure15- Follow-up at similar period showing good to excellent range of movements at bilateral hips and knee joints

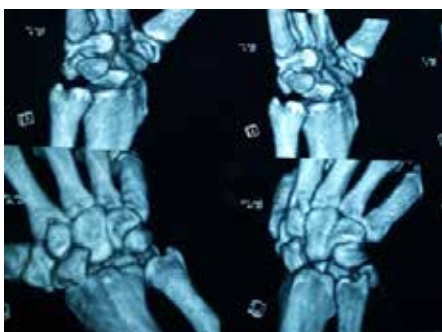


Discussion-

Modern day orthopedic surgeons are often faced with the challenge of polytrauma with multiple complex fractures especially in a high volume trauma center like ours. The occurrence of bilateral comminuted femoral fractures with one sided segmental femur fracture including basicervical neck fracture along with bilateral waist of scaphoid fractures along with perilunate trans-scaphoidal carpal dislocation is a very rare occurrence and according to our research has not been mentioned in literature.

Bilateral scaphoid fractures along with perilunate carpal dislocation pose a great challenge in view of diagnosis as well as treatment. The sensitivity to diagnose by plain radiography is almost only 70%. To 80% which is quite low. Therefore, additional imaging techniques like CT scan are also helpful (2, 7, 8). (figure6).

Figure6- C.T.Scan with 3D reconstruction showing trans-scaphoid perilunate dislocation



As such it is an uncommon injury but amongst the fracture dislocation pattern it's the most common pattern accounting for almost 61 % (1).The blood supply to scaphoid is already precarious and typically retrograde and therefore it is more prone to develop nonunion and resultant avascular necrosis (9).Therefore early recognition and fixation is important to prevent debilitating complications like stiffness of wrists and wrist arthritis. According to the classification described by Herzberg et al we classified our case of bilateral perilunate fracture dislocation as acute phase injury. Both closed and open reduction techniques have been described in literature with almost equal encouraging results. But early open reduction and internal fixation of scaphoid along with carpal reduction has slightly better results (1, 8).The future prognosis of the wrist depends on anatomical reduction of scaphoid and carpal reduction. Both the rates of avascular necrosis of scaphoid and lunate bone have been high if the procedure is not performed early and due to inadequate reduction (8).

Here, in our case, left side required only Hebert screw fixation and reduction of carpal bones which was stable on operating table when checked under fluoroscopy. On the contrary on the right side additional K-wire fixation was required to reduce the carpal bones. Difference of opinions exist as to which approach to take but studies reveal that Volar approach is the preferred approach so as to avoid injury to the dorsal vessels which are usually main vascular supply to the scaphoid. More understanding of the wrist anatomy and biomechanics and carpal stability pattern has revealed that repair of volar intrinsic ligaments is also necessary after such an injury for good healing and functional outcome (1). Sometimes, in addition, after scaphoid reduction and fixation, treatment often requires intercarpal fixation within the proximal carpal row like in our case on the right side (1).

The incidence of nonunion and resultant avascular necrosis is high if the diagnosis or the treatment is delayed or if the reduction is inadequate on postop immobilization period is inadequate (10). In our case after almost 3 months of follow-up period both the wrist showed similar amount of healing and union (figures12,13).

Figure12- 3 and a half to 4 month follow up showing union of right scaphoid fracture.



Figure13- Union of left sided scaphoid fracture seen at 4 month follow-up period



Both the wrist got good functional range of movements. Patient had a good grip strength as well. Relatively early mobilization is the key to get a good functional outcome.

Bilateral comminuted fractures with one sided segmental femur fractures are as a result of high velocity injuries like this one in motor vehicular accidents or as a result of falls from heights⁽¹¹⁾. The reported incidences of segmental femur fractures with ipsilateral basicervical neck fractures is reportedly 2.5% to 6%^(3, 11). There are increased chances of missing the neck fracture part. According to literature, the reported chances of missing the neck fracture part is almost 13 to 30%^(3, 5, 12).

In this case, we fixed the bilateral scaphoid fracture and bilateral perilunate dorsal dislocation on day 1 of injury. Along with that, we fixed the ipsilateral only femoral fracture part on day 1. Studies also reveal that early reduction and internal fixation of femur fractures done within 24 hours decrease mortality rates, chances of infection and pulmonary embolism⁽⁴⁾. Antegrade Reamed Intramedullary interlocking nailing was done for femur diaphyseal fracture on the left side.

For the segmental femur fracture with ipsilateral basicervical neck fracture, various methods have been described in literature. These include, Antegrade proximal femoral nailing, retrograde intramedullary nail and dynamic hip screws for neck fracture and open reduction and internal fixation for both fractures using dynamic compression plating^(3, 5). The results of proximal femoral nailing are quite encouraging. The advantages of the procedure is that it's a closed procedure and more chances of preserving the fracture hematoma, reduced intraoperative blood loss and biological fixation of both fracture sites with a single implant⁽¹²⁾.

The reported incidence of osteonecrosis for the neck part is usually low and the prognosis is usually good because the neck part is usually undisplaced and the energy of the trauma is usually more for the diaphyseal part. Therefore almost all the time, the diaphyseal part of the fracture is more comminuted like in this case.

The major complications which are dreaded are non-union and avascular necrosis of the femoral neck. The nonunion of femoral shaft can be dealt with secondary bone grafting like in this case. Fortunately for us and the patient, femoral neck fracture united well. Normally, after femur fracture stabilization non-weight bearing and knee mobilization is started by 3 weeks. But in our case, we could not start early rehabilitation since all 4 limbs were injured. Early knee mobilization was started on left side where only femur was fractured.

By end of almost 12-14 weeks, both scaphoid showed signs of union and both the wrist had good- excellent range of movements (figures 12 and 13). Almost at the same time, femur showed signs of union. So we started weight bearing on that left limb when the patient had enough grip strength to hold the walker for mobilization purpose. The patient was followed up every monthly till the segmental femur showed union by almost 5-6 months. Patient is still under our follow-up since almost 18 months and is walking full weight bearing and has gained his employment with only minimal disability which is the ultimate achievement from an orthopaedician's point of view.

Conclusion-

Bilateral comminuted femur shaft fractures with ipsilateral basicervical neck fractures associated with bilateral transscaphoidal perilunate carpal dislocation with bilateral waist of scaphoid fracture is a very rare and a complex injury pattern. All the injury patterns are difficult to diagnose. High levels of suspicion should be maintained to diagnose the fracture especially for the carpal injuries and for diagnosing ipsilateral hip fractures in femoral shaft fractures.

Early open reduction and internal fixation helped by relatively

early physiotherapy helps to get full union in scaphoid fractures and to get a good to excellent range of movements. Proximal femoral nailing is a good treatment modality for segmental femur fracture with the advantages of closed procedure and low perioperative blood loss.

The aim of this publication is to help trauma surgeons know the rarity of such an injury pattern and to have a high index of suspicion whenever treating a patient of polytrauma and to investigate such a patient in details to diagnose all the injuries possible.

Conflicts of interest-None

Written Informed consent of the patient-Taken

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