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A Rare Case of Ipsilateral "Floating Ileum" with Floating Hip and Floating Knee

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Learning Point of the Article:

In the light of available data, it can be safely concluded that floating ileum,floating hip and floating knee injuries are not simple skeletal injuries but often a part of polytrauma with other significant associated systemic injuries. The clinical outcome of these patients not only depend on proactive and optimum management of tibial,femoral and ileuml fractures but also on the management of associated injuries.

Abstract

Introduction: Concomitant ipsilateral floating hip with floating knee is a very rare injury pattern. Its co-occurrence with ipsilateral complete separation of ileum from pelvic girdle, which can be termed as "floating ileum," is even rarer. These are extremely high energy injuries associated with significant systemic insult adding to the dilemma and complexity in management. There is no mention in the literature about this potentially life-threatening injury combination; hence, an attempt has been made to provide a pathway of the management of this rare but complex injury pattern.

Case Report: We are presenting a case of 17-year-old male with this menacing amalgamation of injuries along with the challenges associated in the management. The patient had ipsilateral complete disruption of sacroiliac joint along with transverse fracture of acetabulum due to which ileac bone was completely separated from rest of the pelvic bone and was displaced anteriorly, superiorly, and medially. The patient was also having ipsilateral shaft of femur fracture and distal third tibia fracture and acute respiratory distress syndrome as well to further complicate the scenario.

Conclusion: Early damage control, followed by definitive fixation and aggressive rehabilitation, appears to be the safe and acceptable path to reach good clinical outcome.

Keyword: Floating hip, floating knee, floating ileum, floating, sacroiliac injury.

Introduction

Concomitant ipsilateral floating hip with floating knee is a rare injury. Its co-occurrence with ipsilateral complete separation of ileum from pelvic girdle, which can be termed as floating ileum, is even rarer. Injury of this volume poses great challenge even to an experienced orthopedic surgeon by virtue of its complexity. It is an indicator of high velocity trauma with fractures often just representing the tip of iceberg. The authors are presenting one such unique case. To best of the author's knowledge, there is no case reported in the literature of this menacing amalgamation of injuries.

Case Report

A 17-year-old male, presented to the emergency department of our institute, following road traffic accident. He was unable to stand after the accident and was complaining pain around left hip, left thigh, and leg. Patient was managed as per advance trauma life support protocol. On secondary survey, pelvic compression test was positive and tenderness was elicited over left thigh and leg. There was no distal neurovascular deficit. Radiological evaluation showed left transverse mid shaft femur fracture, spiral fracture distal third tibia, and transverse acetabulum fracture with complete disruption of sacroiliac (SI) joint (Fig. 1). Fracture of transverse process of L5 vertebra and

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Author's Photo Gallery


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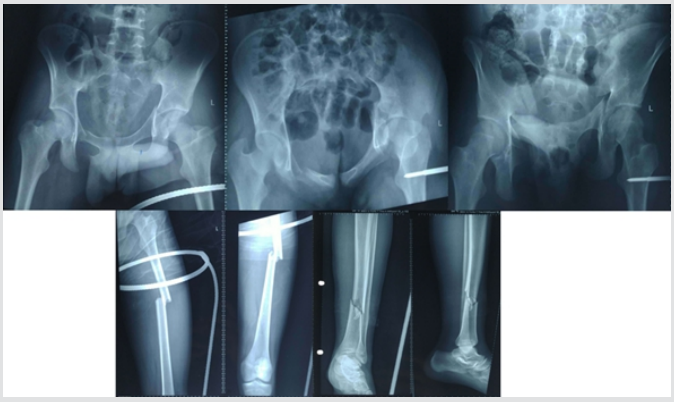

Figure 1: Pre-operative X-rays – anteroposterior, inlet and outlet views of pelvis, anteroposterior, and lateral views of femur and tibia showing sacroiliac joint disruption with transverse fracture of acetabulum, shaft femur, and shaft tibia fractures.

left superior and inferior pubic rami was also present. Computerized tomography (CT) was done to further appreciate the fracture geometry. CT showed superior and medial displacement of ileum which was completely separated from sacrum and also ischium and pubis through transverse fracture through ileum (Fig. 2).

Patient developed acute respiratory distress syndrome (ARDS) the same day and was intubated and shifted to critical care unit. As a measure of damage control orthopedics, tibia and femur were temporarily stabilized with external fixator. Patient was kept on ventilatory support for 2 weeks. One week after weaning off from ventilator, intramedullary nailing was done for both tibia and femur. Five days; thereafter, patient was planned for open reduction anterior and internal fixation of pelvis and acetabulum. SI joint dislocation was addressed first from lateral window of ilioinguinal approach along with anterior superior iliac spine osteotomy for enhanced exposure. As already it was about a month post-injury, reduction of ileum to its anatomic position was a sizable challenge, which was accomplished using following maneuvers in synergism. Axial traction was applied by an assistant. A Schanz Pin was inserted through the lateral aspect of ileum percutaneously, in a manner similar to iliosacral screw up to the articular facet under vision and was then withdrawn slightly. This Schanz Pin was used to apply lateral traction. A blunt Hohmann retractor was passed from under the

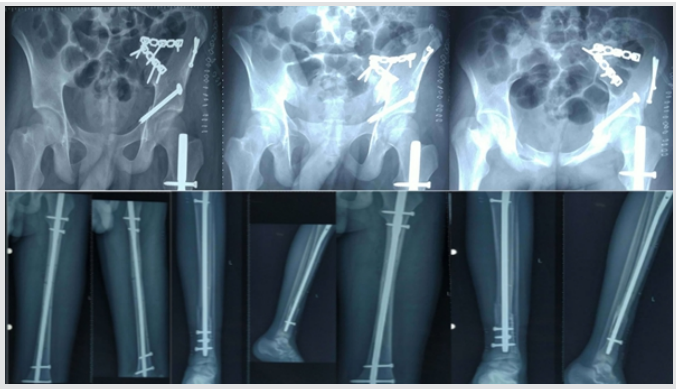

Figure 3: Anteroposterior, outlet and inlet views of pelvis, anteroposterior, and lateral views of femur and tibia.

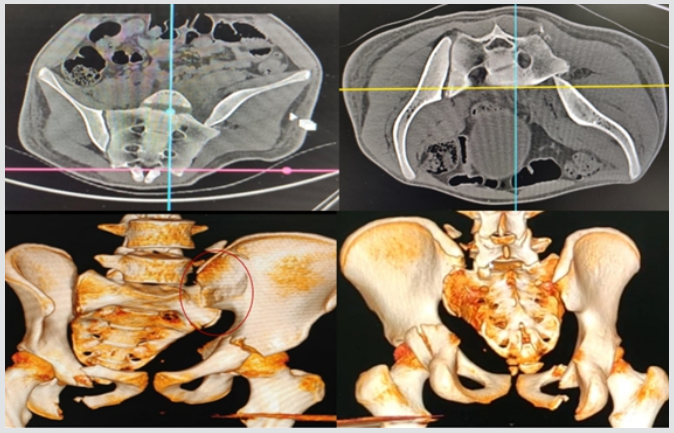

Figure 2: Pre-operative computerized tomography scan coronal, axial, and 3D reconstruction images showing superior, anterior, and medial migration of separated ileum fragment.

ileum up to lateral aspect of sacrum, protecting L5 nerve root. Maintaining the axial and lateral traction, Ileum was levered into its position and fixed anteriorly using recon plates. Acetabulum was then reduced using a picador through the same approach and fixed with 7 mm ccs inserted as anterior column screw. Post-operative radiographs are shown in (Fig. 3).

Postoperatively, patient had weakness in ankle dorsiflexion which completely recovered by 3 months. Aspirin 75 mg along with compression stockings was advised for 6 weeks in post-operative period as prophylaxis for deep vein thrombosis. There were no other complications. Patient was discharged on seventh post-operative day. Follow-up was scheduled at 2 weeks, 6 weeks, 3 months, 6 months, 1 year, and yearly thereafter. Sitting and partial weight bearing was allowed at 6 weeks. Radiograph at 6 months follow-up showed bony consolidation of all the fractures suggestive of fracture union and hence full weight bearing was initiated. Patient resumed his normal routine after 1 year.

Discussion

The term "floating" used in orthopedic literature to describe patterns of skeletal injuries with discontinuity of bones above and below a joint [1]. Term floating knee was introduced by Blake and Mcbryde in 1975 when they used this to describe ipsilateral fractures of femur and tibia resulting in a floating fragment consisting of knee joint [2]. The term floating hip injuries were first used Liebergall et al. in 1992 for ipsilateral femoral fractures associated with acetabular or pelvic fractures [3]. To fracture multiple bones in the same limb, it takes very high amount of energy which also dissipates in surrounding soft tissue. By the virtue of severity of injury, outcome in these patients is often dissatisfactory. In a large series of 224 patients with floating knee, Rollo et al. concluded that complication rates remain high with this combination of injury [4]. Bansal et al. in their series of 39 patients reported that floating knee injury was commonly associated with other severe injuries with head

injury being most common [5]. Ostrum et al. in their series of 20 patients treated with intramedullary nailing of both tibia and femur showed that 88% of these patients had excellent/good clinical outcome but complication rates were high especially at tibial site [6]. Hee et al. in their case series of 84 patients reported that 59 patients (70.2%) had excellent/good outcome [7]. They suggested that along with open fractures, smoking, and increasing age were predictors of delayed/non-union and delayed weight bearing and hence increase the chances of poor outcome. Dwyer et al. in their study comparing outcome of various treatment methods reported that clinical outcome was better in operative patient groups [8]. Hegagy et al. in their series of 15 patients reported excellent/good outcome in 80% patients [9]. Only two patients in their series had compound fractures (both on tibial side) and there was no mention of presence or absence of associated injuries. Rethnam et al. suggested that antegrade femoral and tibial nailing (two incisions) make treatment of knee ligament easier although a single incision technique (antegrade tibial and retrograde femoral nailing through a single incision at the knee) is a good technique in terms of speed and ease but the repair or reconstruction of a torn anterior or posterior cruciate ligament after a single incision technique can be a difficult proposition [10].

Term floating ileum has not been used in literature, but it is apt to use it in this scenario as ileum was completely separated from sacrum (through SI joint disruption) and ischium and pubis below (through transverse acetabulum fracture) resulting in a floating fragment of ileum, completely detaching it from rest of pelvic bone. This pattern of injury can be considered as a variant of vertical shear injury. Usually, in a vertical shear after disruption of posterior pelvic ring the fracture line passes anteriorly through the pubic symphysis or the ipsilateral superior and inferior rami. However, in this scenario, the fracture line was passing more superolaterally creating a transverse fracture of the acetabulum. As a result, ileum was completely separated from rest of the pelvis leading to its significant displacement in all the three planes, that is, superior, anterior, and medial. Development of ARDS was an indication of severity of systemic insult due to massive release of inflammatory markers. It also highlights the importance of damage control orthopedics in initial management of these complex injuries. Due to paucity of literature regarding these injuries, there is no standard protocol for management and every case should be dealt individually.

Conclusion

Ipsilateral fracture of femur and tibia along with complete disruption of SI joint and transverse fracture of acetabulum is a treacherous concoction of skeletal injuries and can lead to severe systemic insult. Management of these injuries is onerous and demands a planned multidisciplinary approach to reach an acceptable outcome. Early damage control, followed by definitive fixation and aggressive rehabilitation, appears to be the safe and acceptable path to reach good clinical outcome.

Clinical Message

Simultaneous occurrence of floating ileum, floating hip, and floating knee is one of the rarest combination and there is no standard protocol for management and its need a multidisciplinary approach. Early damage control, followed by definitive fixation and aggressive rehabilitation, is essential for good functional outcome.

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