

Isolated Luxatio Erecta Femoris – Case Series and Review of Literature

A S Arun Kumar¹, Jiju George¹, Ayyappan Nair¹

Learning Point of the Article:

Luxatio Erecta Femoris needs anticipatory knowledge, timely intervention and proper reduction methods for better outcome.

Abstract

Introduction: Luxatio erecta femoris or inferior hip dislocation is the rarest type of hip dislocation. It can be caused by a severe trauma to the hip and the mechanism of injury is often very complex. Very few cases have been reported in the literature, and often associated with other musculoskeletal injuries. Overall about 30 cases were reported till recently.

Case Presentations: We came across five cases of Luxatio erecta femoris from our six year study period from 2015 to 2020. All five cases were males (mean age-28.4 years, age range 20–40 years). All of them were isolated injuries (pure dislocation without any associated femur, acetabular, or pelvic fractures). We will present the details of these cases along with review of literature, trying to unravel the mechanism of such an injuries.

Conclusion: With the increase in high energy road traffic accidents, the incidence of luxatio erecta femoris in adults has increased. We could identify all those injuries and treated it with excellent clinical outcome. This type of rare dislocations if properly identified, we can manage it without much delay and very minimal complications.

Keywords: Luxatio erecta femoris, dislocation, trauma.

Introduction

In our present scenario, there is a significant incidence of Road Traffic Accidents (RTA). These high energy traumas are associated with increased incidence of hip dislocations. Posterior hip dislocations are the most common type encountered, but inferior dislocations can also occur and it is the rarest type of all the dislocations encountered. [1]. Luxatio erecta is the term commonly used to describe the inferior dislocation of shoulder and similarly in the hip region, the inferior dislocation is described as luxatio erecta of the hip or luxatio erecta femoris. [2]. The mechanism of such an injury is very complex. Patient can rarely recollect exactly what had happened and also there might be other

injuries too. There are very limited numbers of case reports in the literature and most of them are about pediatric hip dislocations and the mechanism of injury is entirely different from that of high energy trauma in an adult. [3]. In our tertiary care centre, we came across 5 five such cases in a time frame of 6 years, from 2015 to 2020, all of them were isolated luxatio erecta femoris. In this study, we are discussing the details of these cases along with the essential review of literature.

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Author's Photo Gallery



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Figure 1: Typical limb attitude in a patient with luxatio erecta femoris.



Figure 2: X-ray picture showing luxatio erecta femoris.



Figure 3: CT picture showing luxatio erecta femoris.

Case Report

Case 1

A 40 year old male sustained left hip injury following a RTA. He was the pillion rider on a motorcycle. A car hit the motorcycle and the pillion rider fell on his knee, the motorcycle and the rider fell on top of his back. He was brought to the emergency room (ER) with the lower limb flexed at the hip and knee, and thigh was supported with his own hands. (Fig. 1). Any movements attempted were refused by the patient due to pain. Radiologically, the hip was found dislocated inferiorly. A few attempts were made under sedation in the ER to reduce it, but failed. So closed reduction under general anesthesia was done.

Case 2

A 28-year- old male brought to the emergency room ER with history of injury to left hip while engaged in a well digging work. He was crushed under the falling rubble from a well he was digging. He sustained blunt chest injury also. He was brought to the ER by co-workers with his lower limb flexed and supported by hands under the thigh. Clinically and radiologically diagnosed to have left inferior hip dislocation. So closed reduction under general anesthesia was performed.



Figure 4: (a and b) Case No: 2 and Case No: 5 at 6 months follow-up period. Pain free ROM.No AVN

Case 3

A 30-year- old male sustained a RTA while traveling in a car. He was driving the vehicle when hit by a pickup lorry from the front. Details of the injury mechanism were not available. On presentation to the hospital, the attitude of the right lower limb was flexion, abduction at the hip and flexion at knee joint. Associated head injury was managed non operatively. Radiographs of the hip showed typical inferior hip dislocation (Fig. 2), which was treated by closed reduction under general anesthesia.

Case 4

A 24-year-old male was climbing a tree to trim its branches and leaves. One of the branches on which he stepped on broke off. Patient fell to the ground and landed on a flexed knee. He was brought to the ER with both hips and knees flexed. During examination one of the hips could be extended while the other was held tight by the patient. After doing clinical and radiological evaluation, patient was diagnosed with to have isolated inferior hip dislocation. Patient had a calcaneal fracture on the opposite limb as well which was treated conservatively. The hip was reduced under general anesthesia.

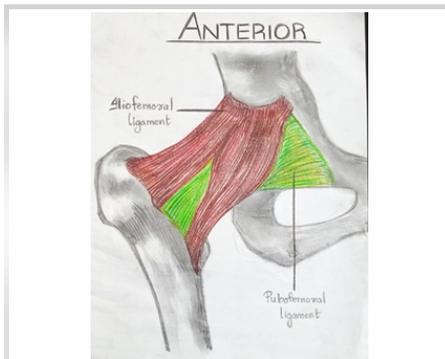


Figure 5: Schematic representation of anterior hip ligaments.

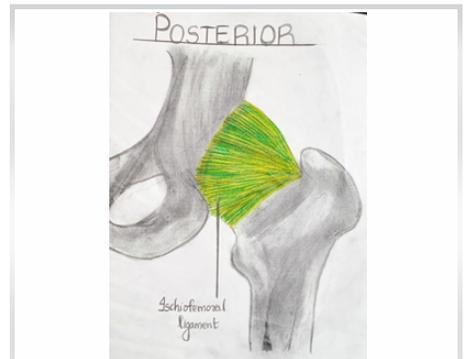


Figure 6: Schematic representation of posterior hip ligaments.

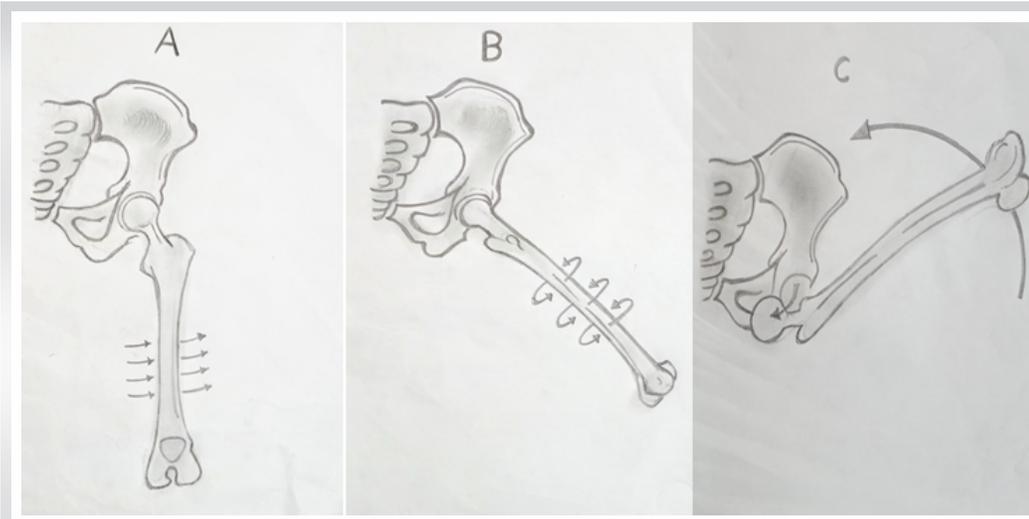


Figure 7: Mechanism of injury producing more common obturator type luxatio erecta of the hip. (a) The patient falls, or some other force is applied to the femur, which is forcibly abducted and (b) externally rotated. (c) As the forcible abduction and external rotation continues with flexion against the pelvis and lower abdomen, the femoral head is levered anteriorly out of the acetabulum.

initiated immediate post reduction period, for functional recovery in the follow-up period. All the cases were followed up for a period of 6 months. There was no pain, deformity, limitation of motion or features of avascular necrosis (AVN) in the radiographs, at the end of 6 months (Fig. 4a and 5b).

Discussion

The hip joint is a ball-and-socket joint that’s inherently stable due to its bony

architecture and powerful ligaments, allowing it to resist the abnormal destabilizing forces. The depth of the acetabulum, the labrum, joint capsule, muscular support, and surrounding ligaments contribute to the anatomical stability. The main ligaments stabilizing the joint from directional forces include the iliofemoral ligament and ischiofemoral ligament which are located anteriorly and the posteriorly, respectively (Fig. 5 and 6). Dynamic muscular support includes the rectus femoris, gluteal muscles, and short external rotators. [4]. Because the anterior ligaments are stronger, trauma to the hip commonly presents as a posterior dislocation (85%). Traumatic anterior dislocation accounts about 10% of

Case 5

A 20- year-sold female attempted suicide by jumping from about 50 ft height, brought to the emergency department with severe pain in the left hip, and deformity of left hip about 90° flexion, 15° abduction, and about 20° external rotation. No distal neurovascular impairment was there. She was having associated head injury and blunt trauma abdomen and chest. Radiologically diagnosed as inferior hip dislocation. After stabilizing her general condition, closed reduction of the dislocation under sedation was done.

Management Aand outcome

After stabilizing the general condition of patients in ER, computed tomography (CT) evaluation of hip was done to rule out any fractures. (Fig. 3). Closed reduction of hip under general anesthesia or intravenous sedation was done. Post- reduction review CT scan was done to rule out any intra-articular fragments or iatrogenic fractures. Skin traction for a period of 4 weeks was used in all the patients. Gradual supervised physiotherapy was

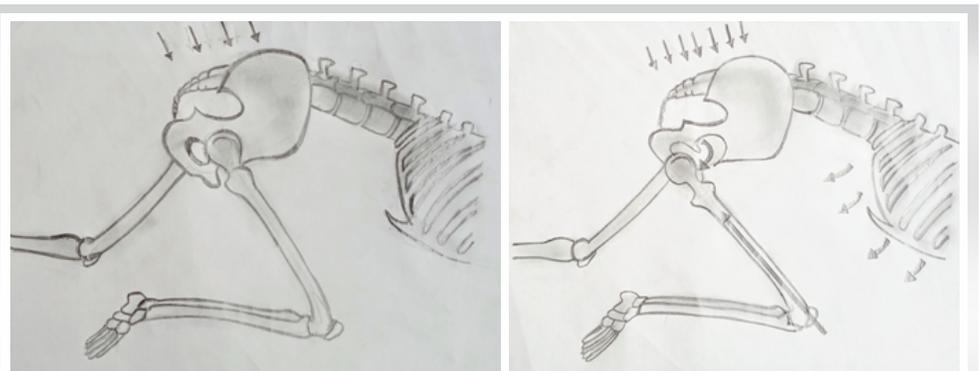


Figure 8: Mechanism of injury producing the rarer form of inferior ischial dislocation with femoral inversion. (a) The subject falls with the hip flexed upon the torso, landing on the flexed knee. The weight of the body and the momentum of the fall are transmitted to the fixed femur. (b) This force is enhanced by further flexion of the torso and, at times, the additional weight of a second body falling over the subject. The femoral head dislocates inferiorly through the shallow and relatively rimless inferior margin of the acetabulum



dislocations. [5]. Luxatio erecta femoris is a sub-type of anterior dislocation. [6, 7]. In the literature, it has been reported to occur generally following high-energy trauma and commonly seen with a concomitant femoral head or neck fracture. Isolated luxatio erecta is the rarest form. [8, 9].

MEDLINE, PubMed, and Google Scholar were searched using the key words: “Hip” and “inferior dislocation” or “luxatio erecta femoris” or “infracotyloid dislocation.” A total of 21 articles reporting on 24 men and 6 women aged 5– to 56 (mean, 25) years with 28 unilateral and one bilateral inferior dislocation of the hip were reviewed (Table 1) [2, 3, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27]. Two patients had a concurrent displaced fracture of the ipsilateral proximal femur. [18]. 1 One patient had an ipsilateral greater trochanter fracture post reduction which was managed surgically [22]. One patient had ipsilateral superior pubic rami fracture [23]. Six patients were children, [2, 3, 10, 12, 13], of whom 2 two were injured when another child fell onto their back as they fell. [3, 13]. Dislocation in children is usually secondary to low-energy trauma, owing to increased joint laxity and a shallow acetabulum [3]. The mechanism of injury included road traffic accidents (n = 13), falling while running (n = 4), sports related (n = 4), falling from a height (n = 5), falling from a bicycle (n = 1), and falling from a tree branch onto a leg (n = 1), and fall of wall over the body (n = 2). Most patients presented with an ischial-type dislocation, with extreme hip flexion, prominence of the greater trochanter, and the thigh touching the anterior abdominal wall, [10, 11, 12, 13, 14, 3, 15, 16, 19], whereas some presented with varying degrees of flexion, abduction, and external rotation, indicating an associated fracture, a chronic injury, or an obturator-type dislocation. [17, 18, 20] All dislocations were treated with closed reduction under sedation or general anaesthesia, followed by varying regimens of traction and restricted weight bearing. One patient with a chronic, neglected inferior dislocation of the hip underwent total hip arthroplasty and regained normal activity by 3 months [20]. One patient with a concurrent intertrochanteric proximal femoral fracture underwent open reduction (with the aid of a Schanz pin) and internal fixation (with a compression hip screw) [18]. One patient had a recurrent dislocation after a fall from a standing height one 1 year later. Two patients underwent operative treatment for shaft of femur fracture

(inter locking nailing) [9, 26]. All patients eventually achieved a full and pain-free range of hip motion, with no evidence of avascular necrosis of the femoral head. All children achieved normal hip development. Four patients were lost to follow-up. [13, 14, 16, 27, 28]. A limitation of this study was that meta-analysis was not performed and that only case reports and case series were reviewed.

The exact mechanism of injury is still debatable. The sequence of events resulting in the deformity are not always recollected as they are high energy injuries and the condition of the patient at the time of injury. When the hip dislocates inferiorly, it is flexed to an extent that the distal end of the femur rises above the horizontal plane of the pelvis at the acetabular fossae level. Two mechanisms of injury have been identified producing two different subtypes of inferior hip dislocation, that is, i.e. obturator subtype and ischial subtype [9]. The obturator dislocation has characteristic limb position and mechanism of injury. *Kolar Kolar et al.* suggested that extreme hip flexion coupled with lateral pressure might make head of the femur pushed through gap between ischiofemoral and pubofemoral ligaments with iliofemoral ligament acting as hinge. [19] (Fig 7). Ischial subtype could result from a fall from height, leading to an axial load to the femur in a flexed position or from an injury that forces the hip into wide abduction, the femur inverted and the head lying below the acetabulum alongside and lateral to the ischial tuberosity [26] (Fig. 8). The obturator type is the most commonest type [19].

Patients usually complain of pain and keep the thigh flexed. The long axis of the femur may vary in alignment with respect to the spine from parallel to an angle almost 90° away from the axis. A variety of circumstances have been mentioned in the literature which lead to inferior hip dislocation — fall from height to curb or the pavement below, falling while running, a heavy object falls over the back of the falling victim, etc. [9]. In our case 2, the impact was upon a flexed knee with the hip also in flexion. The knee impacted on the well floor and was then fixed. The body was flexed on the hip and its weight and the momentum of the fall were transmitted to the shaft of the femur, which was fixed at the knee. The forward momentum of the body and the weight of well wall falling over the body added to the loading of the femur, which was dissipated by escape of the femoral head through the

Table 1: Review of the literature regarding luxation erecta femoris

Study	Year	Sex/age (years)	Injury mechanism	Treatment	Outcome
Mauck and Anderson[10]	1935	F/6	Fall from a height	Closed reduction, bed rest 2 weeks	Recurrent dislocation at 1 year
Sankarankutty[11]	1967	M/7	Fall from bicycle	Closed reduction, traction 6 weeks, non-weightbearing 3 months	Full recovery at 6 months
Rao and Read[12]	1975	F/5	Fall while running	Closed reduction, traction 4 days, spica casting 4 weeks	Full recovery at 5 months
Abad Rico and Barquet[13]	1982	M/10	Fall while running	Closed reduction, traction 2 weeks, spica casting 3 weeks	Lost to follow-up
Eddy and Connell[14]	1988	F/28	Fall while running	Closed reduction, bed rest 4 days	Lost to follow-up
Beauchesne et al[3]	1994	M/7	Fall while running	Closed reduction, traction 3 days, toe-touch weight bearing 4 weeks	Full recovery at 18 months
Bartley and Dimon[15]	1995	F/23	Sports related	Closed reduction, traction 2 days, protected weight bearing 6 weeks	Slight discomfort at 6 years, no avascular necrosis
Brogdon and Woolridge[16]	1997	M/15	Sports related	Closed reduction, traction 2 weeks, toe-touch weight bearing	Lost to follow-up
Ferguson and Harris[17]	2000	M/35	Road traffic accident	Closed reduction, traction 3 days, toe-touch weight bearing	-
Singh et al[18]	2006	-	-	Open reduction, dynamic hip screw for concurrent intertrochanteric fracture, traction 2 weeks, protected weight bearing 2 months	Full recovery at 2.5 years
Kolar et al[19]	2011	M/37	Sports related	Closed reduction	Full recovery at 1 year, no participation in sports
Pankaj et al[20]	2011	M33	Road Traffic Accident 6 months earlier	Uncemented total hip arthroplasty owing to chronic dislocation	Full recovery at 3 months
Aggarwal et al[2]	2012	M/40, M/56, M/10, M/29	Road traffic accident, Road traffic accident (n=2), fall from a height, tree branch falling on a leg	Closed reduction, traction for 6 weeks	Full recovery at the mean of 6 months
Bhagwat et al[21]	2012	M30	Road traffic accident	Bilateral closed reduction, traction 6 weeks	Full recovery
Yang et al[22]	2014	M/47	Road Traffic Accident	Closed reduction. Post reduction Greater Trochanter fracture fixed with implant. Bed rest 3 weeks and crutch walk next 3 weeks	2 years full Range Of Movements(ROM)+ pain free
Jain et al[9]	2015	M17	Road traffic accident	Open reduction and internal fixation, antegrade intramedullary nailing for a displaced fracture of the left femoral shaft, non-weightbearing 6 weeks	Moderate heterotopic ossification at 4 years, no avascular necrosis(AVN)
Tekin et al[23]	2016	F26	Fall from height	Closed reduction under sedo analgesia	Expired post reduction due to complication of chest and abdominal injury
Ismael et al[24]	2017	M17	Road Traffic Accident	Closed reduction under General Anesthesia(GA) failed followed by open reduction. Immobilised for 6 weeks	3 months no dislocation or AVN
Kulambi et al[25]	2018	30 M	Road Traffic Accident	Closed reduction under GA. Thomas splint 3 weeks, partial weight bearing 3 weeks	6 months pain free normal ROM, No AVN
Dharmshaktu et al[26]	2020	M18-52	Road traffic accident Fall from height Fall of wall over body	All closed reduction. 1 case additional operative treatment of femoral shaft fracture(interlocking nail after hip reduction) non weight bearing for 3 weeks	Full recovery Variable follow up period
P. Agarwal et al[27]	2021	M25 M42 F29	Road traffic accident-2 Fall from height-1	Immobilized in Thomas splint for 1 month. At 1 month –ROM exercise. At 2 months – Partial weightbearing. At 4 months – Full weightbearing	1 lost follow up at 1 month. Others full recovery

relatively rimless inferior margin of the acetabulum. The femoral head came to rest lateral to the ischium.

In the treatment of traumatic luxatio erecta femoris, closed reduction is recommended through muscle relaxation under general anaesthesia or sedation, but at times open reduction is the next option [26]. Reduction can be attained by maintaining traction toward the head end of patient while gradually extending the thigh, sometimes

with additional internal rotation. [2, 29]. The hip is usually immobilized for 4 weeks followed by partial weight bearing. The results of the dislocation in most studies have been found good with good range of motion and no features of avascular necrosis in most reports [30].

Conclusion

Luxatio erecta femoris is a rare injury and very few cases

have been reported in the literature and a majority were in pediatric population. With the increase in high energy road traffic accidents, the incidence in adults has increased. Diagnosis is evident by the typical extremity position and by radiographs. Closed reduction by applying gentle extension and internal rotation with concurrent cephalad traction is usually possible under

general anesthesia or intravenous sedation. The prognosis after reduction is excellent.

Clinical Message

Luxatio erecta femoris, if properly identified and managed without delay, the clinical outcome will be excellent.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient's parents have given their consent for patient images and other clinical information to be reported in the journal. The patient's parents understand that his names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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