Bilateral Luxatio Erecta Humeri and Bilateral Knee Dislocations in the Same Patient

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ABSTRACT

Bilateral knee dislocations seldom occur, and fewer than a dozen cases of bilateral luxatio erecta humeri (erect dislocation of the shoulder) have been reported. Here we present the case of a patient who sustained bilateral knee dislocations and bilateral luxatio erecta humeri in a motorcycle accident. Transient neurologic compromise resolved with closed reduction of the bilateral shoulder and left knee dislocations. To our knowledge, this is the first case report of a patient with this combination of injuries.

Erect dislocation of the shoulder (luxatio erecta humeri) is a rare type of glenohumeral dislocation. Luxatio erecta occurs in fewer than 1% of glenohumeral dislocations.[1] Even more rare is a bilateral presentation in the same patient (fewer than a dozen cases have been reported). Complete dislocation of the knee is also a rare injury, with bilateral injuries being even more uncommon.[2] However, no other known case report illustrates bilateral luxatio erecta humeri and complete bilateral dislocation of the knees in the same patient. In addition to sustaining this extraordinary extremity trauma, the patient also developed severe hypothermia, with a markedly depressed core body temperature.

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Am J Orthop. 2007;36(11):611-613.

CASE REPORT

A man in his early 40s, brought to the emergency department by helicopter, presented on a backboard wearing a Philadelphia collar and with fixed elevation of arms above head, elbows bent, and cold left leg and foot. He had been thrown from his motorcycle approximately 100 feet, and approximately 8 hours had passed before he was discovered. The well-developed patient had no past medical history of musculoskeletal diseases or injuries. On physical examination, his core body temperature was 29°C. He was awake, oriented to person and place, and complained of numbness of both hands and left foot.

Examination of the upper extremities revealed that the patient's arms were abducted approximately 130° at the shoulders, flexed at the elbows, and pronated at the forearms. He had bilateral shoulder sulcus signs with palpable humeral heads in the axillae. He could move all his fingers on verbal command. Sensation was intact in the radial, median, and ulnar nerve distributions. Vascular examination revealed distal radial and ulnar pulses (detectable only by Doppler), but capillary refill in the nail beds of the fingers took fewer than 2 seconds.

Physical examination of the lower extremities revealed a neurovascularly intact right lower extremity with gross ligamentous instability. A Lachman test at 20° of knee flexion resulted in a complete anterior dislocation (grade 4). The posterior drawer test was grade 3. Varus stress test at 0° and 30° was also grade 3. Valgus stress testing at 0° was grade 1 and at 30° was grade 3. The left lower extremity had an anterior subcutaneous depression just proximal to the knee, with prominent femoral condyles posteriorly. The left foot was cyanotic and cold. There were no pedal pulses by Doppler ultrasound. Neurologic examination revealed complete motor and sensory deficits in the left ankle and foot for both the tibial and peroneal nerve distribution.

Radiographic examination confirmed the clinical diagnosis of bilateral erect dislocations (both subglenoid) of the glenohumeral joints and an unreduced anterior dislocation of the left knee (Figures 1-3). The right shoulder x-ray also showed a displaced greater tuberosity fracture. The superolateral aspects of the humeral heads were impacted beneath the inferior glenoid rims, with the humeral shafts parallel to the spines of the scapulae. Alignment of the right knee was grossly normal, but the gross degree of instability revealed that the right knee had also been dislocated and had spontaneously reduced.

With use of intravenous morphine sedation, closed reduction of the left knee was performed by longitudinal distal traction; an audible clunk occurred with knee reduction. Closed

Figure 1. Anteroposterior x-ray of right shoulder shows subglenoid luxatio erecta glenohumeral dislocation and displaced greater tuberosity fracture.

Figure 2. Anteroposterior x-ray of left shoulder shows subglenoid luxatio erecta glenohumeral dislocation.

reduction by gentle upward axial traction and abduction using a counteraction maneuver across the torso easily reduced both shoulders, and they remained reduced. The arms were then brought down into adduction and internal rotation, and strong radial pulses immediately returned. The left foot quickly warmed, and Doppler posterior tibial and dorsalis pedal pulses were obtained. Capillary refill took fewer than 2 seconds, and the foot became pink. Full neurologic function recovered within minutes, and the compartments of the lower leg were soft. Velpeau-type immobilizers were placed for the arms, and bilateral knee immobilizers were placed for the lower extremities. Postreduction x-rays showed anatomical reductions, with the only fracture being the displaced right greater tuberosity fracture. Arteriography of bilateral axillary and popliteal arteries showed no arterial injuries.

The patient subsequently developed compartment syndrome of the left lower leg over the next 4 hours, as it was reperfusing and warming, and 4-compartment fasciotomies were performed. Several irrigation and debridement procedures were performed for the left leg because of myonecrosis and deep infection secondary to the extent of myonecrosis. Anatomical open reconstruction of the posterolateral right knee structures, open reduction and internal fixation of the displaced right greater tuberosity fracture, and repair of the right rotator cuff were performed in 10 days, when the patient was stable enough to return to the operating room. Initial plans were for staged right knee arthroscopic anterior and posterior cruciate ligament reconstructions with allografts after the left leg wounds were healed and showed no evidence of infection. The left knee was not planned to be reconstructed acutely because of ongoing infection and the location of the fasciotomy incisions. The patient remained hospitalized for 3 weeks and underwent extensive rehabilitation. He was discharged to a nursing home and was subsequently completely lost to follow-up. Multiple attempts to locate him over a 4-year period have proved unsuccessful.

DISCUSSION

Luxatio erecta humeri was described initially by Middeldorpf and Scharm in 1859.[3,4] Incidence of this injury is estimated to be less than one half of 1% of all shoulder dislocations.[5] Bilateral luxatio erecta humeri is even less common, with less than a dozen known case reports.[6] The first case report of bilateral luxatio erecta humeri was described in 1920 by Murard.[7] Approximately 100 cases of luxatio erecta have been reported in the English-language literature.[1] Our patient's case is unique in that it appears to be the only one in which bilateral luxatio erecta humeri and bilateral knee dislocations occurred in the same patient.

The mechanism of injury for erect shoulder dislocations is through a violent abduction force or direct axial load on an already abducted upper extremity.[6] Clinical diagnosis is fairly easy to make because of the patient's fixed "hands up" position, with the shaft of the humerus in at least 120° of abduction[6] and the forearm pronated resting on the head.[1] Motion is understandably painful and vehemently resisted by the patient, who is unable to actively or passively lower his or her arms.[1]

Associated neurovascular injuries are frequent (ie, axillary nerve and artery) but usually spontaneously resolve with early reduction, as in our

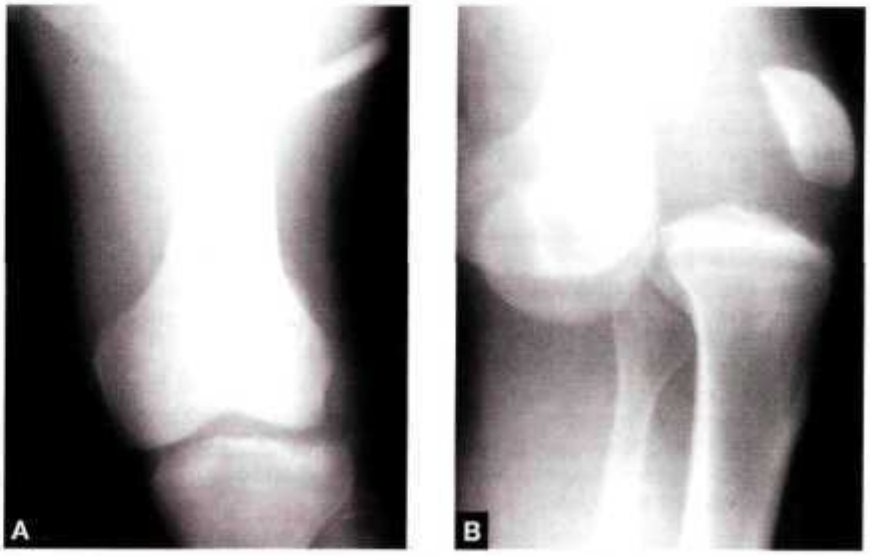

Figure 3. Anteroposterior (A) and lateral (B) x-rays of left knee show anterior left knee dislocation.

patient's case, as the compression on neurovascular structures is relieved. Recurrent dislocation and instability are less common consequences of the injury, with development of adhesive capsulitis being the more common pathologic sequelae.[1,8] Acute bony injuries about the shoulder girdle are common, including fractures of the clavicle, acromion, coracoid, scapula, and, most commonly, the greater tuberosity.[8,9] This was apparent in our patient's case (his right shoulder sustained a displaced greater tuberosity fracture). In many of these injuries, soft-tissue injuries include rotator cuff tears.[1] Radiographically, the humeral head may be beneath the inferior rim of the glenoid (subglenoid type, as in this patient) or in front of the neck of the scapula (subcoracoid type), as described by Newman.[16] The shaft of the humerus is parallel to the scapular spine.[1] Treatment is often closed reduction using a traction-countertraction force technique under general anesthesia or under conscious sedation.[1,8]

Complete dislocation of the knee is one of the most devastating lower extremity injuries. Knee dislocation has been defined as a knee with at least 3 of the 4 major ligamentous complexes torn, usually involving tears or avulsions of both cruciate ligaments and tears of the medial and/or lateral ligamentous complexes.[10] Incidence of lower extremity vascular injuries (usually popliteal artery injuries) associated with a high-velocity knee dislocation, as in this case, is approximately 33%,[10] and nerve injuries associated with high-velocity knee dislocations range from 14% to 35%.[8,11,12] For patients with a vascular injury secondary to a traumatic knee dislocation that has not been repaired within 8 hours, the amputation rate is approximately 85%.[9] Although our patient did not sustain a vascular injury by definition, his vascular perfusion was limited for at least 10 hours before presentation, and he sustained a compartment syndrome with significant myonecrosis and a secondary deep infection secondary to this occurrence.

Major ligamentous reconstruction is recommended within 2 weeks of injury or after vascular repair[10,13-15] and should be carried out only if there is no concern about infection or limb survival. In the meantime, the knee should be immobilized in full extension[10] to prevent posterior subluxation of the femur on the tibia. The current recommendation is to perform ligamentous repair or reconstructions of the torn ligamentous structures in order to decrease the pain, stiffness, and instability that follow knee dislocations. Lower extremities with a peroneal nerve injury generally have a poorer outcome and poorer knee function.[10] No current treatment promises to restore function to a nonfunctioning or stretched common peroneal nerve. Therefore, an ankle foot orthosis is used to keep the foot in neutral dorsiflexion,[10] or tendon transfers[16] are performed to address the resultant footdrop.

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AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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