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A CASE OF KNEE DISLOCATION

Dr Gurmeet Singh Sarla

Department of General Surgery, MH Devlali, Nasik, Maharashtra, India

Abstract

Traumatic knee dislocation is an uncommon but serious and potentially limb threatening injury because neurovascular injuries are commonly associated with these injuries.31 years old footballer presented with twisting injury while playing football and sustained dislocation of the Right knee joint. Closed reduction was done followed by POP immobilization. Vascular damage was ruled out by color Doppler studies. Knee dislocations may often reduce spontaneously, so a high degree of suspicion is of prime importance . Few injuries challenge both the athlete and the surgeon as much as knee dislocations and multiple ligament knee injuries, often raising the question of whether the athlete will ever be able to return to play. The treatment of knee dislocations has evolved from non-operative treatment to operative repair and reconstruction.

Keywords: Knee dislocation, Closed reduction, Popliteal artery damage, Peroneal nerve damage

Introduction

Knee dislocations are defined as clinical or radiological loss of tibiofemoral congruity. Traumatic knee dislocation is an uncommon but serious and potentially limb threatening injury because neurovascular injuries are commonly associated with these injuries and if not managed well, complications such as ischaemia, compartment syndrome and eventual amputation. Most often knee dislocations are caused by high-velocity trauma. Morbid obesity is associated with low energy or ultra low energy knee dislocations. Rapid identification of the injury, reduction, and definitive management are necessary to minimize neurovascular damage. Emphasis should be laid on diagnosing vascular injuries associated with knee dislocations. Knee dislocations reduce spontaneously and are associated with multiligament disruption.

Case Report

31 years old footballer presented to the department of General Surgery of a peripheral hospital in Nasik, Maharashtra, India with twisting injury while playing football and sustained dislocation of the Right knee joint.

Closed reduction was done followed by POP immobilization. Vascular damage was ruled out by color Doppler studies. He was further transferred to Orthopaedic centre for further management.

Discussion

Epidemiology

The true rate of knee dislocations is not known due to the number of spontaneous dislocations. Knee dislocations account for <0.02% of all orthopaedic injuries in the general population[1] and <0.5% of all joint dislocations[2].Road traffic accidents are the causative in approximately 50 % of knee dislocations followed closely (33%) secondary to sports injuries. The highest incidence was associated with snow skiing[3].

Extent of damage

Knee dislocations can be generally be considered to be associated with disruption of at least 2 out of 6 of the major ligamentous and cartilaginous structures, with or without instability. There is an associated high risk of neurovascular damage particularly to the popliteal artery and the common peroneal nerve, where they are tethered by the popliteal fossa boundaries and fibular head respectively ranging between 20-40% to as high as 64% for popliteal artery damage in some studies[4]. Knee dislocations often reduce spontaneously leading to a high rate of delayed presentation or missed diagnosis[5]. Complications of missed Knee dislocation can include vascular compromise, ischaemic limb, permanent nerve damage, popliteal vessel thrombosis, acute compartment syndrome requiring decompression fasciiotomies and even amputation[6].

Classification

Table 1

Kennedy's Classification of Knee Dislocation.

Direction	Frequency	Mechanism	Structures	Associated Damage
Anterior	40%	Hyperextension	ACL rupture first	Popliteal artery (Intimal tear)
Posterior	33%	Dashboard	PCL rupture first	Popliteal artery (Complete tear)
Lateral	18%	Varus/valgus stresses	Tibial plateau fractures	Peroneal nerve
Medial	4%	Varus/valgus stresses	Tibial plateau fractures	PLC damage

Table 2

Schenck and Wascher Classification

Group	Definition
I	Single cruciate only
II	Bi-cruciate disruption only (rare)
III	Bi-cruciate and posteromedial or postero-lateral disruption (common)
IV	Bi-cruciate and posteromedial and postero-lateral disruption
V	Dislocation with associated fracture

Anatomy

The knee complex is stabilized by 6 main ligamentous or cartilaginous structures as well as several muscles and tendons. Anterior and posterior tibial translations are prevented by the anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL), respectively[7]. Excessive valgus forces are restrained by the medial collateral ligament (MCL), whereas excessive varus forces are restrained by the lateral collateral ligament (LCL)[7]. The medial and lateral menisci transmit axial loads and stabilize against any rotational forces[7]. The muscles and tendons that aid in stabilizing the knee include the vastus lateralis, vastus medialis, vastus intermedius, rectus femoris, biceps femoris, semitendinosus, semimembranosus, sartorius, gracilis, iliotibial tract, popliteus, and gastrocnemius.

Neurovascular damage

The popliteal artery, because of its attachments to the knee proximally at the adductor hiatus and distally at the soleus arch, is injured in approximately 20% to 40% of all knee dislocations[8]. A patient with absent distal pulsations of the dorsalis pedis or posterior tibial artery needs an angiography. Upon angiographical confirmation of vascular injury, arterial repair for short segment injuries and interpositional grafts for long segment injuries is often needed. Patients with either asymmetric pulsations or ABI <0.9 need further workup with either a CT or MR angiography.

Although the peroneal nerve is not tethered to the knee, it can still be injured due to its anatomical location as it passes around the fibular neck[8]. Peroneal nerve injury has been shown to occur in up to 33% of knee dislocations[8]. Treatment options for complete nerve palsy include ankle-foot orthotic support, neurolysis, tendon transfer, nerve transfer, and combined nerve/tendon transfer. Treatment for partial nerve palsy included nonoperative, neurolysis, nerve transfer, and combined nerve/tendon transfer[9].

Management

Following Advanced Trauma Life Support (ATLS) management, attention should turn to the painful limb. Examination on secondary survey must pick up on both the obvious and subtle clues of acute neurovascular threat to the limb. If the knee joint is still dislocated, it is imperative that it is reduced without delay[10]. Distal pulses may not be a reliable test as with an intimal tear of the popliteal artery, pulses may still be present[11]. Ankle brachial pressure index (ABPI) should always be performed in this instance. It has been well established that if the ABPI is 0.9 or higher the likelihood of a serious arterial injury is mnimal[12].

Once life threatening injuries have been addressed , vascular integrity has been confirmed, and tibio-femoral congruity is achieved, decisions should be made regarding operative versus non-operative treatment, the timing of surgical intervention and the operative techniques to be employed.

Knee dislocations historically were treated in a cast or hinged brace for several weeks or months. Conservative treatment

generally consists of immobilization[13] ranging from 3 to 10 weeks. Conservative treatment is often chosen if the joint feels relatively stable postreduction[14] or if the patient is either older or sedentary with intact collateral ligaments[7]. Surgical treatment has proved to be much more beneficial for active patients, particularly with recent advances in surgical techniques[7]. Surgical treatment depends on which ligaments were injured and the severity of injury to those ligaments[14]. Generally, midsubstance tears are reconstructed and avulsed ligaments are repaired[15]. Repairs are often not as strong as reconstructions and are, therefore, less favored in treating knee dislocations[16].

Rehabilitation

Rehabilitation after a knee dislocation is dictated by both the specific ligaments injured and the method of treatment. Regardless, a patient who sustains a knee dislocation is faced with a long and arduous rehabilitation program, with return to full activity taking at least 9 to 12 months[17]. Even with a comprehensive rehabilitation program, it is less likely that the athlete who suffered dislocation of the knee would be able to compete at the same level as before the injury[18]. Upper and midbody exercises are started, along with single-leg stationary bicycling in order to maintain cardiovascular conditioning. Quadriceps strengthening is emphasized in order to prevent patellofemoral problems throughout the rehabilitation process. Range of motion should be limited from 90° of flexion to 45° of extension by a brace during early exercises in order to decrease the stretch on the healing knee ligaments.

Conclusion

Knee dislocation is a rare but serious and potentially limb threatening condition. Performing closed reduction for acutely dislocated knee joint is of vital importance to prevent neurovascular damage and potential for compartment syndrome and limb amputation. Missed diagnosis may be potentially disastrous. Knee dislocations may often reduce spontaneously, so a high degree of suspicion is of prime importance . Few injuries challenge both the athlete and the surgeon as much as knee dislocations and multiple ligament knee injuries, often raising the question of whether the athlete will ever be able to return to play. The treatment of knee dislocations has evolved from non-operative treatment to operative repair and reconstruction. The principles of treatment of multiligament injury include identification and treatment of all torn ligaments with accurate tunnel placement, anatomic graft insertion sites, utilization of appropriate and strong graft material, secure graft fixation, and supervised rehabilitation program. The heterogeneity, relatively rarity, and serious nature of these injuries have prevented consensus of treatment. Although controversies exist, it is now apparent that operative treatment results in better functional outcomes as compared to non-operative treatment, and athletes undergoing surgery within 3 weeks of injury have been shown to have higher return to sports as compared to those who undergo surgery in the chronic stage.

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