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ACUTE PATELLAR DISLOCATION: DIAGNOSIS AND INITIAL MANAGEMENT STRATEGIES IN THE EMERGENCY SETTING

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ABSTRACT Acute patellar dislocation represents a common knee injury, particularly among adolescents and young athletes, with a high recurrence rate if not properly managed. This review examines the mechanisms of injury, risk factors, clinical presentation, and evidence-based management strategies. The injury typically occurs through traumatic or non-traumatic mechanisms, often involving predisposing anatomical factors such as trochlear dysplasia or patella alta. Diagnosis relies on clinical examination and imaging (radiographs and MRI) to identify associated osteochondral injuries and assess ligamentous damage. Initial emergency management focuses on prompt reduction, immobilization, and pain control, with orthopedic referral indicated for irreducible dislocations or loose bodies. Rehabilitation plays a crucial role in recovery, emphasizing quadriceps strengthening and proprioceptive training, while recurrent cases may require surgical intervention, particularly MPFL reconstruction. A multidisciplinary approach ensures optimal outcomes, reducing the risk of long-term complications such as patellofemoral osteoarthritis.

KEYWORDS : Patellar Dislocation; Medial Patellofemoral Ligament; Osteochondral Fractures; Quadriceps Muscle; Joint Instability.

INTRODUCTION

Acute patellar dislocation accounts for 2-3% of all knee injuries, with particularly high incidence among adolescents and young adults due to their active lifestyles and developing musculoskeletal systems (1). This injury typically occurs through a combination of direct trauma, valgus stress, and forceful quadriceps contraction during sports activities or sudden changes in direction. The mechanism often involves the patella displacing laterally while the knee is in slight flexion, frequently resulting in damage to the medial patellofemoral ligament (1). Emergency evaluation must prioritize prompt reduction to restore normal patellar alignment and assess for associated complications such as osteochondral fractures, which occur in up to 40% of cases (2). Initial stabilization with immobilization and appropriate follow-up are crucial to prevent recurrent dislocations and long-term patellofemoral joint dysfunction (2).

Methods

A comprehensive literature review was conducted using four databases: PubMed, Embase, Scopus, and Web of Science. The search strategy employed keywords including "acute patellar dislocation," "emergency management," "medial patellofemoral ligament," and "reduction techniques," combined with Boolean operators. Articles were screened for relevance based on titles and abstracts, with inclusion criteria focusing on diagnosis, initial management, and recurrence prevention in emergency settings. After excluding duplicates and non-relevant studies, 15 key references were selected for final analysis, prioritizing recent evidence (2010-2023) and high-impact studies.

Mechanism of Injury and Risk Factors

Acute patellar dislocations typically occur through two distinct mechanisms. Traumatic cases often result from a sudden twisting motion with the foot planted (common in sports like basketball or soccer) or from a direct blow to the medial aspect of the knee (3). Non-traumatic dislocations frequently involve predisposing anatomical factors including trochlear dysplasia (abnormally shallow femoral groove), patella alta (high-riding patella), and generalized ligamentous laxity (4). These structural abnormalities significantly increase vulnerability to dislocation, even with minimal force.

The injury demonstrates clear demographic patterns, with peak incidence occurring between ages 10-17 years during adolescent growth spurts (5). Females are particularly susceptible due to their typically wider Q-angle (the angle between quadriceps pull and patellar tendon), which creates greater lateral force vectors on the patella (3). Athletes participating in pivoting sports account for approximately 60% of cases, with basketball, soccer, and gymnastics being most frequently implicated (4). Additional risk factors include previous dislocation (recurrence rates approach 50% in untreated cases), femoral anteversion, and inadequate vastus medialis obliquus (VMO) muscle development (5). Understanding these mechanisms and risk profiles is essential for both prevention strategies and accurate diagnosis in emergency settings.

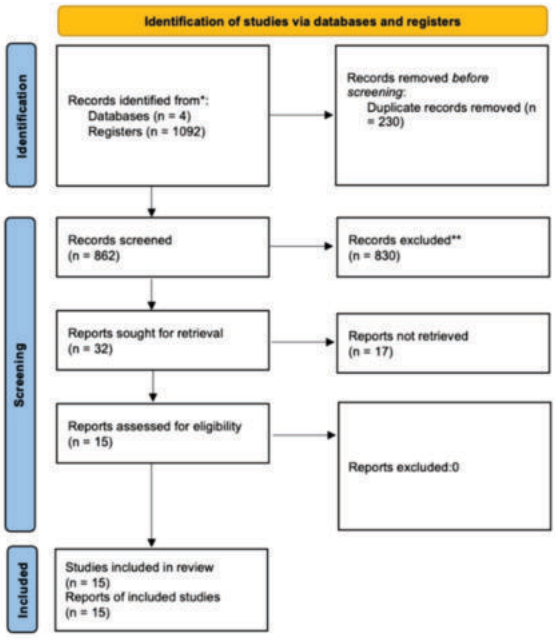

Figure. PRISMA.

Clinical Presentation of Acute Patellar Dislocation

Acute patellar dislocation presents with a characteristic constellation of symptoms and physical findings that facilitate prompt recognition in emergency settings. Patients typically describe a sudden onset of severe knee pain accompanied by an immediate sensation of the "knee giving way" or frank deformity, often during athletic activity involving pivoting or direct trauma (6). The overwhelming majority (approximately 93%) report an inability to bear weight immediately following the injury, with rapid development of swelling due to hemarthrosis, which usually becomes clinically evident within

2-3 hours post-injury (7).

On physical examination, the most striking finding is often visible lateral displacement of the patella in complete dislocations, though spontaneous reduction may occur before evaluation (8). The apprehension test—performed by gently attempting to glide the patella laterally with the knee in 20-30° of flexion—provides a highly sensitive (up to 98%) indicator of patellar instability when it reproduces pain or defensive muscle contraction (9). Palpable effusion, present in nearly all cases, reflects either hemarthrosis from medial patellofemoral ligament (MPFL) rupture or potentially more concerning osteochondral injury (6).

Careful Assessment Should Document

1. Tenderness along the medial patellar border (MPFL insertion)
2. Range of motion limitations (typically 20-90° arc due to pain/swelling)
3. Joint instability during gentle stress testing (7)

The presence of a large effusion with crepitus raises suspicion for associated osteochondral fractures, which imaging studies must evaluate (8). While most patients report dramatic symptom improvement after reduction, persistent medial knee tenderness and mechanical symptoms may indicate retained loose bodies or cartilage flaps requiring orthopedic consultation (9).

Diagnostic Approach for Acute Patellar Dislocation

The evaluation of acute patellar dislocation requires a systematic approach combining imaging and careful clinical assessment. Initial radiographic evaluation should include standard anteroposterior (AP) and lateral knee views, complemented by a Merchant or sunrise view to properly assess patellofemoral alignment (10). These images serve to identify associated fractures, particularly osteochondral lesions of the patella or lateral femoral condyle (present in 25-50% of cases), as well as evaluate for predisposing anatomical factors such as patella alta or trochlear dysplasia (11).

When available, magnetic resonance imaging (MRI) provides critical soft-tissue evaluation, demonstrating medial patellofemoral ligament (MPFL) tears in over 90% of acute dislocations (12). MRI proves particularly valuable for detecting occult osteochondral fragments, assessing cartilage integrity, and evaluating the extent of medial retinacular injury - findings that significantly influence management decisions (10). The axial (transverse) MRI sequences best visualize patellar tracking abnormalities and trochlear morphology, while coronal views help identify bone bruise patterns pathognomonic for transient patellar dislocation (11).

The differential diagnosis must consider other common knee injuries that may mimic patellar dislocation, including:

1. ACL tears - which typically present with immediate large effusion but maintain normal patellar tracking
2. Meniscal injuries - often causing mechanical symptoms without patellar instability
3. Patellar fractures - evident on radiographs but lacking the characteristic medial tenderness of MPFL injury (12)

Clinical correlation remains essential, as up to 50% of patellar dislocations reduce spontaneously before evaluation, potentially leading to diagnostic uncertainty (10). In such cases, the combination of medial knee tenderness, positive apprehension sign, and characteristic bone bruise pattern on MRI (lateral patella/medial femoral condyle) confirms the diagnosis (11). This comprehensive diagnostic approach facilitates appropriate triage, distinguishing patients requiring urgent surgical intervention (those with loose bodies or large osteochondral defects) from those suitable for conservative management (12).

Initial Management of Acute Patellar Dislocation in the Emergency Department

The emergency management of acute patellar dislocation follows a structured approach focused on prompt reduction, stabilization, and identification of complications requiring orthopedic intervention. Approximately 50% of dislocations reduce spontaneously before evaluation, but for persistent cases, manual reduction should be attempted immediately (10). The preferred technique involves gradual knee extension while applying gentle medial pressure to the laterally displaced patella, a maneuver successful in >90% of cases (11). Moderate sedation (e.g., with propofol or ketamine) may be necessary when significant pain or quadriceps spasm impedes reduction. Following successful reduction, clinicians must confirm stability through palpation of the patellofemoral joint and assessment of passive range of motion (typically 0-90° initially) (12).

Immobilization represents a critical next step, with current evidence supporting use of a knee immobilizer or hinged brace locked in 0-30° flexion for 1-2 weeks to allow MPFL healing (13). Patients should ambulate with crutches, weight-bearing as tolerated, with particular caution advised for those with concomitant osteochondral injuries. Pain and swelling control follows a multimodal approach: scheduled NSAIDs (e.g., ibuprofen 600mg q8h) address both discomfort and inflammation, while cryotherapy (ice packs for 20 minutes hourly) helps reduce hemarthrosis development (14). Elevated positioning above heart level further minimizes swelling during the initial 48 hours.

Orthopedic consultation should be obtained emergently for absolute indications including irreducible dislocations (requiring possible open reduction) and radiographically evident osteochondral fractures or loose bodies (10)(12). Relative referrals include cases with:

1. High-risk anatomical variants (trochlear dysplasia, patella alta) on imaging
2. Second or subsequent dislocations
3. Concerning physical exam findings (mechanical block, severe medial ligamentous laxity) (13)

Approximately 15-20% of cases ultimately require surgical intervention, particularly adolescents with predisposing anatomy or athletes seeking to return to pivoting sports (14). All patients should receive urgent orthopedic follow-up within 1-2 weeks for reassessment of stability and initiation of guided rehabilitation focusing on vastus medialis strengthening and proprioceptive training (11). This comprehensive ED approach minimizes both short-term complications (re-dislocation, persistent hemarthrosis) and long-term sequelae (patellofemoral arthritis, chronic instability).

Follow-Up and Rehabilitation

Following initial stabilization, structured rehabilitation is essential to restore function and prevent recurrence. Early physical therapy (initiated 2-3 weeks post-injury) focuses on progressive quadriceps strengthening, particularly targeting the vastus medialis obliquus, combined with proprioceptive training to improve dynamic patellar stability (15). While most first-time dislocations respond well to conservative management, recurrent instability (occurring in 15-40% of cases) often necessitates surgical consideration (15). MPFL reconstruction has emerged as the gold standard for recurrent dislocations, demonstrating >90% success rates in stabilizing the patellofemoral joint and allowing return to sports (14,15). Close monitoring for 6-12 months is recommended to assess functional recovery and identify patients requiring intervention.

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