

ORTHOPAEDIC AND FRACTURE

Lower limb trauma (lec 4)

Dr. Ali Saleh Aljanabi

M.B.Ch.B F.I.C.M.S ortho

Injuries of the knee and leg

- MCL is the primary stabilizer Valgus stresses
- Iliotibial band and lateral collateral ligament (LCL) resist the main varus angulation
- Cruciate (ACL),(PCL) ligaments provide anteroposterior and rotary stability.

ACUTE KNEE LIGAMENT INJURIES

Clinical features

- History of a twisting injury ,painful and (usually) swollen knee – and, in contrast to meniscal injury, the swelling appears almost immediately.
- Tenderness is most acute over the torn ligament, and stressing one or other side of the joint may produce excruciating pain.
- Partial tears permit no abnormal movement, but the attempt causes pain. Complete tears permit abnormal movement, which sometimes is almost painless.

Imaging

- *Plain x-rays* may show that the ligament has avulsed a small piece of bone
- *Stress films* (if necessary under anaesthesia) show whether the joint hinges open on one side
- *Magnetic resonance imaging (MRI)* is helpful in distinguishing partial from complete ligament tears. This may also reveal ‘bone bruising’

Treatment

SPRAINS AND PARTIAL TEARS

- **RICE (rest , ice , compression , exercise)**

COMPLETE TEARS

MCL tear , long cast for 6 weeks and there after graded exercises are encouraged.

LCL tear are rare. If the diagnosis is certain, these can be treated conservatively as for *MCL* tears.

ACL tear should be by early operative reconstruction

PCL tear are treated conservatively.

Complications

1. *Adhesions*
2. *Ossification* in the ligament
3. *Instability* , repeated injury predisposes to osteoarthritis.

CHRONIC LIGAMENTOUS INSTABILITY

Clinical features

The patient complains of giving way. The joint looks normal apart from slight wasting; there is rarely tenderness but excessive movement in one or more directions can usually be demonstrated. Diagnosed by MRI

Arthroscopy

indicated if: **(1)** the diagnosis, or the extent of the ligament injury, remains in doubt;
(2) other lesions, such as meniscal tears or cartilage damage, are suspected;
(3) surgical treatment is anticipated.

Partial meniscectomy and removal of loose cartilage tags can be performed at the same time.

Treatment

Most patients with chronic instability have reasonably good function and will not require an operation.

The indications for operation are:

1. Recurrent locking
2. Intolerable symptoms of giving way;

3. Suboptimal function in a sports person or others with similarly demanding occupations

4. Ligament injuries in adolescents (the long-term effects of chronic instability in this group are more marked).

RUPTURE OF QUADRICEPS TENDON

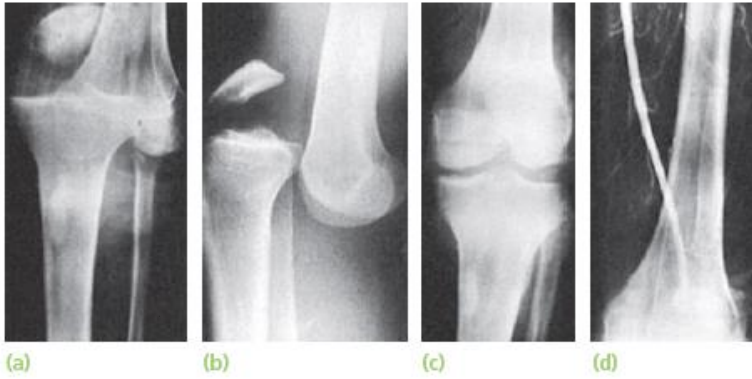
Usually elderly with one of the following (diabetes, rheumatoid disease, corticosteroids). Occasionally acute rupture is seen in a young athlete. Clinically tearing pain and giving way of the knee. There is bruising and local tenderness; sometimes a gap can be felt proximal to the patella. Active knee extension is either impossible, The diagnosis can be confirmed by MRI.

Treatment

- *Partial tears*, plaster cylinder 6 weeks, followed by physiotherapy.
- *Complete tears*, Early operation is needed, or else the ruptured fibres will retract and repair will be more difficult. Early supervised movement through the brace is important to prevent adhesions, the repair heals over the next 12 weeks.

DISLOCATION OF KNEE

- Occurs in a road accident and the cruciate ligaments and one or both lateral ligaments are torn.
- Clinically rupture of the joint capsule produces a leak of the haemarthrosis, leading to severe bruising and swelling. the foot must be examined because the popliteal artery may be torn or obstructed.
- *X-ray* In addition to the dislocation, the films occasionally reveal a fracture of the tibial spine or posterior part of the plateau (cruciate ligament avulsion), avulsion of the fibular styloid or avulsion of a fragment from the near the edge of the lateral tibial condyle (the *Segond fracture*).
- *ABPI should be at least 0.9*
- *Arteriography* may be needed
- Treatment is reduction under anaesthesia; this is usually achieved by pulling directly in the line of the leg, but hyperextension must be avoided because of the danger to the popliteal vessels and arterial injury should be excluded
- Complications EARLY (Arterial damage , *Nerve injury*)
LATE (*Joint instability , Stiffness*)



30.12 Knee dislocation and vascular trauma (a,b) This patient was admitted with a dislocated knee. After reduction (c) the x-ray looked satisfactory, but the circulation did not. (d) An arteriogram showed vascular cut-off just above the knee; had this not been recognized and treated, amputation might have been necessary.

FRACTURED PATELLA

Direct injury – usually a fall onto the knee or a blow against the dashboard of a car – causes .

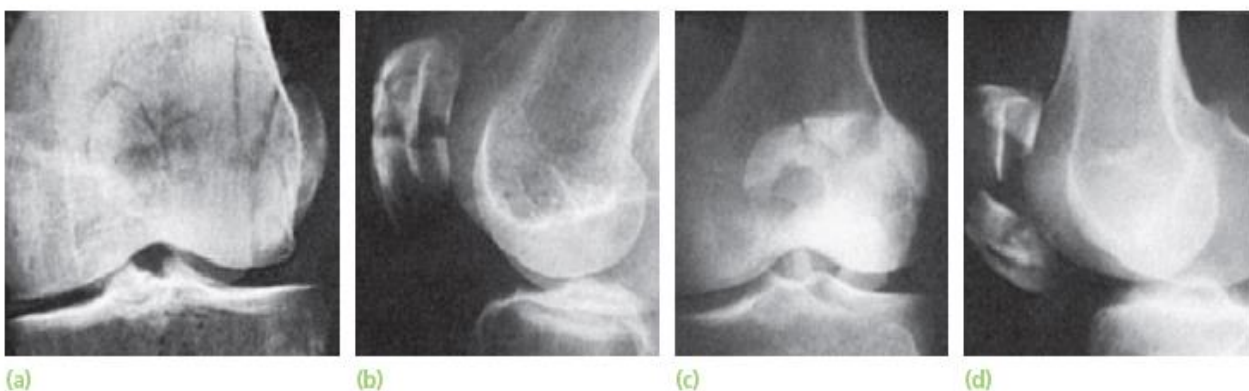
Indirect injury occurs, typically, when someone catches the foot against a solid obstacle and, to avoid falling, contracts the quadriceps muscle forcefully.

Clinical features

- Swollen and painful knee . bruising over the front of the joint.
- Tenderness and a gap can be felt. If there is an effusion, aspiration may reveal the presence of blood and fat droplets.

X-ray

fine fracture lines without displacement, multiple fracture lines with irregular displacement or a transverse fracture with a gap between the fragments, A fracture line running obliquely across the superolateral corner of the patella should not be confused with the smooth, regular line of a (normal) **bipartite patella**.



30.14 Fractured patella – stellate (a,b) A fracture with little or no displacement can be treated conservatively by a posterior slab of plaster that is removed several times a day for gentle active exercises. (c,d) With severe comminutions, patellectomy is arguably the best treatment, although some surgeons would consider preserving as many useful fragments as possible.

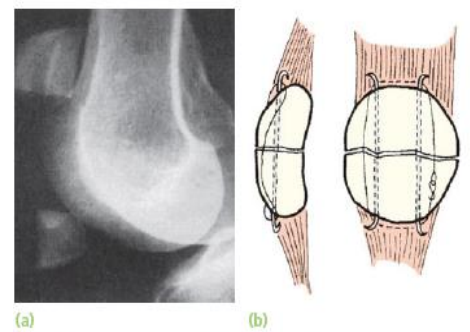
Treatment

Undisplaced or minimally displaced fractures ;conservative

Comminuted (stellate) fracture The extensor expansions are intact and the patient may be able to lift the leg. Undersurface of the patella is irregular and there is a serious risk of damage to the patellofemoral joint. For this reason some people advocate patellectomy, To others it seems reasonable to preserve the patella if the fragments are not severely displaced, a hinged brace is used.

Displaced transverse fracture

Operation is essential. The fragments are reduced and transfixed with two stiff K-wires; flexible wire is then looped tightly around the protruding K-wires and over the front of the patella (tension band wiring)



30.15 Fractured patella – transverse The separated fragments (a) are transfixed by K-wires; (b) malleable wire is then looped around the protruding ends of the K-wires and tightened over the front of the patella.

DISLOCATION OF PATELLA

traumatic dislocation is due to indirect force: sudden, severe contraction of the quadriceps muscle while the knee is stretched in valgus and external rotation.

Predisposing factors (genu valgum, tibial torsion, high- shallow intercondylar groove, as well as patellar hypermobility riding patella (patella alta) and a due to generalized ligamentous laxity or localized muscle weakness).

Clinical features tearing sensation and a feeling that the knee has gone ‘out of joint’; may collapse and fall to the ground.the knee may be swollen and there may be bruising and tenderness on the medial side.

Imaging

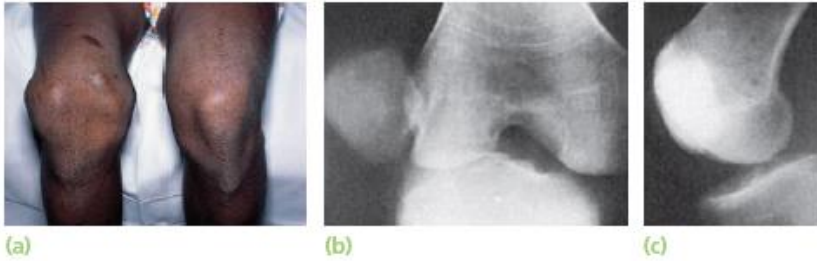
AP , lateral and (‘skyline’) *x-ray views* are needed. In an unreduced dislocation,

Treatment

patella can be pushed back into place Then cast is retained for 2 or 3 weeks and the patient then undergoes a long period (2–3 months) of quadriceps strengthening exercises.

Complications

- *Recurrent dislocation*; Patients treated non-operatively for a first-time dislocation have a 15–20% chance of recurrence .



30.16 Dislocation of the patella (a)
The right patella has dislocated laterally; the flattened appearance is typical.
(b,c) Anteroposterior and lateral films of traumatic dislocation of the patella.

TIBIAL PLATEAU FRACTURES

Mechanism of injury

varus or valgus force combined with axial loading

Schatzker classification

Type 1 – vertical split of the lateral condyle

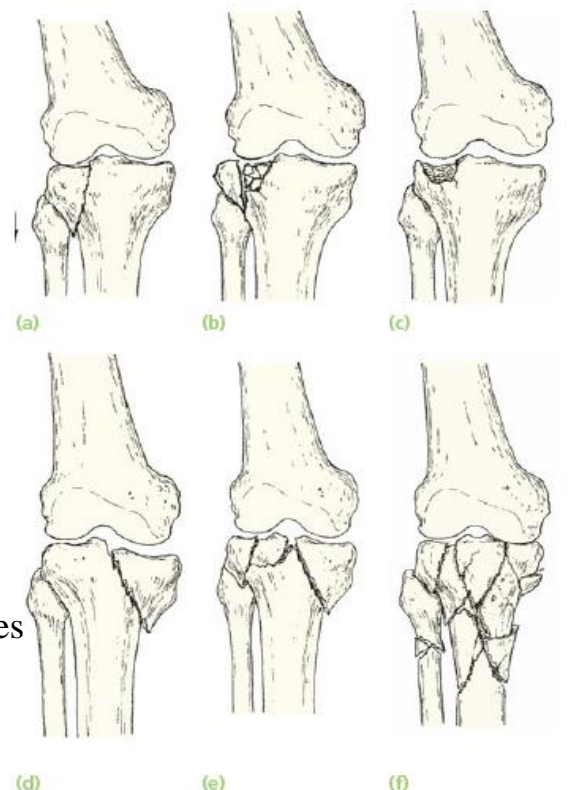
Type 2 – type 1 with depression of an adjacent loadbearing part of the condyle

Type 3 – depression of the articular surface with an intact condylar rim

Type 4 – fracture of the medial tibial condyle

Type 5 – fracture of both condyles

Type 6 – combined condylar and subcondylar fractures



Clinical features

Swollen knee and may be deformed. Bruising is usually extensive and the tissues feel ‘doughy’ because of haemarthrosis.

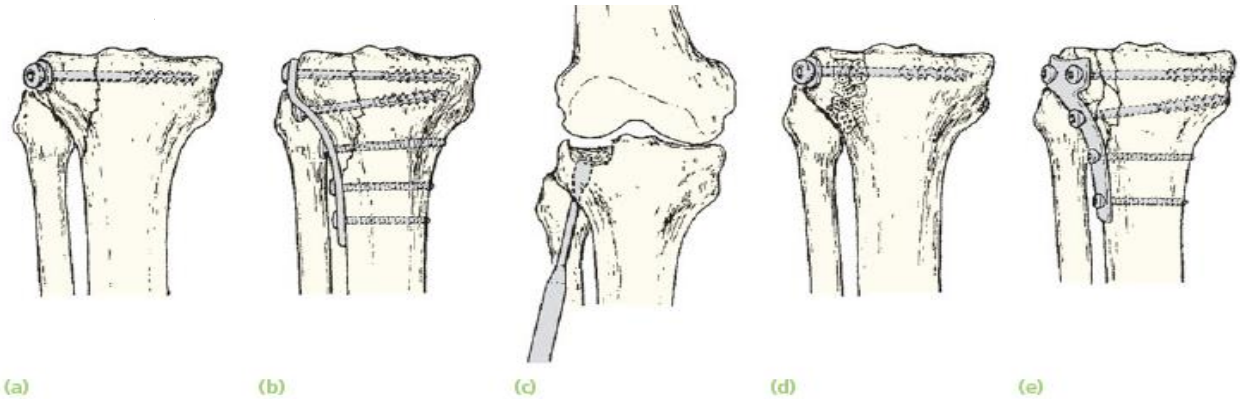
Imaging

AP, lateral and oblique x-rays will usually show the fracture and Ct scan is needed

Treatment

Undisplaced , conservative

Displaces need operative treatment. According to soft tissue status and type of fracture



30.21 Tibial plateau fractures – fixation (a) Two or three lag screws may be sufficient for simple split fractures (type 1), though (b) a buttress plate and screws may be more secure. (c) Depression of more than 5 mm in a type 3 fracture can be treated by elevation from below and (d) supported by bone grafts and fixation. (e) Type 2 fractures require a combination of both techniques – direct reduction, elevation of depressed areas, bone grafting and buttress plate fixation.

Complications

• EARLY

Compartment syndrome – With closed types 4 and 5 fractures there is considerable bleeding and swelling of the leg – and a risk of compartment syndrome.

• LATE

1. *Joint stiffness*
2. *Deformity* Some residual valgus or varus deformity is quite common
overloading of one compartment may predispose to osteoarthritis in later life.
3. *Osteoarthritis*

FRACTURES OF TIBIA AND FIBULA

A twisting force causes a spiral fracture of both leg bones at different levels;

Indirect injury is usually low energy; with a spiral or long oblique fracture one of the bone fragments may pierce the skin from within.

Direct injury crushes or splits the skin over the fracture; this is usually a high-energy injury and the most common cause is a motorcycle accident.

Pathological anatomy

choice of treatment – depends on 1. *The state of the soft tissues*

2. *The severity of the bone injury*

3. Stability of the fracture – Severely comminuted fractures are the least stable of all, and the most likely to need mechanical fixation.

4. *Degree of contamination* – In open fractures this is an important additional variable.

Management

The main objectives are: (1) to limit soft-tissue damage and preserve (or restore, in the case of open fractures) skin cover; (2) to prevent – or at least recognize– a compartment syndrome; (3) to obtain and hold fracture alignment;

(4) to start early weight bearing (loading promotes healing);

(5) to start joint movements as soon as possible.

LOW-ENERGY FRACTURES

undisplaced or minimally displaced, a full-length cast from upper thigh to metatarsal necks is applied with the knee slightly flexed and the ankle at a right angle.

Displaced it is reduced with x-ray control. alignment must be near-perfect (no more than 7 degrees of angulation) and rotation absolutely perfect

- The limb is elevated and the patient is kept under observation for 48–72 hours.
- After 2 weeks the position is checked by x-ray. A change from an above- to a below-the-knee cast is possible around 4–6 weeks, when the fracture becomes ‘sticky’. The cast is retained (or renewed if it becomes loose) until the fracture unites, which is around 8 weeks in children but seldom under 12 weeks in adults.

Displaced or comminuted fracture treated by operation using *either intramedullary nailing , Plate fixation or External fixation*

Complications

- **Early** ;vascular injury , compartment syndrome , infection
- **Late**; Malunion , *Delayed union , Non-union , Joint stiffness , Osteoporosis , complex Regional pain syndrome*

