Injuries of the knee and leg

Acute knee ligaments injuries

The bony structure of the knee joint is inherently unstable , but the the strong capsule, intra and extra-articular ligaments and controlling muscles provide stability.

Valgus stresses are resisted by fascia lata , pes anserinus, superfacial and deep layers of the medial collateral ligament and posteromedial part of the capsule .In full extension all these structures , as well as anterior cruciate ligament (ACL) , act together to prevent both valgus and rotation.At 30 of flexion , the medial collateral ligament is the main stabilizer.

The main checks to varus angulation are the illiotibial tract and the lateral collateral ligament(LCL).

The cruciate ligaments provide both anteriopsterior and rotary stability.

Injuries of the knee ligaments are common ,particularly in sport and RTA, where they may be associated with fractures and dislocation. They vary in severity from simple strain to complete rupture.

Most ligaments injuries occur while the knee is bent, when the capsule and ligaments are relaxed and the femur is allowed to rotate on the tibia.

Clinical presentation-

The patient gives a history of twisting injury and may even claim to have heard a pop as the tissue snapped, the knee is swollen which appear immdiatley.there is pain and tenderness is most acute over the torn ligament, and stressing one or other side of the joint may produce severe pain . With complete tear the patient may have little or no pain , whereas with partial tear the knee is painful , swelling also is worse with partial tear, because the haemorhage remains confined the knee joint , with complete tear the ruptured capsule permits leakage and diffusion. With partial tear attempted movements is always painful, the abnormal movements of complete tear is often painless or prevented by spasm. Abrasion suggest the site3 of impact , but bruising is more important and indicates he site of damage . The doughy feel of haemarthrosis distinguishes ligament injuries from meniscus injury with fluctuant feel. Tenderness localizes the lesion , but the sharply defined tender spot of partial tear contrast with the diffuse tenderness of complete one. The entire limb should be examined for other injuries and for vascular and nerve damage.

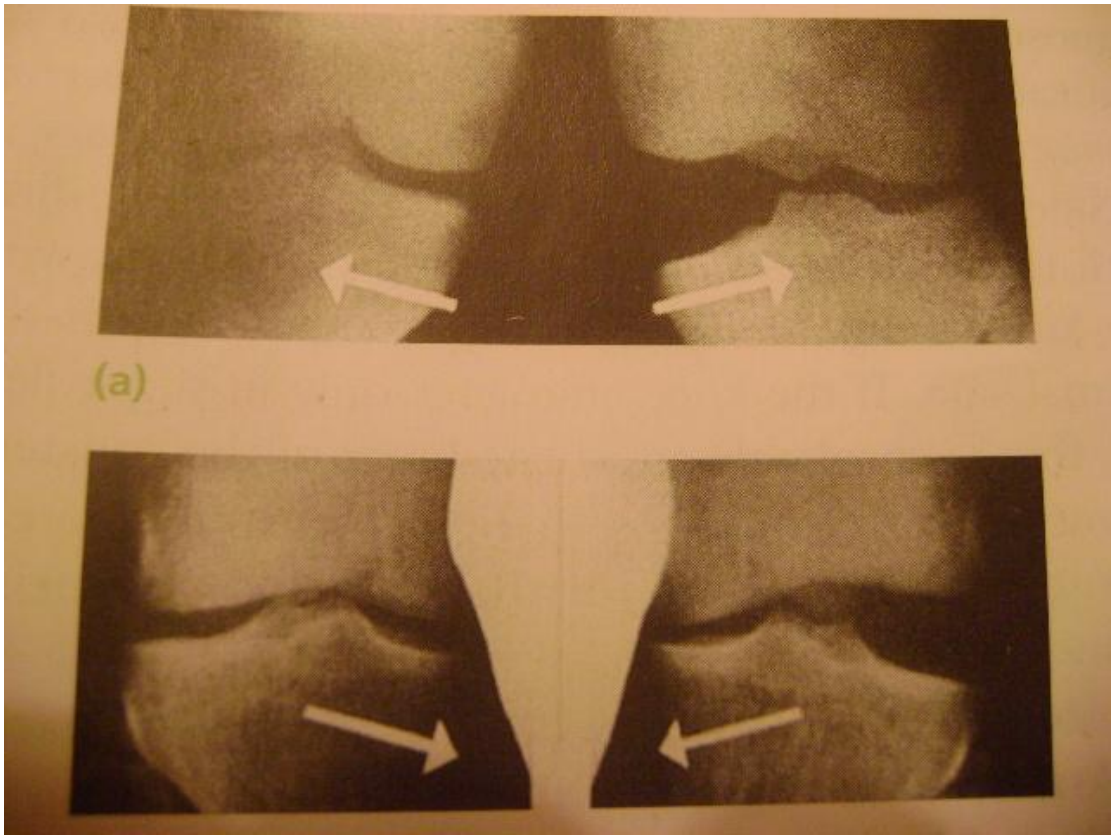
The most important aspect of examinations is to test for stability , partial tear permit no abnormal movements but causes pain. Complete tears permits abnormal movements which sometimes is painless. To distinguish between the two is important because their treatment is different , so if there is doubt , examination under anesthesia is mandatory.

Imaging –plain x- ray may show that ligament has avulsed a small piece of bone – the medial ligament usually from the femur , the lateral ligament from the the fibula , the anterior cruciate ligament from the tibial spine and the posterior cruciate ligament from the back of upper tibia.

Stress film demonstrates if the joint hinge open on one side .

MRI is sometimes needed to distinguishes partial tear from complete tears.CT scan may help to define osteo-articular fractures prior to internal fixation.

Arthroscopy is needed if there suspicions of isolated tear anterior cruciate ligament tear and to exclude other internal injuries such as mensical tears.



Treatment

A-sprains and partial tear – the intact fibers splint the torn ones and spontaneous healing will occur. The hazard is the adhesions , so active exercises is prescribed from the start and facilitated by aspiration of tense effusion , applying of ice packs to the knee and , sometimes by injecting local anesthesia into the tender area. Weight – bearing is permitted but the knee is protecte4d from rotation or angulation strains by heavy padded bandage or functional brace.

B-complete tears

1-isolated tear of medial collateral ligament: long cast brace is applied for 6 weeks and thereafter graded exercise are encouraged.

2-isolated tear of lateral ligament : treated as for medial ligament(MCL).

3-isolated tear of ACL: operative reconstruction is indicated in a-professional sportsmen b- if there is avulsion of tibial spine . in others , the treatment is conservative , the cast brace is worn only until symptoms subsides and thereafter movement and muscle strengthing exercise are encouraged.

4-isolated tear of posterior cruciate ligament treated conservatively.

5- combined injuries: a) combined ACL and collateral ligament injury – reconstruction of the ACL often obviates the need for collateral ligament treatment .

b) combined posterior cruciate ligament and collateral ligament injuries – similar is used but , here all the damaged structures to be repaired.

Dislocation of the knee

The knee can be dislocated by considerable violence , as in RTA . The cruciate ligaments and one or both lateral ligaments are torn.

Clinical features: a-severe bruising b- swelling c- gross deformity d- the distal pulsation must be examined to exclude damage of the popliteal artery also sensation of the limb must be checked.

x-ray – in addition to the dislocation , the film occasionally reveal a fracture of the tibial spine . if there is any doubt about the circulation ., an arteriogram should be done.

Treatment

a) closed reduction under anesthesia must be done urgently , this achieved by pulling directly in the line of the leg , but hyperextension must be avoided because of the danger to the popliteal vessels , after that the limb is rested on a back splint with the knee in 15 degree of flexion , the circulation is checked during the next week. If the joint is unstable , an anterior external fixation can be applied. B) open reduction is indicated in 1-failure of closed reduction 2-open wound 3-vascular damage. When swelling ha subsided , a cast is applied and worn for 12 weeks , weight bearing in the plaster is permitted as soon as the patient can left the leg.

Complication

a) early 1- arterial damage – popliteal artery damage is common and need immediate repair 2- nerve injury – the common peroneal nerve may be injured , but fortunately it recover by itself

b) late 1- joint instability 2- stiffness may occur due to prolonged immobilization.

Acute injuries of the extensor apparatus

Disruption of the extensor apparatus may occur in the quadriceps tendon , at the attachment of quadriceps tendon to the proximal surface of the patella , through the patella and retinacular expansion , the patellar ligament or at the insertion of the patellar ligament to the tibial tubercle.

In all but direct fractures of the patella , the mechanism of the injury is the same , sudden resisted extension of the knee or sudden passive flexion of the knee while the quadriceps is contracting.

The lesion tends to occur at progressively higher level with increasing age : adolescent suffer avulsion fracture of the tibial tubercle , young adult sport men tear the patellar ligament , middle aged adult fracture their patella , and older people suffer acute tear of the quadriceps.

Rupture of the quadriceps tendon

The patient is usually elderly , may have a history of diabetes or rheumatoid disease, or may have been treated with corticosteroid .occasionally acute rupture is seen in young athlete. the typical injury is followed by tearing pain and giving away of the knee .There is bruising and local tenderness, sometimes a gap can be felt proximal to the patella . Active knee extension either impossible (complete tear) or weak(partial tear) . The diagnosis can be confirmed by MRI.

Treatment

a)partial tear :plaster cylinder is applied for 6 weeks followed by physiotherapy.

b)complete tear :need operative treatment.

Rupture of the patellar ligament

This is uncommon injury , it is usually seen in young athletes and the tear is almost always at the proximal or distal attachment of the ligament. There may be previous history of tendonitis and local injection of corticosteroid.

The patient gives a history of sudden pain on forced extension of the knee , followed by bruising , swelling and tenderness at the lower edge of the patella or more distally.

X- ray may show a high riding patella and a tell-tale flake of bone torn from the proximal or distal attachment of the ligament. MRI will help to differentiate a partial from a complete tear.

Treatment

Partial tear can be treated by applying plaster cylinder .complete tear need operative repair or reattachment to the bone.

Fracture patella

The patella is a sesamoid bone in continuity with quadriceps tendon and the patellar ligament . there are additional insertion from the vastus medialis and lateralis into the

medial and lateral edges of the patella. The extensor strap is completed by the medial and lateral extensor retinacula which bypass the patella and insert into the proximal tibia.

The key to the management of patellar fractures is the state of the entire extensor mechanism.if the extensor retinacula are intact , active knee extension is still possible even if the patella itself is fractured..

Mechanism of injury

The patella may be fractured by direct force or by indirect traction force that pulls the bone apart.

Direct injury usually a fall into the knee or a blow against the dashboard of a car causes either undisplaced c rack or a comminuted fracture, without severe damage to the extensor expansion.

Indirect injury occurs typically when someone c atches the foot against a solid obstacle and to avoid falling , contracts the quadriceps muscle forcefully . this is a transverse fracture with a gap between the fragments.

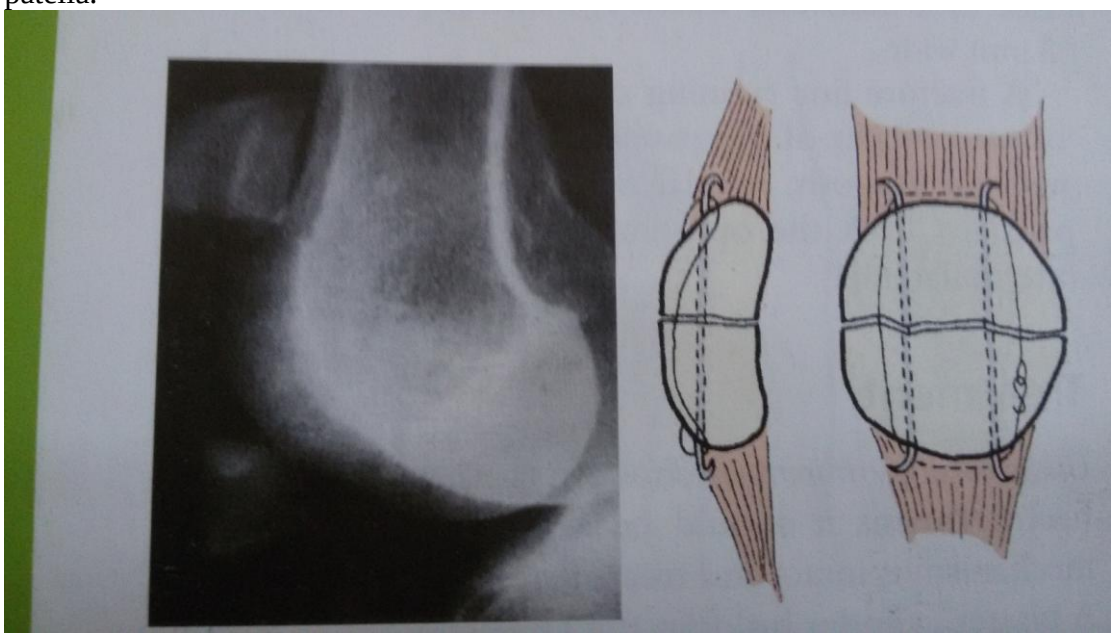
Clinical features

The knee is painful , swollen. there may be abrasion or bruising over the front the joint . the patella is tender and sometimes a gap can be felt.

Active knee extension should be tested , if the patient an left the leg, quadriceps mechanism is still intact. If there is an effusion , aspiration may reveal the presence of blood and fat droplets.

X-ray may show one or more fine fracture lines without displacement , multiple fracture lines with irregular displacement or transverse fracture with gap between the fragments.

Patellar fractures are classify as transverse ,polar ,longitudinal or comminuted. Displacement is significant if the the gap between the fragment is more than 3mm or if the displacementc reate astep on the articular surface of the patella.



Treatment

a)undisplaced or minimal displaced fractures : a cylinder cast holding the knee strieght is worn for 3-4 weeks with quadriceps exercises, if there is a haemoarthrosis it is aspirated.
b)comminuted fracture can be treated by cylinder cast .
c)displaced transverse fracture
the lateral expansions are and the entire extensor mechanism is disrupted, operation is essential.

Dislocation of the patella

Because the knee is normally angled in slight valgus , there is natural tendency for the patella to pull towards the lateral side when the quadriceps muscle contract. Lateral deviation of the patella during extension is prevented by number of factors 1-intercondlyler groove2-medial patellofemoral ligament3-medial patellomensical and patellotibial ligaments 4-medial retinacular fibers.

Mechanism of injury

1-while the knee is flexed and quadriceps muscle relaxed , the patella may be forced laterally by direct violence which is rare. 2- indirect force due to sudden severe contraction of quadriceps muscle while the knee is steched in valgus and external rotation, this is more common.

Predisposing factors
1-genu valgum 2- tibial torsion 3- high riding patella 4-shallow intercondylar groove 5- patellar hyper mobility.

Clinical features
The patient may feel a tearing pain sensation and feeling that the knee has gone out of the joint , when running , the patient may collapse and fall into the ground . often the patella spring back into position spontaneously , however if it remains unreduced , there is obvious deformity, the displaced patella seated on the lateral side of the knee , neither active or passive movement is possible.
If dislocation has reduced spontaneously , the knee may be swollen and there may be bruising and tenderness on the medial side.

Imaging
Ap ,lateral and tangential x-ray views are needed . in an unreduced dislocation , the patella is seen to be laterally displaced and tilted or rotated.
MRI may reveal soft tissue lesion, torn ligaments and articular cartilage and bone damage.
Treatment
In mostc ases the patella can be pushed back into place without much difficulty and anesthesia not needed , the exception is intra articular dislocation which may need open reduction, the knee is aspirated and then immobilized in full extension in cast for 2-3 weeks .

Tibial plateau fractures

Fractures of the tibial plateau are caused by avarus or valgus force combined with axial loading. This sometime the result of car striking a pedestrian , more often it is due to a fall from height in which the knee is forced into valgus or varus.the tibial ondyle is crushed or split by the opposing femoral condyle which remain intact.

Classification

The most useful classification is that of Schatizker

Type 1- vertical split fracture of the lateral condyle . this is a fracture through dense bone , usually in young people .

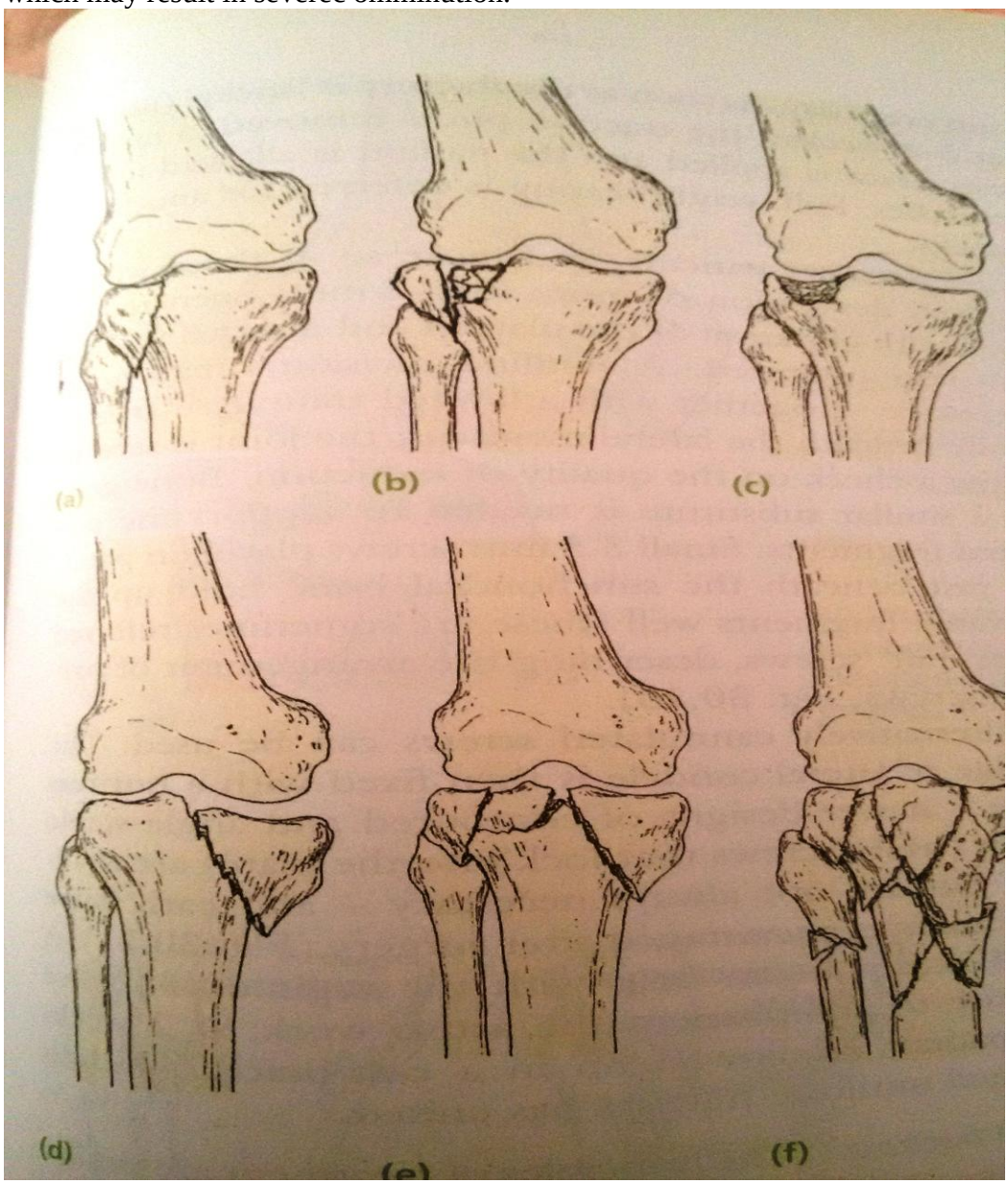
Type 2- vertical split of the lateral condyle combined with depression of adjacent load bearing part of the condyle .

Type 3- depression of the artciular surface with intact condyler rim , this injury is the commonest one , typically occurs in older people who are osteoporotic.

Type 4- fracture of the medial tibial condyle .

Type 5- fracture of bothc ondyles, and tibial shaft is wedged between them.

Type 6- combined condyler and subcondyler fractures, this is a high energy injury which may result in severec omminution.



Clinical features

The knee is swollen and may deformed. Bruising is usually extensive and the tissue feel doughy because of haemoarthrosis. Gentle examination may suggest medial or lateral instability. The leg and foot should be examined for signs of vascular or neurological injury.

X-ray

Ap,lateral and oblique views will usually show the fracture, but the amount of Comminution may not appreciated without tomograghy.

Stress views are sometimes helpful in assessing the degree of joint instability.

Treatment

Type 1- fractures if undisplaced can be treated conservatively . the haemarthrosis is aspirated and a compression bandage is applied, as soon as the acute pain subside and selling subsided , a hinge cast brace is fitted and the patient is allowed up . after 4 weeks , partial weight bearing is permitted but full weight bearing is delayed until the fracture has healed.

Displaced fractures should be treated by open reduction and internal fixation.

Type 2- if depression is slight (less than 5 mm), the knee is stable and the patient is old and frail, the fracture is treated closed with the aim of regaining mobility and function. After aspiration and compression bandaging, skeletal traction is applied via a threaded pin passed through the tibia 7 cm below the fracture. An attempt is made to squeeze the condyle into place , the knee is then flexed and extended several times to mould the upper tibia on the opposing femoralc ondyle, as soon as the fracture is sticky , the traction pin is removed , a hinged cast brace is applied and the patient is allowed up on crutches, but full weight bearing is deferred for 10 weeks .

In young patients , and more so in those with central depression of wore than 5mm .open reduction and internal fixation is preferred.

Type 3- the principles of treatment are similar to type 2 fractures.

Type 4- a) osteoporotic crush fracture of medial plateau are difficult to reduce , in long term the patient is likely to be left with some degree of varus deformity . the principles of treatment are the same as for rush fracture of the lateral plateau.

b) for medial condyler split fracture , if undisplaced can be treated closed as for an undisplaced type 1 fracture . displaced fracture will need open reduction and internal fixation.

Type 5&6 fractures , a simple bicondyler fracture in an elderly patient can often be reduced by traction and the patient is then treated as for type 2 injury , more complex fractures with Comminution especially in younger adult are better managed operatively.

Complications

Early

1- compartment syndrome , with closed type 5&6 fractures , there is considerable bleeding and swelling of the leg.

Late

1-joint stiffness 2- deformity 3- osteoarthritis

Fractures of the tibia and fibula

The tibia is more commonly fractured , and more commonly sustain an open fracture than any other long bone because of its subcutaneous position.

Mechanism of injury

A twisting force causes a spiral fracture of both leg bones at different levels , angulatory force produces transverse or short oblique fractures at the same level.

Direct injury rushes or split the skin over the fracture, this is usually a high energy lesion.

The risk of complication and progress to fracture healing are directly related to the amount and type of soft tissue damage.

The following table show Gustilos classification of open fractures

Grade	Wound	Soft tissue injury	Bone injury
1	Less than 1 cm long	minimal	Simple low energy fracture , spiral or long oblique
2	More than 1cm long	Moderate , some muscle damage	Moderate comminution
3a	More than 1cm long	Severe deep contusion plus – minus compartment syndrome	High fracture pattern , comminuted but soft tissue cover possible
3b	More than 10 cm long	Severe loss of soft tissue cover	Requires soft tissue reconstruction for cover
3c	More than 10cm long	As 3b , with vascular injury that need repair	Requires soft tissue reconstruction for cover

Clinical features

The limb should be carefully examined for signs of soft tissue damage :bruising , severe swelling , crushing or tenting of the skin , an open wound , circulatory changes , diminution or loss of sensation and inability to move the toes . always be on the alert for signs of an impending compartment syndrome.

X-ray

The entire length of both tibia and fibula , as well as the knee and the ankle joint must be seen. Spiral fractures without Comminution are low energy injuries .transverse , short oblique and comminuted fractures especially if displaced are usually high energy

injuries.

Management

The main objectives are 1-tolimit soft tissue damage and preserve cover2- to prevent or at least recognize compartment swelling 3- to obtain and hold fracture alignment 4- b to start early weight bearing 5- to start joint movement as soon as possible.

Low energy fractures

Most low energy fractures including Gustilo 1&2 injuries after attention to the wound can be treated non operative methods.

If the fracture is undisplaced or minimally displaced a full length cast from upper thigh to metatarsal neck is applied with the knee slightly flexed and the ankle at right angle , displacement of the fibular fracture is ignored.

If the fracture is displaced , it is reduced under general anesthesia with x-ray control . apposition need not to be complete but alignment must be near perfect (no more 7 degree of angulation) and rotation absolutely perfect. A full length cast is applied as for undisplaced fractures. The position is checked by x-ray , minor degrees of angulations can still bec orreted by making transverse cut in the plaster and wedging it into a better position.

The limb is elevated and the patient is kept under observation for 48-72 hours to avoid compartment syndrome. After 2 weeks , the position is checked by x – ray . the cast is retained until the fracture unites , which is 8 weeks in children but seldom under 16 weeks in adults.

Indication for fixation in low energy fractures

1-failure of closed reduction 2- non union 3- unstable fractures.

High energy fractures

Initially the most important consideration is the viability of the damaged soft tissue and underlying bone.

Tissues around the fracture should be disturbed as little as possible and open operation should be avoided unless there is already an open wound, transverse fractures are usually stable after reduction, they can be treated closed , provided a careful watch is kept for symptoms and signs of compartment syndrome.

Comminuted and segmental fractures , those associated with bone loss and any high energy fracture which is inherently unstable requires early surgical stabilization.

Open fractures

A suitable treatment for open fractures include : 1- antibiotics 2- debridement 3- soft tissue cover 4- rehabilitation

Antibiotics are started immediately , a second generation cephalosporin is suitable for Gustilo type 1-3a wounds , but more severe grades benefit from gram –negative cover as well. If the wound result from agricultural accident, anaerobic cover with metronidazole should be added.

Adequate debridement is possible only if the original wound is extended , however excise as little skin as possible .

Gustilo grade 1 injury an be closed primarily and then treated as for closed injuries , more severe wounds are left open and reexamined within 48 hours , if necessary a further debridement is carried out.

It is important to stabilize the fracture , for Gustilo 1,2,3a injures locked intramedullary nailing is permissible. For Gustilo 3 b&c , it is wiser to apply an external fixators , leaving the wound free to be inspected and treated as necessary.

Early complications

1-vascular injury , due to fractures of proximal half of the tibia may damage popliteal artery , this require urgent repair.

2- compartment syndrome . tibial fractures, both open and closed and intramedullary nailing are the commonest causes of compartment syndrome of the leg.

3- infection ,open fractures are always at risk .

Late complications

1-malunion 2- delayed union 3- non union 4- joint stiffness 5-osteoporosis 6-algodystrophy.

Peripheral nerve injuries

Seddon description of three different types of nerve injury (neuropraxia, axonotmmesis, and neurotemesis) served as useful classification for many years .

Increasingly ,however, it has been recognized that manyc ases falls into an area some where between axonotemesis and neurotemesis. Therefore , following Sunderland, amore useful practical classification is offered here .

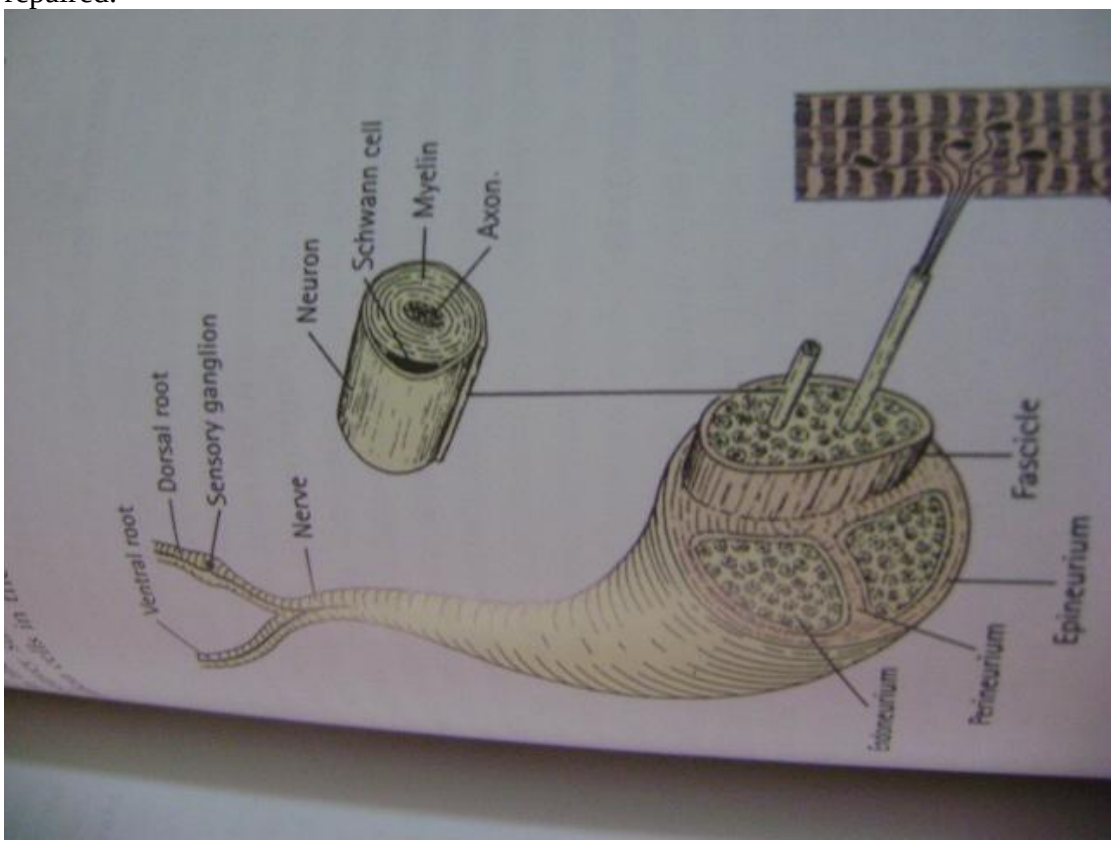
1-first degree injury , this embraces transient ischemia and neuropraxia , the effect is reversible.

2-secnd degree injury , this correspond to axontemesis , the endoneurium is preserved, regeneration can lead to complete or near complete recovery without the need for intervention.

3- third degree injury , this is worse than axonotemesis , the endoneurium is disrupted but the perineurial sheaths are intact and the internal damage is limited . fibrosis and cross connection will limit recovery.

4-fourth degree injury ,here only the epineurium is intact. The nerve trunk is still in continuity but the internal damage is severe , recovery is unlikely , the injured segment should be excised and the nerve repaired or grafted.

5- fifth degree injury, the nerve is divided and will have to be repaired.



Obstetrical brachial plexus palsy

Obstetrical palsy is caused by excessive traction on the brachial plexus during the childbirth . two pattern are seen 1- upper root injury (Erb palsy), typically in overweight baby with shoulder dystocia delivery or 2- complete plexus injury(Klumpkes palsy) , usually after breech delivery of smaller babies.

Clinical features

The diagnosis is usually obvious at birth , after a difficult delivery the baby has a floppy or flail arm. Further examination a day or two later will define the type of brachial plexus injury .

Erb palsy is caused by injury of c5& c6 and s.t c7 , the abductors and external rotators of the shoulder and the supinator are paralyzed. The arm is held to the side , internally rotated and pronated . there may also be loss of finger extension. Sensation can not be tested reliably in baby.

Klumpk is much less common , but more worse. This is complete plexus lesion , the arm is flail and pale , all finger muscles are paralyzed and there may be also be vasomotor impairment and unilateral Horner syndrome.

x-ray should be taken to exclude shoulder or clavicular fracture.

Management

Over the next few weeks one of several things may happen

1-paralysis may recover completely , many of the upper root lesions recovers spont. A fairly reliable indicator is return of biceps activity after 3 month.

2- paralysis may improve . atotal lesion may partially resolve , leaving the infant with either an upper root or c omplete root syndrome which is unlikely to change.

3- paralysis may remain unaltered, this is more likely with complete lesion.

While waiting for recovery , physiotherapy is applied to keep the joint mobile.

Operative treatment

If there is no biceps recovery by 3 months , operative intervene., should be considered . unless the roots are avulsed , it may be possible to excise the scar and bridge it with nerve graft. If the root are avulsed , nerve transfer may give good results.

Axillary nerve

The axillary nerve (c5&c6) arises from the posterior cord of the brachial plexus. The nerve is sometimes ruptured in brachial plexus injury. More often it is injured during shoulder dislocation or fractures of the humeral neck. Iatrogenic injuries occur in transaxillay operation and with lateral deltoid splitting incisions.

Clinical features

The patient complains of shoulder weakness , and the deltoid is wasted . although abduction can be initiated, it can not maintained . retropulsion is impossible , careful testing will reveal a small area of numbness over the deltoid.

Treatment

Nerve injury associated with fractures or dislocation recovers spontaneously in about 80% of cases . if the deltoid shows no signs of recovery by 6-8 weeks , EMG should be done , if tests suggest denervation then the nerve is explored. If operation of repair failed , provided that trapezius and serratus anterior are functioning , shoulder arthrodesis can provide both stability and some degree of abduction.

Radial nerve

The radial nerve may be injured at the elbow , in the upper arm or in the axilla.

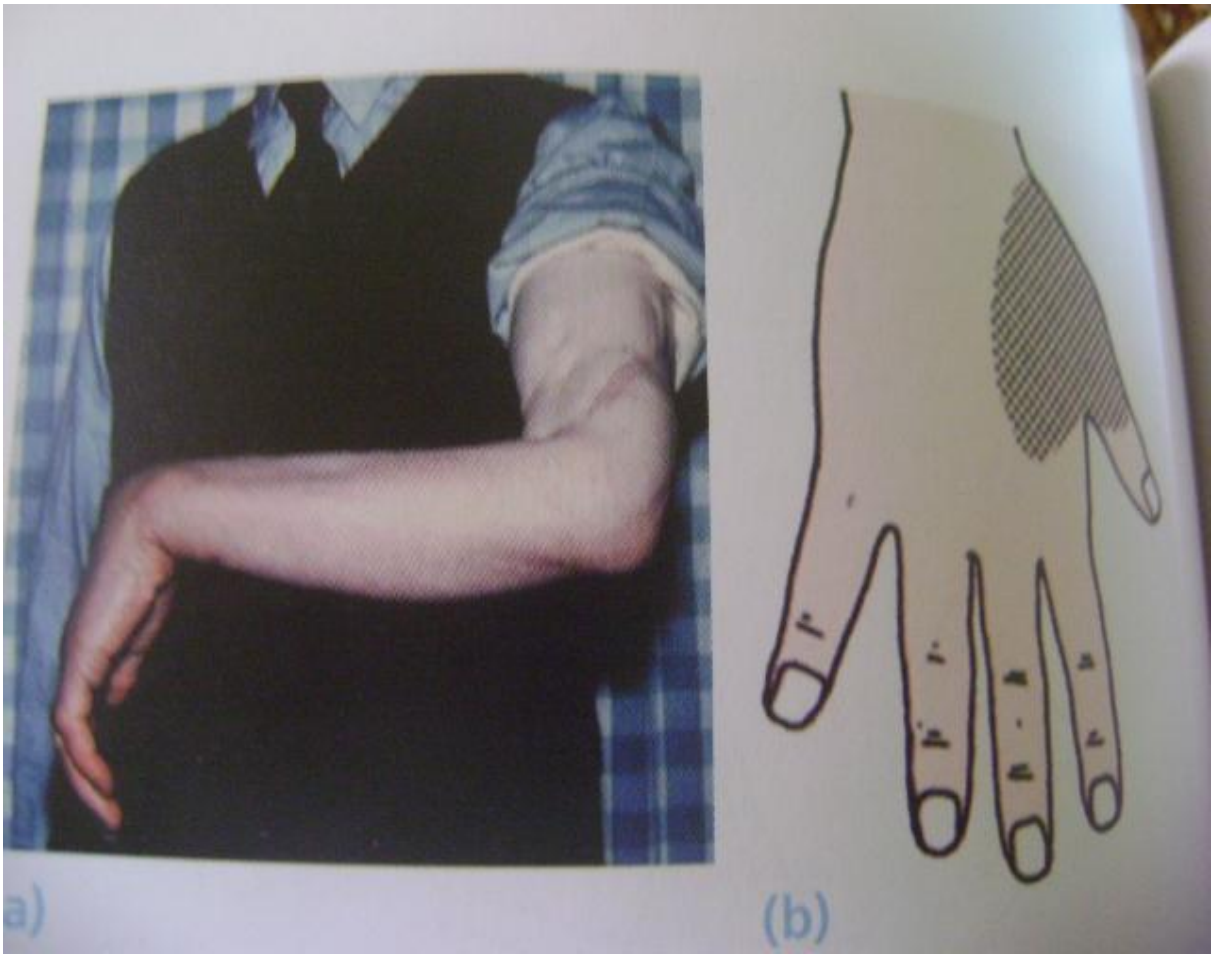
Clinical features

Low lesion are usually due to fractures or dislocation at the elbow , or to local wound . iatrogenic lesion of posterior interosseous nerve where it winds through the supinator muscle are sometimes seen after operation on the proximal end of the radius. The patient complains of clumsiness and on testing , can not extend the metacarpophalingeal joints of the hand. In the thumb , there is also weakness of abdution and interghalangeal extension. Wrist extension is preserved because the branch to the extensor carpi radialis longs arises proximal to the elbow.

High lesion occur with fractures of the humerus or after prolonged tourniquet pressure . there is an obvious wrist drop , due to weakness of the radial extensor of the wrist , as well as an ability to extend their metacarpoghalangeal joints . sensory loss is limited to a small patch on the dorsum around the anatomical snuffbox.

Very high lesions may be caused by trauma or operation around the shoulder. More often , they are due to chronic compression in the axilla , this is seen in drinker and drug addicts (Saturday night palsy) or in thin elderly patients using crutches. In addition to weakness of the wrist and hand , the triceps is paralyzed and triceps reflex is

absent.



Treatment

Open injuries should be explored and the nerve is repaired or grafted. Closed injuries are usually first or second degree lesions , and function eventually returns .

If the palsy is present on admission , one can afford to wait for 6 weeks to see if it starts to recovers. If it does not , then EMG should be performed , if this show denervation potentials , then the nerve should explored.

While recovery is awaited , the small joints of the hand must be put through a full range of passive movements. If recovery does not occur , the disability can be largely overcome by tendon transverse.

Ulnar nerve

Injuries of the ulnar are usually either near the wrist or near the elbow , although open wounds may damage it at any level.

Clinical features

Low lesions are often caused by cuts on shattered glass. There is numbness of the ulnar one and a half fingers. The hand assumes a typical posture – the claw hand deformity , with hyperextension of the metacrpophalangeal joinof the ring and little fingers , due to weakness of the internsic muscles. Hypothenar and interosseous wasting may be obvious by comparison with normal hand. Fingers abduction is weak and this , together with loss of thumb addiction , makes pinch difficult. The patient is asked to grip a sheet of paper forcefully between thumb and index fingers while the

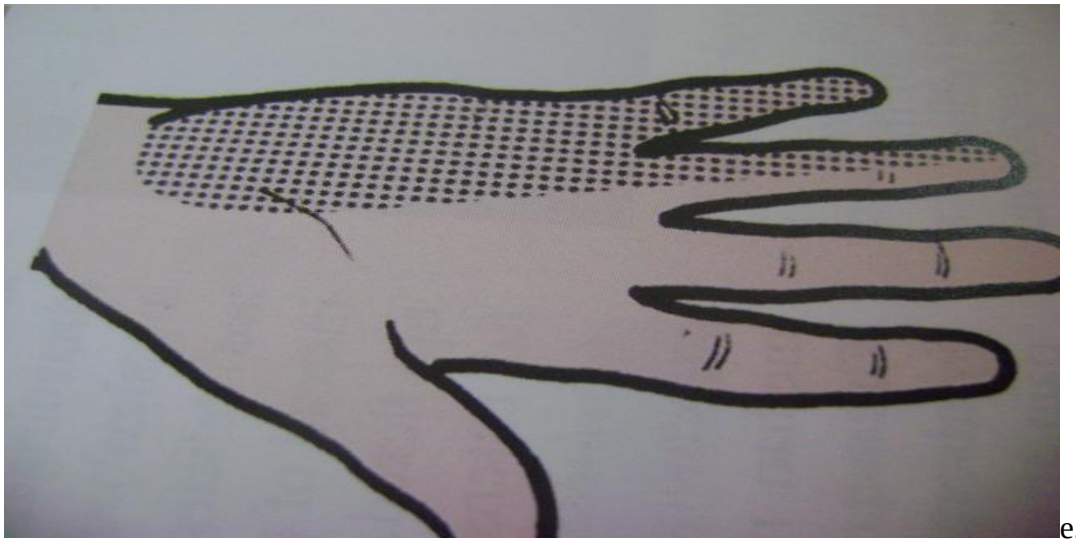
examiner tries to pull it away, there will be powerful flexion of thumb interphalangeal joint (Forments sign).

High lesions occur with elbow fractures or dislocation . the hand is not markedly deformed because the ulnar half of flexor digitorum profundus is paralyzed and the fingers are therefore less clawed , otherwise motor and sensory loss are the same as in low lesions.

Treatment

Exploration and suturing of a divided nerve , anterior transposition at the elbow permits closure of gap up to 5cm. while recovery is awaited , the skin should be protected from burn, passive physiotherapy keeps the hands supple and useful.

If there is no recovery after nerve repair , tendon transfer can be done



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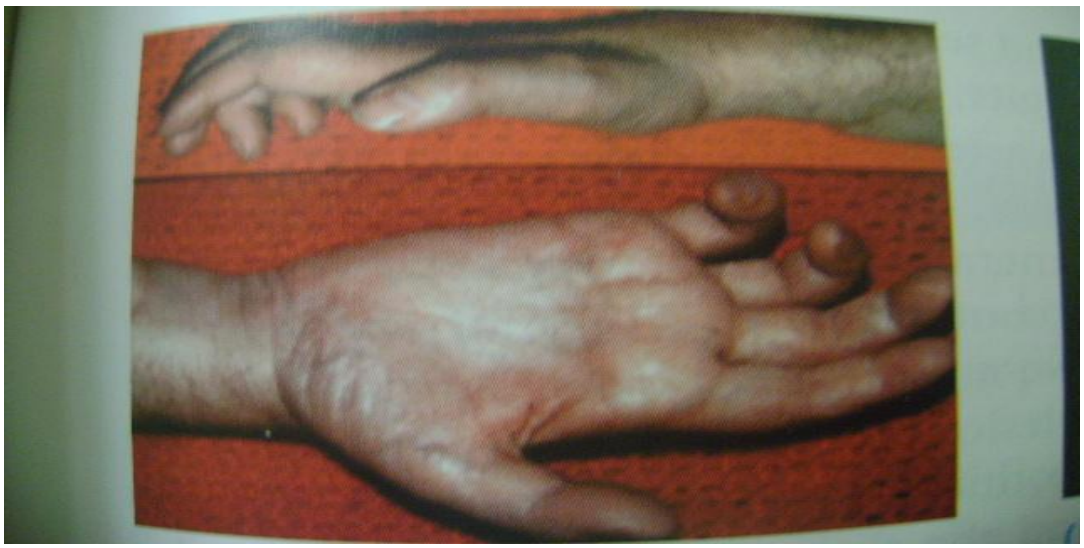

Median nerve

The median nerve is most commonly injured near the wrist or high up in the forearm.

Clinical features

Low lesion may be caused by cuts in front of the wrist or by carpal dislocation . the patient is unable to abduct the thumb and sensation is lost over the radial three and a half digit. In long standing cases the thenar eminence is wasted and trophic changes may be seen.

High lesions are generally due to forearm fractures or elbow dislocation, but stabs and gunshot wounds may damage the nerve at any level. The signs are the same as those of low lesions but , in addition the long flexor of the thumb, indexand middle fingers, the radial wrist flexor and the forearm pronaters muscles are all paralyzed. Typically , the hand is held with the ulnar fingers flexed and the index straight (the pointing sign) . also because the thumb and index flexor are deficient , there is characteristic pinch defect.

Isolated anterior interosseous nerve lesions are extremely rare . the signs are similar to those of a high median nerve injury , but without any sensory loss.

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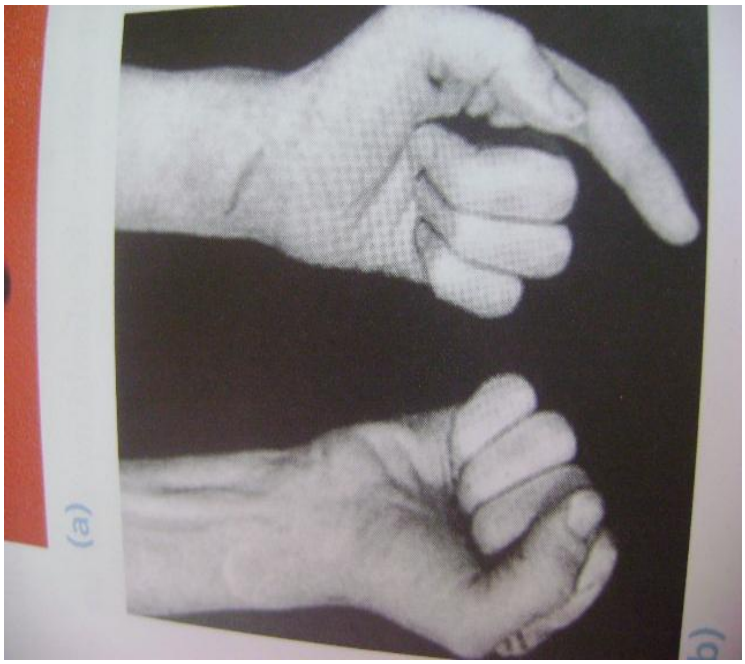

Treatment

If the nerve is divided , suturing or nerve grafting should always be attempted. Postoperatively the wrist is splinted in flexion to avoid tension.

Late lesions are sometimes seen, if there has been no recovery , tendon transfer can be done .

Femoral nerve

The femoral nerve may be injured by gunshot wound , by pressure or traction during operation or bleeding into the thigh.

Clinical features

Quadriceps action is lacking and the patient is unable to extend the knee actively. There is numbness of the anterior thigh and medial aspect of the leg. The knee reflex is depressed.

Treatment

This is a fairly disabling lesion and if possible counter measures should be undertaken . a thigh hematoma may need to be evacuated . a clean cut of the nerve may treated successfully by suturing or grafting. The alternative would be a caliper to stabilize the knee , or tendon transfers of hamstring to quadriceps.

Sciatic nerve

Division of the main sciatic nerve is rare except in gunshot wounds. Traction lesions may occur with traumatic hip dislocation and with pelvic fractures.

Clinical features

In a complete lesion the hamstrings and all muscles below the knee are paralyzed , the ankle jerk is absent. Sensation is lost below the knee , except on the medial side of the leg which is supplied by saphanous branch of the femoral nerve . the patient walks with a drop foot and a high stepping gait to avoid dragging the insensate foot on the ground .

Sometimes only the deep part of the nerve is affected , producing what essentially a common peroneal palsy. If sensory loss extend into the thigh and the gluteal muscles are weak , suspect an associated lumbosacral plexus injury.

In late cases the limb is wasted , with trophic ulcers of the foot and fixed deformity of the foot.

Treatment

If the nerve is known to be divided , suturing or nerve grafting should be attempted even though it may take more than a year for leg muscles to be reinnervated. While recovery is awaited , a below – knee drop foot splint is fitted.

The chances of recovery are generally poor at best , will be long delay and incomplete , partial lesion , in which there is protective sensation of the sole can s.t be managed by transferring tibialis posterior to the front in order to counteract the drop foot . the deformities should be corrected if they threaten to cause pressure sores. If there is no recovery whatever , amputation may be preferable to flail , deformed and insensitive limb.

Peroneal nerves

Injuries may affect either the common peroneal nerve or one of its branches the deep or superficial nerves.

Clinical features

The common peroneal nerve is often damaged at the level of the fibular neck by severe traction when the knee is forced into varus or by pressure from a splint or a plaster cast , from lying with the leg externally rotated , by skin traction , by intraneural ganglion or by wounds. The patient has a drop foot and can neither dorsiflex nor evert the foot . the patient walks with a high stepping gait to avoid catching the toes. Sensation is lost over the front and outer half of the leg and the dorsum of the foot . in late c ases pain may be a major feature.

The deep peroneal nerve runs between the muscles of the anterior compartment of the leg and emerge at the lower border of the extensor retinaculum of the ankle . it may be threatened in an anterior compartment syndrome. This lead to pain and weakness of dorsiflexion and sensory loss in a small area of skin between the first and second toes.

The superfacial peroneal nerve descend along the fibula , innervating the peroneal muscles and emerging through the deep fascia 5-10 cm above the ankle to supply the skin over the dorsum of the foot and the medial four toes. The muscular portion may be involved in lateral compartment syndrome. The patient complains of pain in the lateral part of the leg and numbness of the foot , there may be weakness of evertion and sensory loss on the dorsum of the foot

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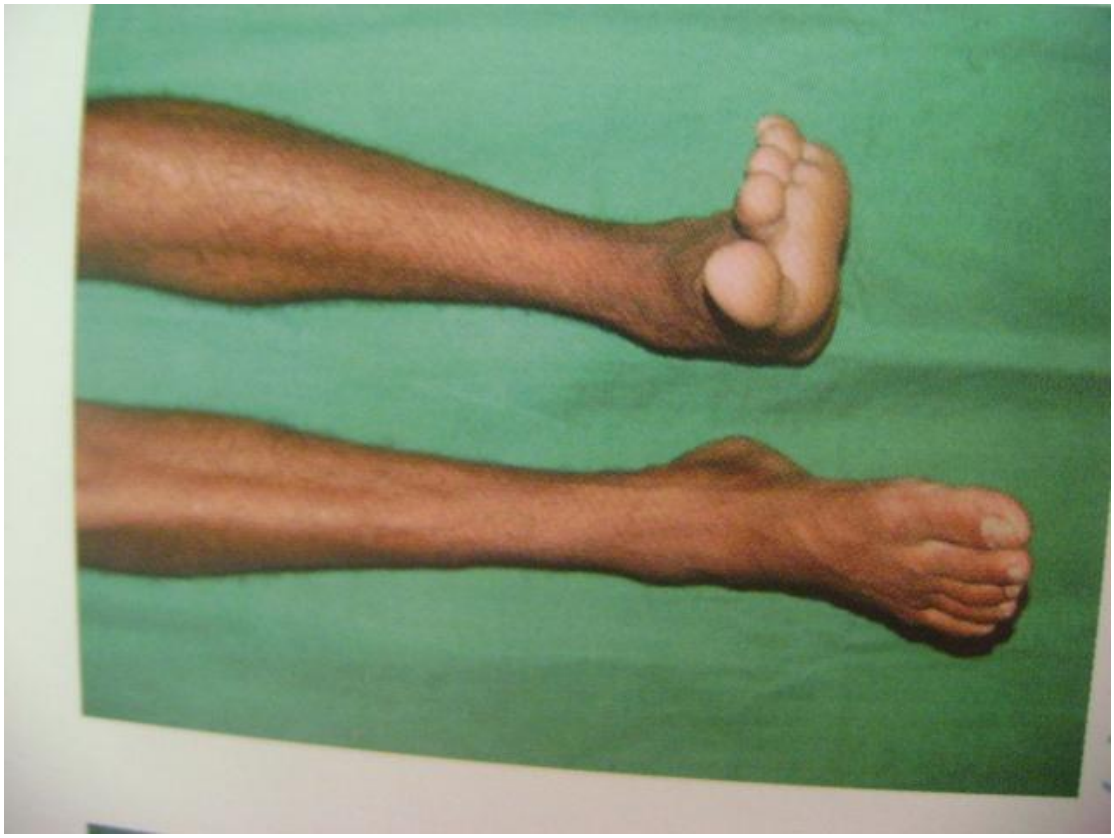

Treatment

Direct injuries of the common peroneal nerve and its branches should be explored and repaired or grafted . while recovery is awaited a splint may be worn to control ankle weakness . if there is no recovery , the disability can be minimized by tibialis posterior transfer or by foot stabilization , the alternative is a permanent splint.

Tibial nerves

The tibial nerve is rarely injured except in open wounds. The distal part is sometimes involved in injuries around the ankle.

Clinical features

The patient is unable to planter-flex the ankle or flex the toes , sensation is abscent over the sole and part of the calf. Because both the long the long flexor and the intrinsic muscles are involved, there is no much clawing , with time the calf and foot become atrophic and pressure ulcers may appear on the sole . fractures and dislocation around the ankle may injure any of the branches and result picture depend on the level of the lesion , thus posterior tibial nerve causes wide sensory loss and clawing of the toes due to paralysis of the intrinsic with active long flexor , but injury to one of the smaller branches causes only limited sensory loss and less motor weakness.

Treatment

A complete nerve division should be sutured as soon as possible. While recovery is awaited, a suitable orthosis is worn to prevent excessive dorsiflexion and the sole is protected from pressure ulceration. In suitable cases , weakness of planter flexion can be treated by hindfoot fusion or transfer of the tibialis anterior to the back of the foot .