

COMPLICATIONS OF FRACTURES

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GENERAL COMPLICATIONS

- BLOOD LOSS
- SHOCK
- FAT EMBOLISM
- CARDIORESPIRATORY FAILURE

BLOOD LOSS

- IN OPEN FRACTURES
- PELVIC FRACTURES
- FRACTURE SHAFT OF FEMUR
- EXTERNAL HAEMORRHAGE CONTROLLED BY DIRECT PRESSURE, WOUND PACKING, WINDLASS TECHNIQUE, INDIRECT PRESSURE AND VERY RARELY BY APPLICATION OF Tourniquets

- TREATMENT DEPENDS ON THE CAUSE OF BLOOD LOSS
- WIDE BORE CANNULA PLACEMENT IN A VEIN AND JUDICIOUS USE OF IV FLUID
- BLOOD TRANSFUSION
- STOP BLEEDING BY SURGICAL INTERVENTION AS PER THE INJURY AND PATIENT CONDITION

SHOCK

- MAJORITY OF PATIENTS PRESENTING WITH POLY TRAUMA SETTING HAVE HYPOVOLAEMIC SHOCK; HOWEVER ANY PATIENT CAN PRESENT WITH A COMBINATION OF SHOCK
- MANAGEMENT OF SHOCK TAKES PRECEDENCE OVER DEFINITIVE MANAGEMENT
- DAMAGE CONTROL ORTHOPAEDIC CAN BE APPLIED IN SELECTED CONDITIONS

FAT EMBOLISM

- COMMON AFTER LIMB FRACTURES
- CIRCULATING FAT GLOBULES LARGER THAN 10 μm in diameter occur in most adults after closed long bone fractures and histological traces of fat can be found in the lungs and other internal organs
- A small percentage develops clinical features similar to ARDS, recognised as fat embolism syndrome (FES)
- High index of suspicion and early diagnosis is the key
- Diagnosed using Gurd and Wilson's criteria
- Management is supportive - from observation to ventilatory support

LOCAL COMPLICATION OF FRACTURES

- CAN BE DIVIDED INTO
- EARLY—-ARISE DURING FIRST FEW WEEKS
- LATE COMPLICATIONS

Table 23.2 Local complications of fractures

Urgent	Less urgent	Late
Local visceral injury	Fracture blisters	Delayed union
Vascular injury	Plaster sores	Malunion
Nerve injury	Pressure sores	Non-union
Compartment syndrome	Nerve entrapment	Avascular necrosis
Haemarthrosis	Myositis ossificans	Muscle contracture
Infection	Ligament injury	Joint instability
Gas gangrene	Tendon lesions	Osteoarthritis
	Joint stiffness	
	Algodystrophy	

LOCAL COMPLICATIONS OF FRACTURES

Table 23.4 Common nerve injuries

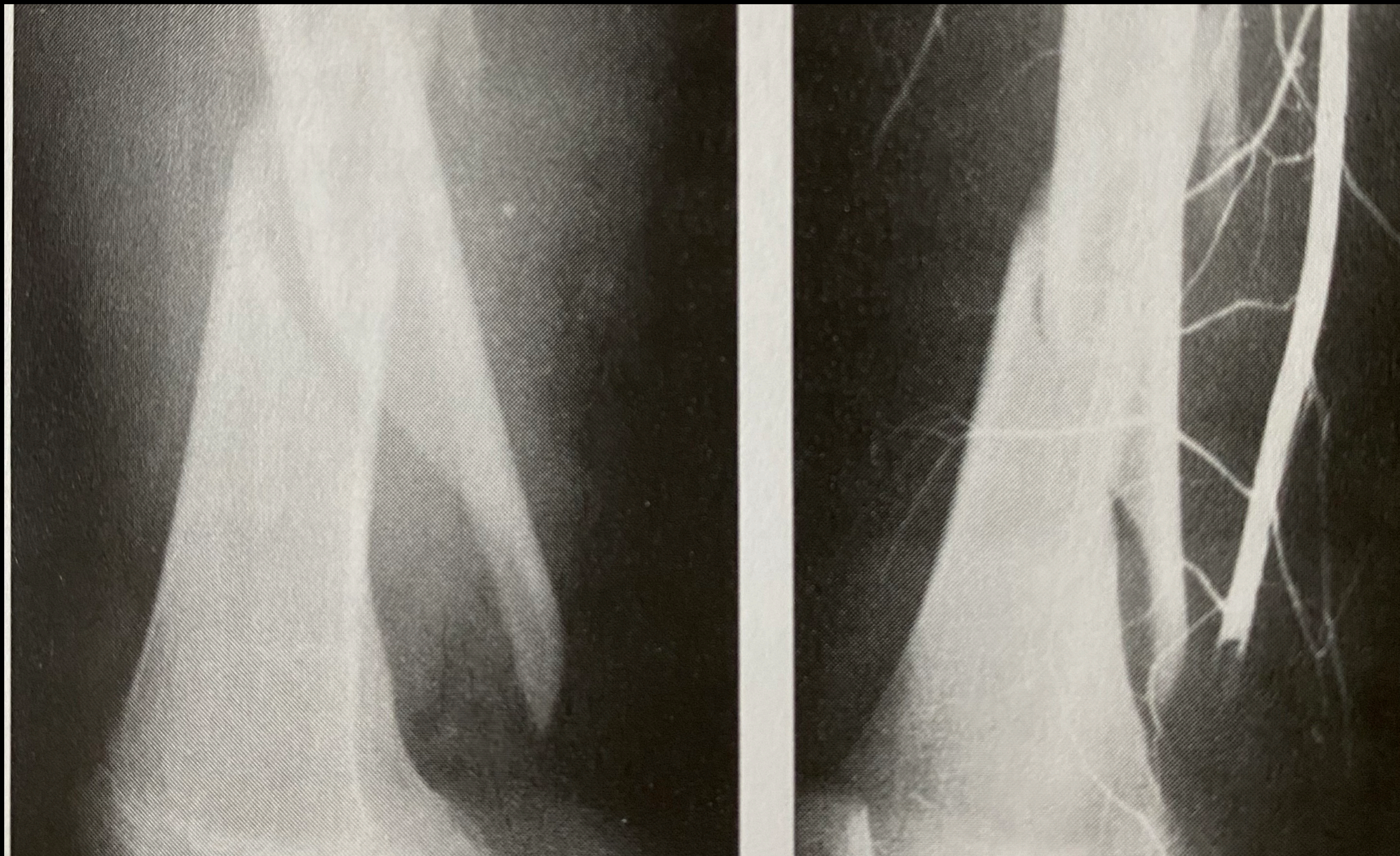
Injury	Nerve
Shoulder dislocation	Axillary
Humeral shaft fracture	Radial
Humeral supracondylar fracture	Radial or median
Elbow medial condyle	Ulnar
Monteggia fracture–dislocation	Posterior-interosseous
Hip dislocation	Sciatic
Knee dislocation	Peroneal

COMMON NERVE INJURIES

Table 23.3 Common vascular injuries

Injury	Vessel
First rib fracture	Subclavian
Shoulder dislocation	Axillary
Humeral supracondylar fracture	Brachial
Elbow dislocation	Brachial
Pelvic fracture	Presacral and internal iliac
Femoral supracondylar fracture	Femoral
Knee dislocation	Popliteal
Proximal tibial	Popliteal or its branches

COMMON VASCULAR INJURIES



PROXIMAL BONE FRAGMENT SPEARED THE POPLITEAL ARTERY



INDICATIONS FOR EARLY EXPLORATION

Nerve injury associated with open fracture

Nerve injury with fractures that need internal fixation

Presence of a concomitant vascular injury

Nerve damage diagnosed after manipulation of the fracture

INDICATIONS FOR EARLY EXPLORATION OF NERVES

COMPARTMENT SYNDROME

- HIGH RISK IN FRACTURES OF ELBOW , FOREARM BONES , PROXIMAL TIBIA AS ALSO MULTIPLE #S OF HAND AND FOOT
- CLASSICAL FEATURES OF 5 Ps
- Pain, paraesthesia, pallor, paralysis and pulselessness
- Treatment may include fasciotomy

LATE COMPLICATIONS OF FRACTURES

- DELAYED UNION
- NON-UNION
- MALUNION
- AVN
- GROWTH DISTURBANCE
- BED SORES
- MYOSITIS OSSIFICANS
- TENDON INJURIES
- NERVE COMPRESSION
- MUSCLE CONTRACTURE
- JOINT INSTABILITY /STIFFNESS
- COMPLEX REGIONAL PAIN SYNDROME
- OSTEOARTHRITIS

DELAYED UNION

- CAUSES- biological; inadequate blood supply, severe soft tissue damage, periosteal stripping
- Biomechanics causes—imperfect splintage, over-rigid fixation, infection
- Patient related-smoking, systemic disease , drugs
- x ray -# fracture remains visible and callus is inadequate
- Treatment involves addressing the cause
- Operative -internal fixation and bone grafting

NON-UNION

- The process of union has come to a standstill
- causes—loss of contact; loss of alignment; instability and loss of stimulation
- Diagnosis -clinically —mobility at # site x ray — radiological gap at # site
- Treatment principles -1. Adequate reduction and 2 fixation and 3 bone grafting

MALUNION

- When union occurs in an unacceptable alignment
- Diagnosis —obvious deformity, or functional inadequacy
- x ray used to diagnose
- Treatment depends on age of patient, duration of #, area of involvement and functional loss or complication that may result if left untreated

AVASCULAR NECROSIS

- Regions notorious for AVN —-head of femur ; proximal part of scaphoid ; lunate; body of talus
- Asymptomatic ;or pain at a later stage
- x ray shows increased density
- Rx ...depends on the bone involved.. for AVN of femoral head THR, for Scapoid bone grafting, for talus arthrodesis and in case of Lunate -there are a no of procedures

GROWTH DISTURBANCES

- IN CHILDREN
- DUE TO PHYSIS INVOLVEMENT
- MAY RESULT IN CORONAL OR SAGGITAL PLANE DEFORMITIES
- SHORTNING MAY BE ADDRESSED BY DISTRACTION OTEOGENESIS

BED SORES

- ELDERLY
- PARALYSED PATIENTS
- OVER SACRUM AND TROCHANTERIC AREA
- CAREFUL NURSING, REHABILITATION
- PLASTIC SURGERY INTERVENTION

MYOSITIS OSSIFICANS

- AROUND ELBOW DUE TO DISLOCATION OR BLOW TO BRACHIALIS
- PAIN AFTER INJURY, LOCAL SWELLING, SOFT TISSUE TENDERNESS
- X RAY NORMAL INITIALLY BUT BONE SCAN SHOWS INCREASED ACTIVITY
- OVER 3 WEEKS PAIN DECREASES BUT JOINT BECOMES STIFF; X RAY SHOWS OSSIFICATION
- BY 8 WEEKS IT IS PALPABLE AND VISIBLE ON X RAYS
- RX. REST THE JOINT; THEN ROM ; EXCISION AT A LATER STAGE

TENDON LESIONS

- Tendinitis of tibialis posterior tendon due to medial malleolar #
- EPL cut due to distal radius fracture 6-12 weeks later
- Tendon transfer may be required

NERVE COMPRESSION

- CPN injury due to a tight cast
- Radial nerve palsy during closed manipulation of fracture humerus or use of crutches
- Median nerve injury due to supra-condylar # humerus #
- Median nerve compression due to injury around wrist

MUSCLE CONTRACTURE

- VOLKMANN'S ISCHAEMIC CONTRACTURE DUE TO COMPARTMENT SYNDROME
- ISCHEMIA OF HAND MUSCLE MAY RESULT DUE TO FOREARM INJURIES
- ISCHEMIA OF CALF MUSCLE MAY RESULT IN CLAW TOE DEFORMITY

JOINT INSTABILITY

- MAY RESULT BECAUSE OF LIG. LAXITY; MUSCLE WEAKNESS OR BONE LOSS
- MAY RESULT IN RECURRENT SUBLUXATION/ DISLOCATION OF JOINTS LIKE SHOULDER ; PATELLA
- AND CARPAL INSTABILITY

JOINT STIFFNESS

- DUE TO PRY TRAUMA
- ADHESIONS
- PROLONGED IMMOBLISATION
- BEST RX IS PREVENTION
- PHYSIOTHERAPY
- SURGICAL RELEASE OR ARTHROLYSIS

COMPLEX REGIONAL PAIN SYNDROME

- TYPE I that develops after injury or noxious event
- TYPE II that develops after a nerve injury
- Continuous pain, burning, swelling, warmth, stiffness joints
- x ray shows patchy rarefaction of the bone
- Rx ...elevation; physiotherapy; regional blocks; and TCADs

OSTEOARTHRITIS

- DUE TO INTRAARTICULAR FRACTURES
- MALUNION OF A METAPHYSIAL FRACTURE MAY CHANGE THE BIOMECHANICS AND LEAD TO SEC OA
- UNICOMPARTMENTAL OA OF KNEE MAY BE TREATED BY OSTEOMOMY
- ADVANCED OA RX BY JOINT REPLACEMENT

THANKS