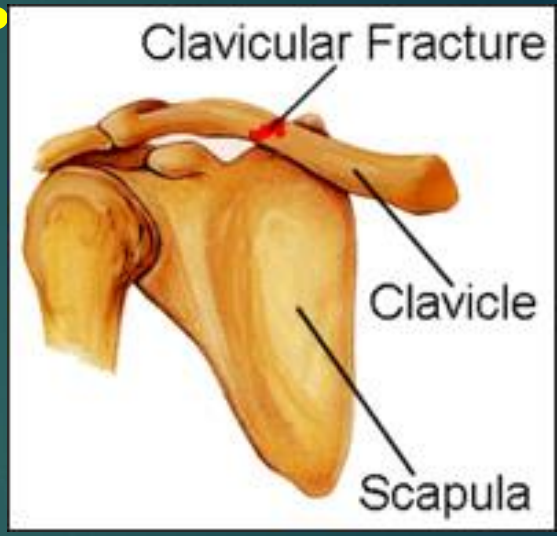
Clavicular nailing.



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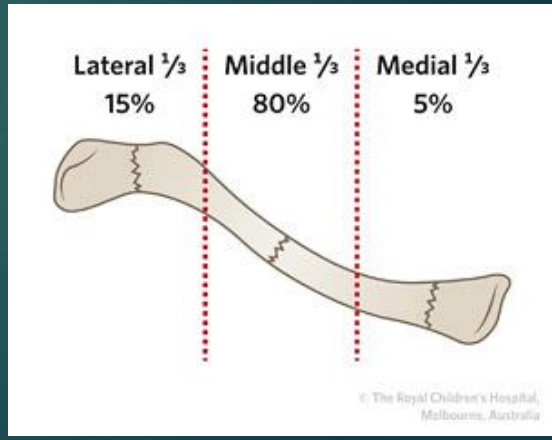
Introduction

- Clavicle fractures account for 5-10% of all fractures.
- Up to 44% of injuries to the shoulder girdle.
- Easy to recognize.
- Majority unite uneventfully.

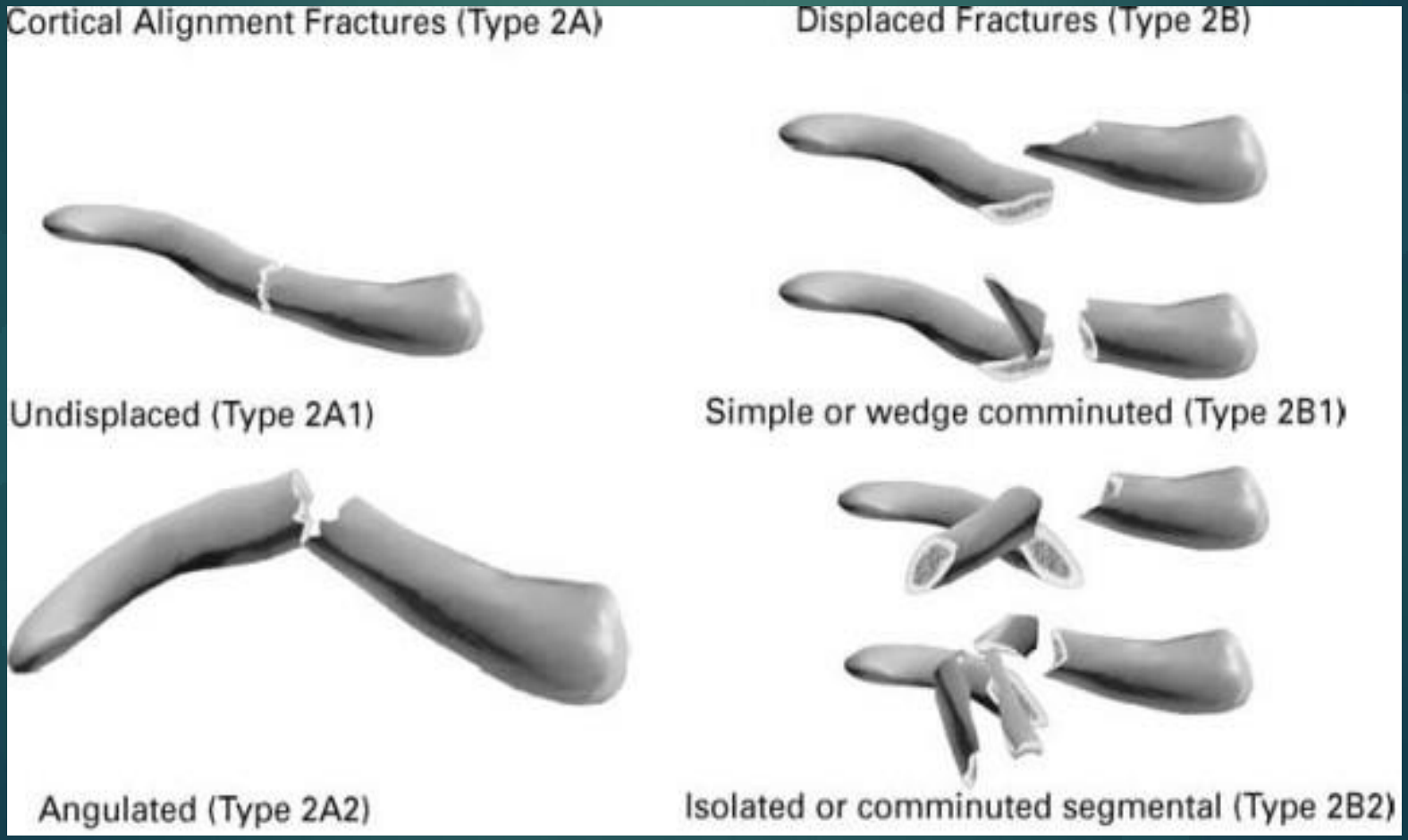
Clavicle Fractures are classified by Allman.

Allman Classification
(JBJS 1967;49A:774)

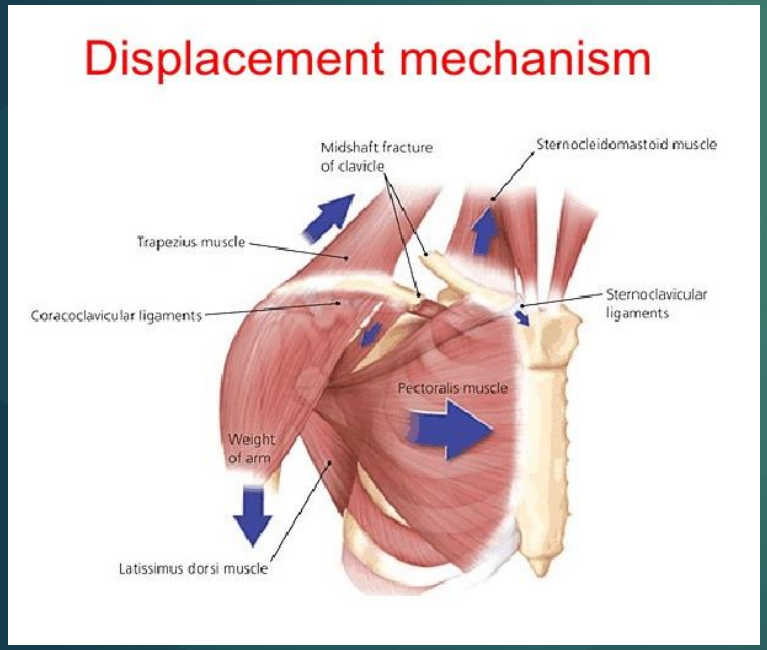
- Group I : Middle third
  - Most common (80% of clavicle fractures)
- Group II: Distal third
  - 10-15% of clavicle injuries
- Group III: Medial third
  - Least common (approx. 5%)



Robinson Classification type 2 fractures.



DEFORMING FORCES IN Fracture clavicle



- STERNOCLEIDOMASTOID MUSCLE PULLS THE MEDIAL FRAGMENT UPWARD.

- WEIGHT OF THE LIMB PULLS THE DISTAL FRAGMENT DOWNWARD.

- TRAPESIUS AND PECTORALIS MAJOR HELPS FOR OVERRIDING OF FRAGMENTS.

Radiographic Evaluation of the Clavicle

- Anteroposterior View
- 30-degree Cephalic Tilt View
- 45 –degree orthogonal view

Treatment Options for clavicle fracture.

- Nonoperative
  - Sling
  - Brace
- Surgical
  - Plate Fixation
  - Intramedullary nail.

Non-operative Treatment

- Simple Sling or Figure-of-8 Bandage.
- “Standard of Care” for most clavicle fractures.
- Unclear about the need to wear a specialized brace.

Fallacies of Non-operative Treatment.

- It is difficult to reduce clavicle fractures by closed means.
- Significantly displaced mid-shaft and distal-third injuries have a higher incidence of malunion and non-union (15-20% nonunion?.)




Conclusion of McKee study

- Displaced midshaft clavicle fractures can cause significant, persistent disability, even if they heal uneventfully.

Literature= Hill et al, JBJS 1997;79B: 537-9)
McKee et al. J Bone Joint Surg .Am 2006;88-A:35-40.)

Surgical Treatment of Clavicle Fractures is advised in.

- 1) Widely displaced fractures.
- 2) Multiple trauma.
- 3) Displaced distal-third fractures
- 4) Open fractures.
- 5) Associated neurovascular injury.

Relative Indications for Acute Treatment of Clavicle Fractures.

- 1) Floating shoulder
- 2) Seizure disorder
- 3) Cosmetic deformity
- 4) Earlier return to work.

Plate Fixation.

- ORIF by anatomical precountored clavicle plate is excellent method.
- Plate applied superiorly or inferiorly.
- Used for acute displaced fractures and non-unions.

- **Complications of non-operative treatment**

Nonunion(1-5%).
Decreased shoulder strength and endurance

Complications of operative treatment by plate (10%-30%).

Hardware complications ;30% of patients.
Request plate removal
Adhesive capsulitis.
Infection(4.8%).
Hardware irritation requiring removal (8%)
Mechanical failure (1.4%)

Intramedullary Fixation

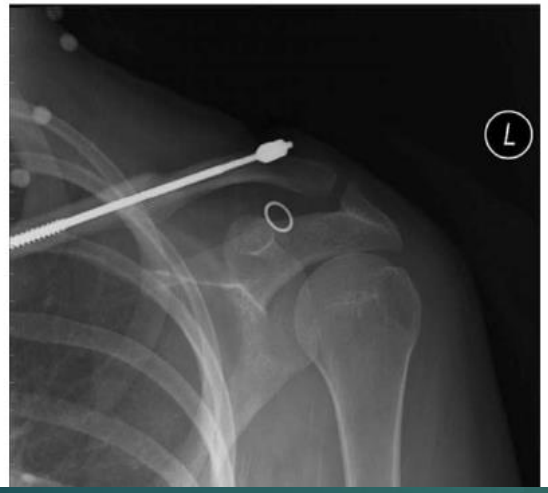
- Large threaded cannulated screws.
- Flexible elastic nails.
- K-wires, Associated with risk of migration.
- Useful when plate fixation contra-indicated

  [Bad skin, Severe osteopenia]

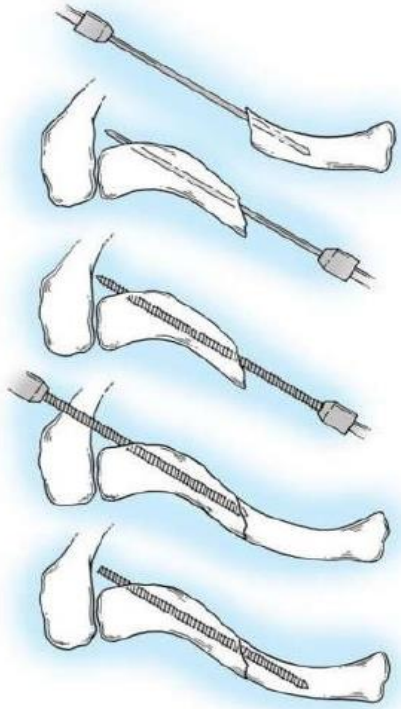
  Fixation less secure

Open reduction and fixation by nail.

Rockwood intramedullary pin of clavicle



McKeever intramedullary fixation of clavicle



Titanium Elastic Nails.

- Accommodate three-dimensional anatomy of the clavicle.
- Typically inserted (from medial to lateral)
- Best in fractures without comminution
- Small incision at fracture site may be needed.

Minimally Invasive Intramedullary Nailing of Midshaft Clavicular Fractures Using Titanium Elastic Nails.

- 31 cases evaluated 26 months avg (6-46 months)
- No nonunions or refractures in any group.
- 7 cases medial migration; 1 case lateral perforation
- 1 case req'd shortening of nail.

Mueller M, et al. J Trauma 2008;64:1528-1534

ORIGINAL ARTICLE

(*J Orthop Trauma* 2009;23:106–112)

Elastic Stable Intramedullary Nailing Versus Nonoperative Treatment of Displaced Midshaft Clavicular Fractures—A Randomized, Controlled, Clinical Trial

- **30 patients: simple shoulder sling**
  - 90% union
  - 2 symptomatic malunions
  - Req'd open reduction.

- **30 patients elastic nail**
  - 100% union
  - 7 cases medial nail protrusion.
  - 2 re-fractures.
  - Better DASH and Constant outcome scores, significantly different during first 18 weeks.
  - Patients more satisfied with cosmetic appearance and overall outcome.

Interlock nailing for fracture clavicle .

Technically demanding procedure

A new concept in treatment of clavicle fracture with The Screw Intramedullary nail .

Screw intramedullary nail

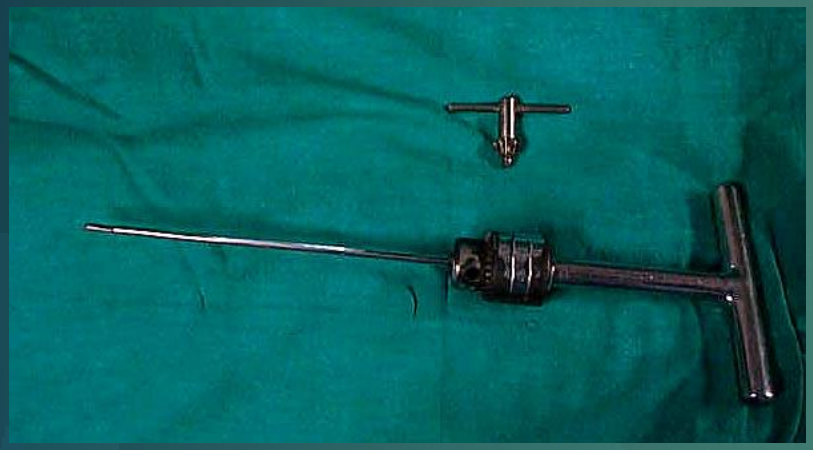
- 5-6 cm in length ,
- 2.5 and 3mm. diameter .
- Screw portion 10mm length and 4.5mm in diameter.
- Screw hole of 3.5 mm.

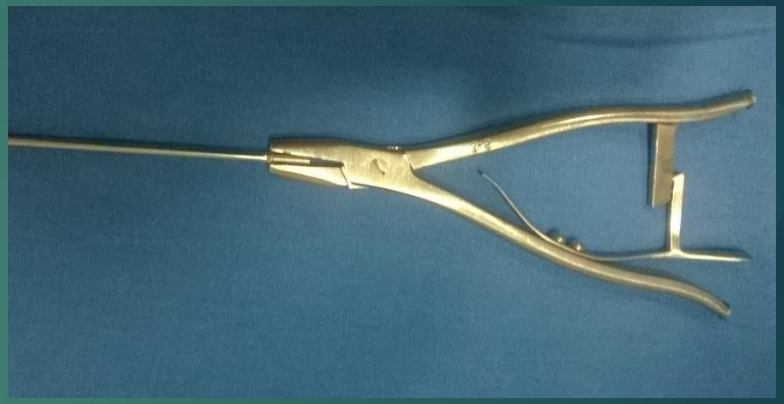
Screw nail is an elastic nail.

- **Nail** is **made of a metal sufficiently elastic to bend as it traversed the canal from the point of insertion and resilient enough to spring back in the curvature when finally seated.**
- **Rigid enough to withstand the torsional, rotational, and angulatory forces.[titanium or steel]**

Procedure

SCREW NAIL MOUNTED ON CHUCK



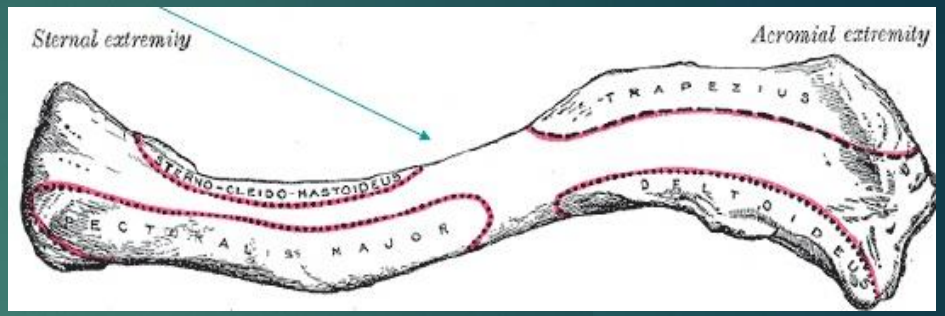


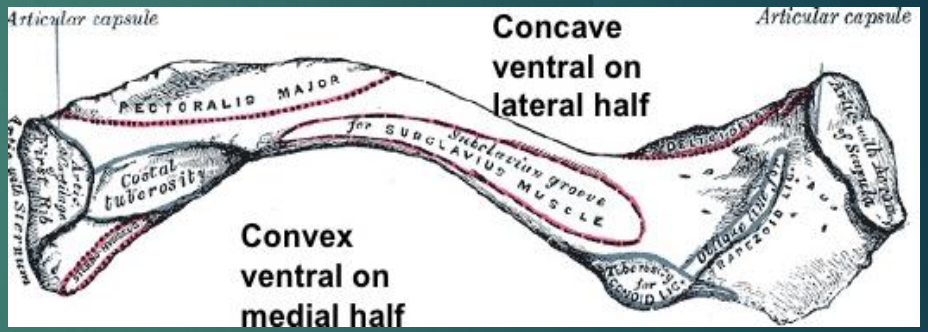
The inserter should firmly grasp the nail in order to control rotation, insertion and nail withdrawaL

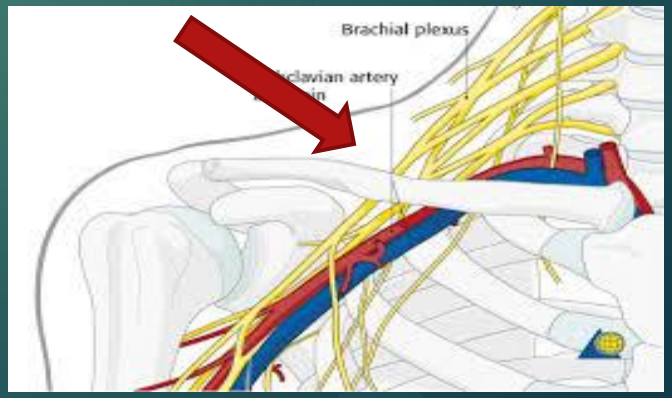
KNOW THE ANATOMY OF BONE

Middle Third
Weak to axial load

Medial Third
Protects brachial Plexus, subclavian Vessels, & Superior lung







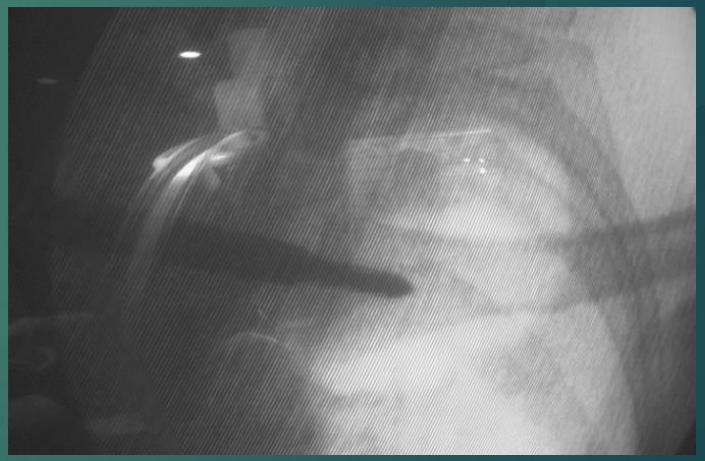
Position of the patient

Place the patient supine with large bump placed between scapula allowing injured shoulder girdle to fall posteriorly .

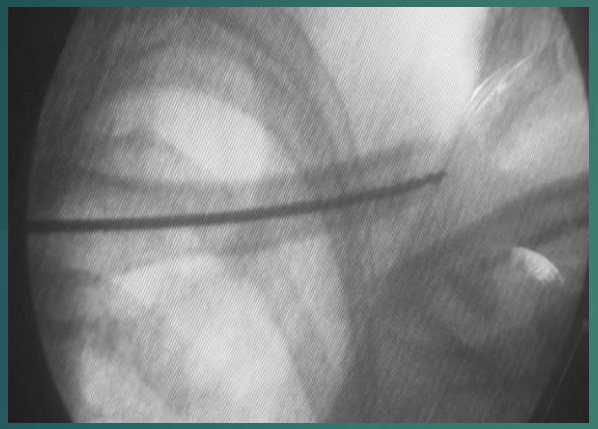
Method of screw intramedullary nail .

- This position helps to restore length and increase exposure of the clavicle.
- Image intensifier is must.
- Medial entry point near sterno-clavicular joint.

Window near the sternoclavicular [SOFT BONE]. Bone awl is passed and entry point is enlarged.



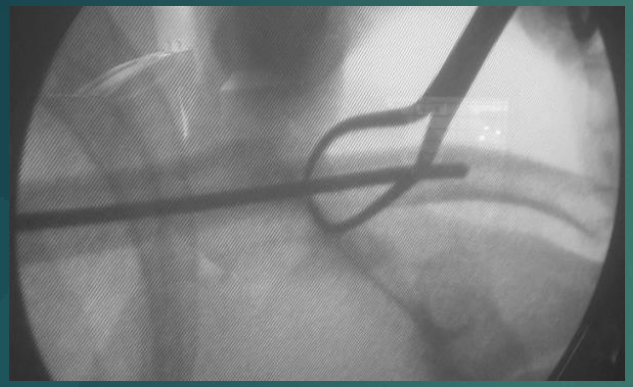
Reaming of canal from the medial end till the fracture site.

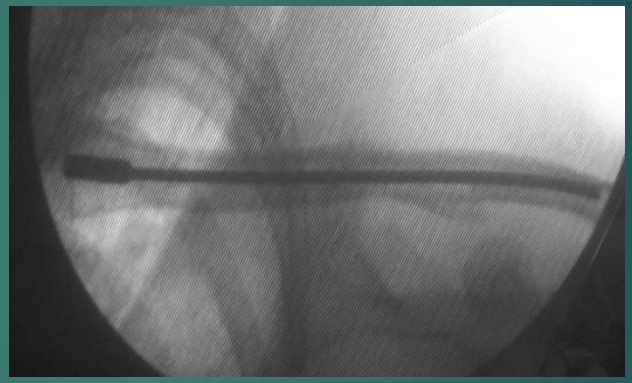


Introduction of nail and negotiation till fracture site.

Reduction of fracture with the help of towel clips and Negotiation of nail.

Negotiation of nail through fracture site.





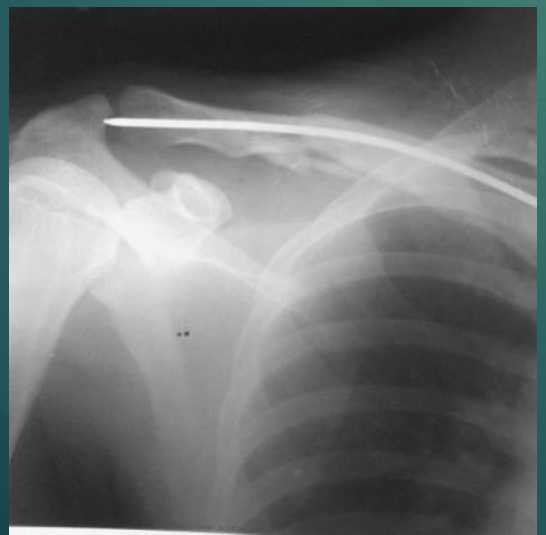
This is very crucial stage .
Monitor every step in c-arm

MINI OPEN REDUCTION.

If there is difficulty give small incision to access fracture fragments.

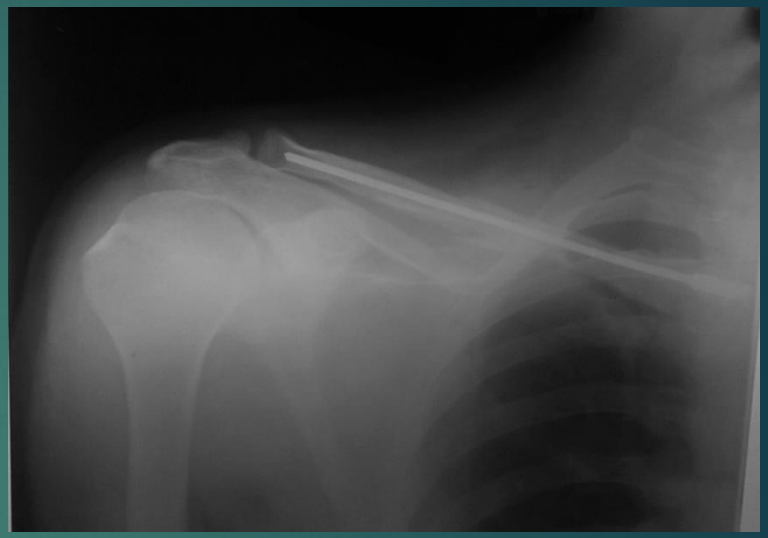
Minimally invasive procedure.

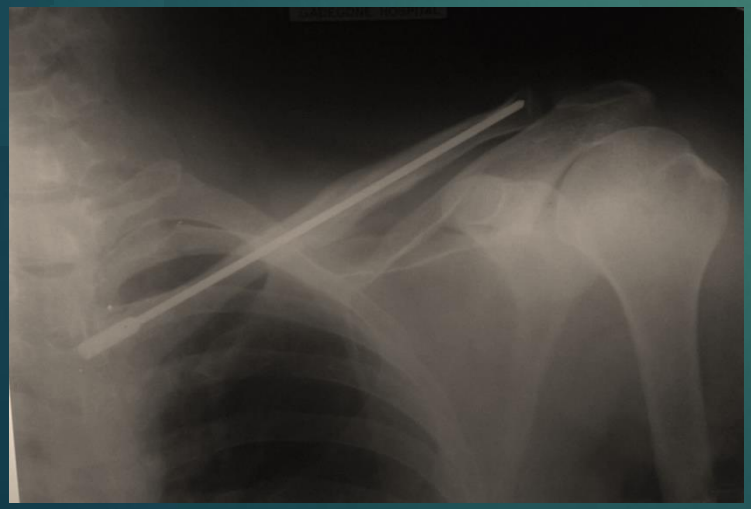
EXAMPLE
Displaced midclavicular fracture



2 months follow-up

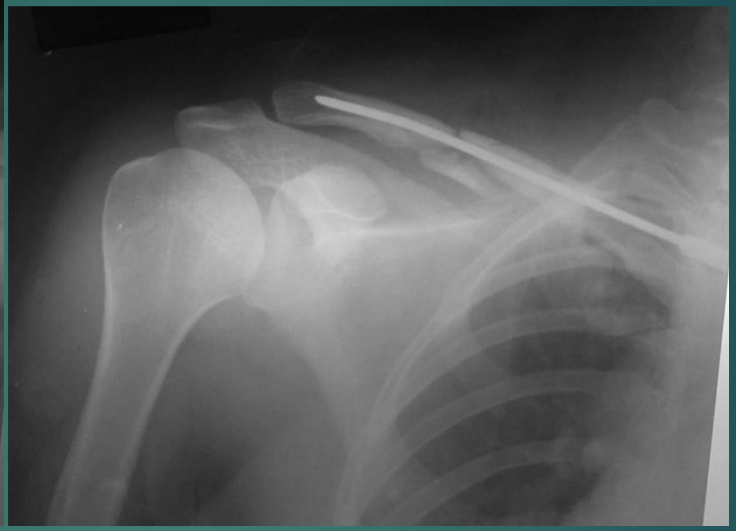
EXAMPLE
Displaced midclavicular fracture



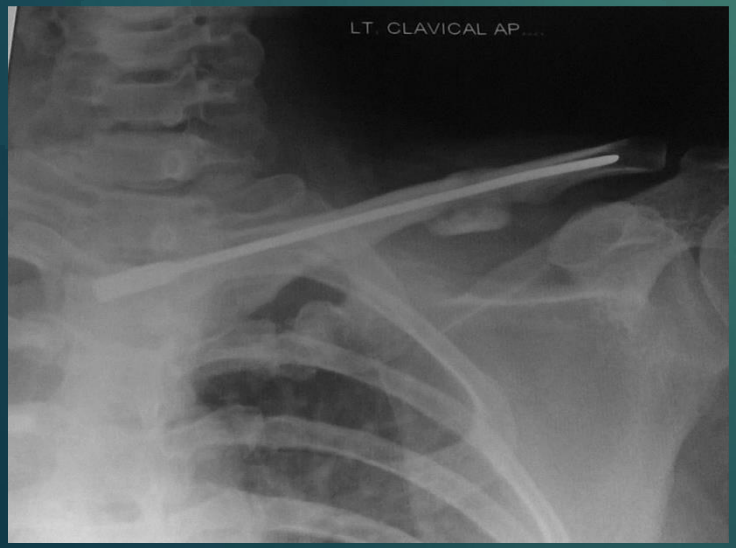


12 months follow-up

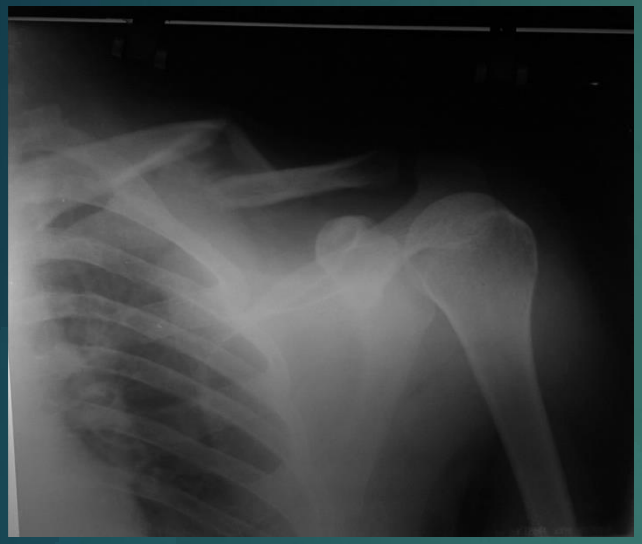
EXAMPLE
Displaced midclavicular fracture

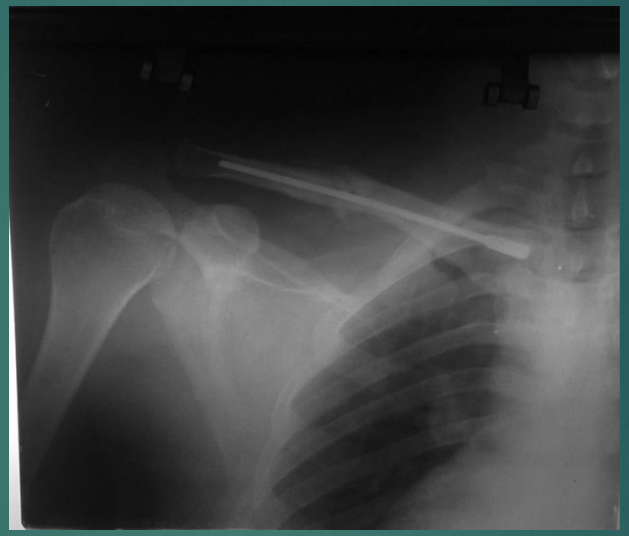


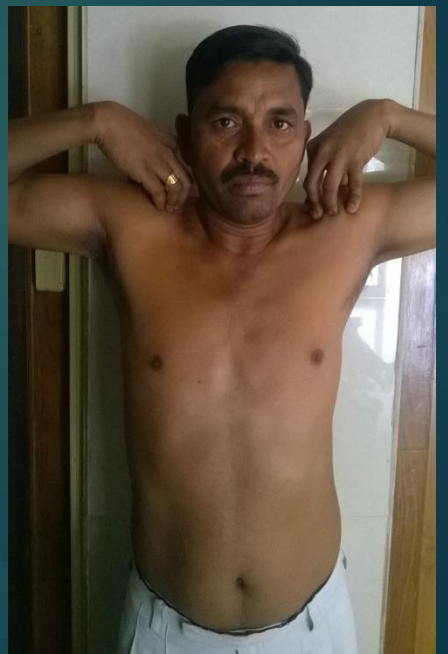
4 months follow-up



EXAMPLE
Displaced 6 months old midclavicular fracture







Correction of symptomatic nonunion with IM screw

Postoperative protocol

- BRACE PROTECTION FOR THREE WEEKS.
- IMMEDIATE MOBILIZATION AS TOLERATED BY PATIENT.
- OVERHEAD ABDUCTION AFTER 4-6 WEEKS.
- AFTER UNION FULL EXERCISES.

Intramedullary fixation

- Open or closed method.
- Medial entry .
- Easy procedure .
- Limited exposure .
- It can be used in comminuted fracture.

IM FIXATION.

- **Disadvatages=**

- Narrow canal.
- Difficult Rotational control.
- Pin migration.

Plate fixation versus intramedullary fixation for displaced mid-shaft clavicle fractures: a systematic review
INTERNATIONAL ORTHOPAEDICS 2012 Mar; 36(3): 579–585.

- Three studies showed no difference in functional outcome or complications after plate fixation or intramedullary fixation for displaced midshaft clavicle fractures.

COMPARISION OF PLATE /NAIL

CONCLUSION.

- Identify the indicated cases for surgery and select appropriate implant.
- Nail migration is prevented by screw intramedullary nail .


THANK YOU