

CASE SERIES REPORT AND REVIEW OF THE LITERATURE: RESULTS OF THE SURGICAL TREATMENT OF SCAPULAR FRACTURES AT LE VAN THINH HOSPITAL

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KHOA NGOẠI CHẤN THƯƠNG, BV LÊ VĂN THỊNH

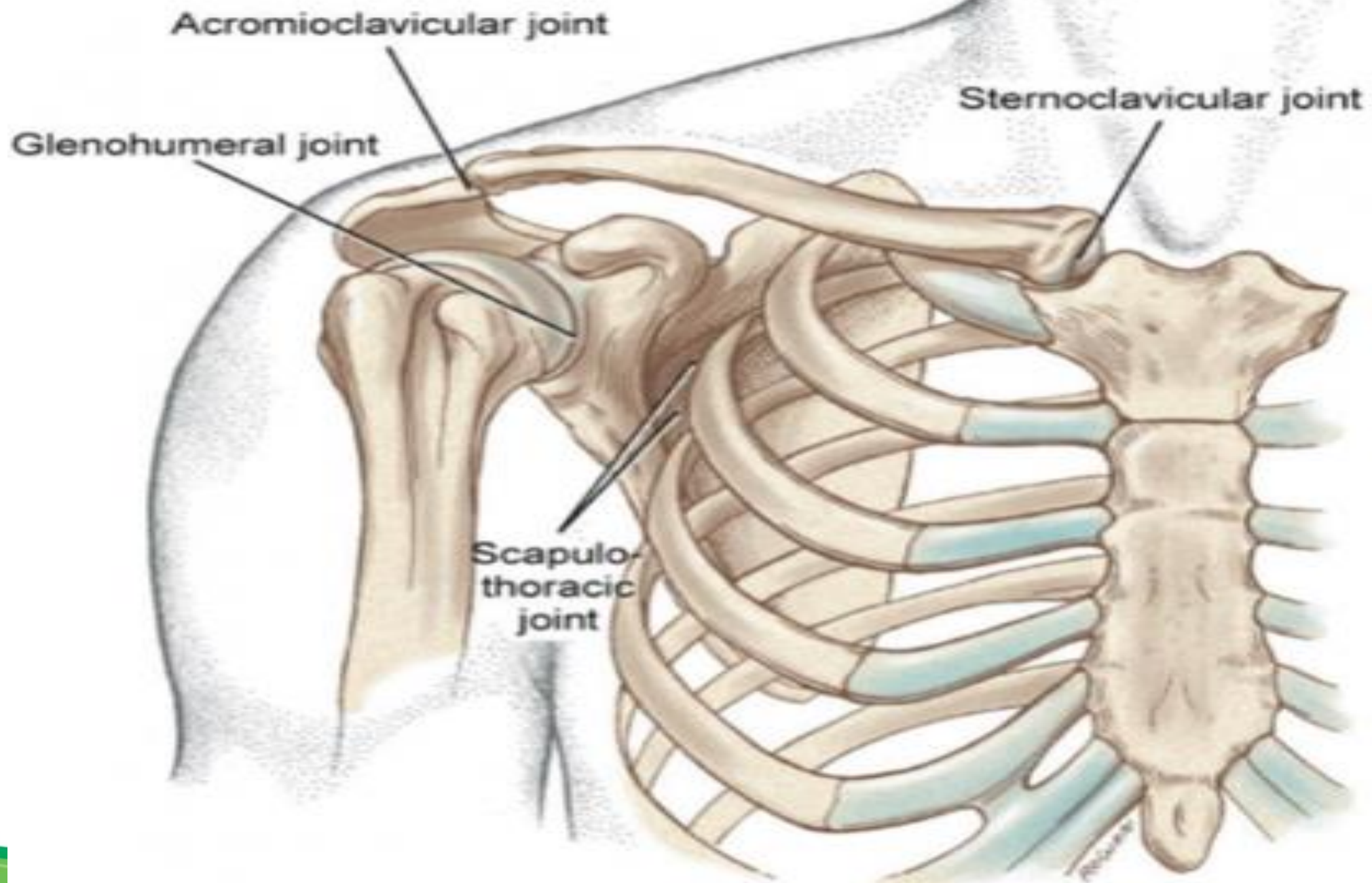


Introduction

- 0.4-0.9% of all fractures and for about 3-5% of all fractures of the shoulder girdle
- High-energy trauma--> polytrauma patients

Rockwood and Greens Fractures in Adults





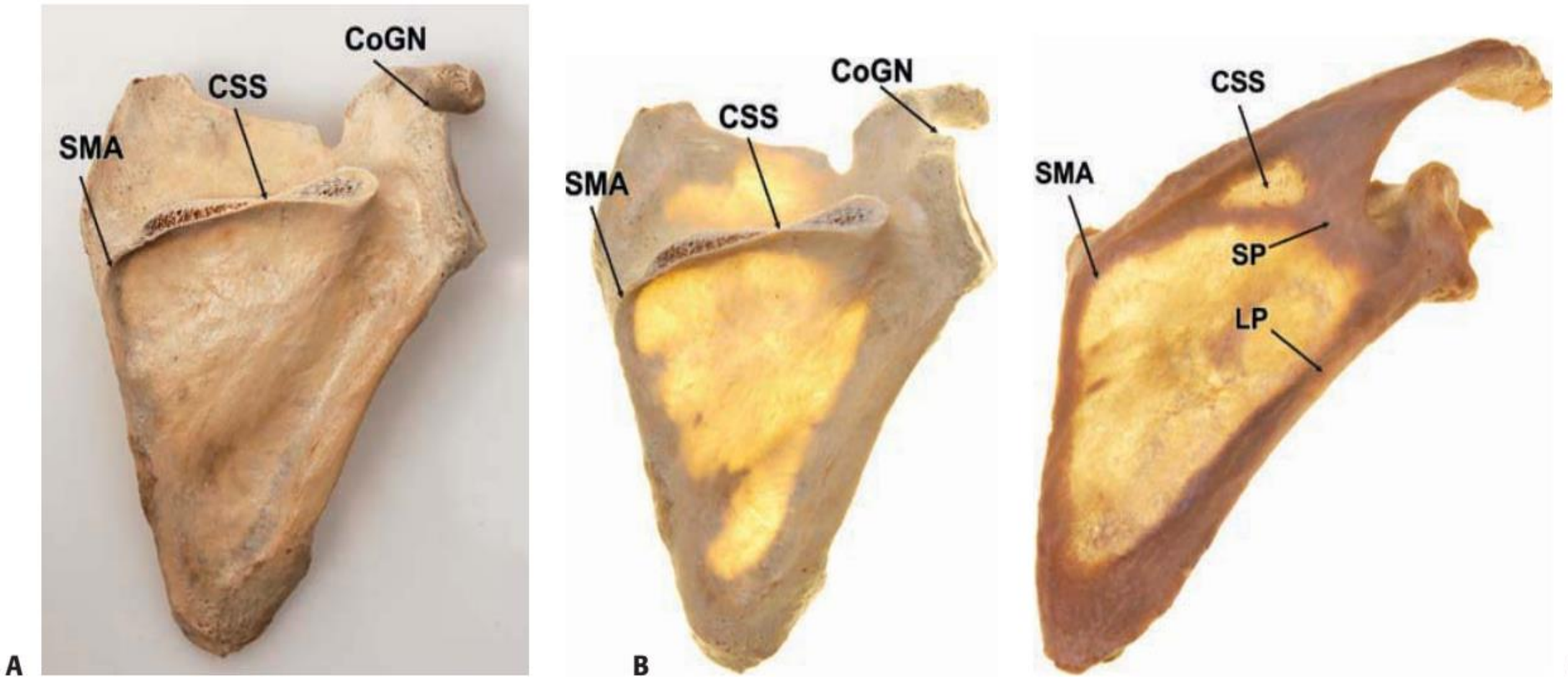
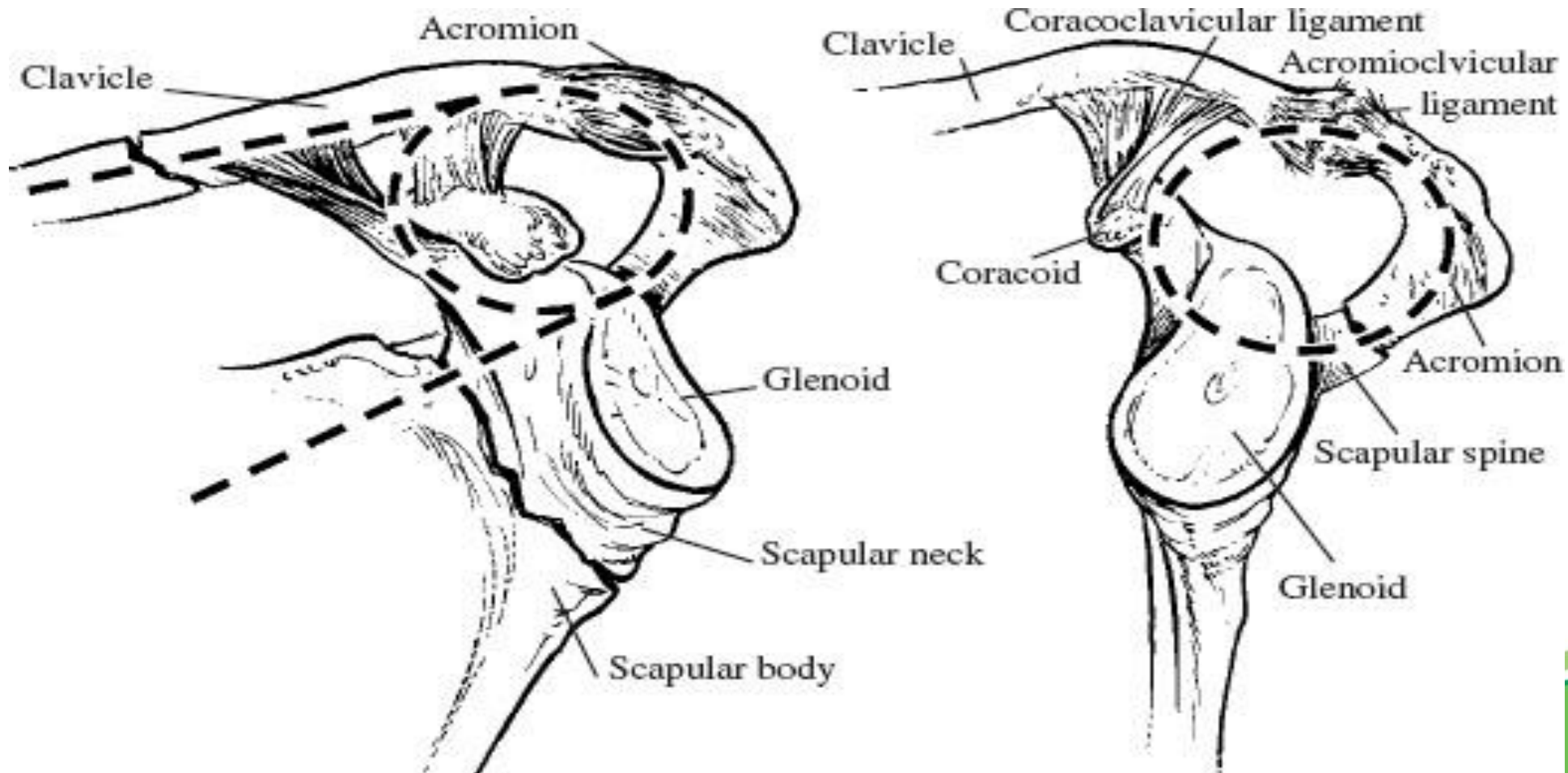


FIGURE 39-1 Anatomy and internal architecture of the right scapula: **A:** Posterior aspect of scapula after resection of scapular spine. **B:** The same specimen transilluminated. **C:** Posteroinferior aspect of transilluminated scapula. SMA, spinomedial angle; CSS, the thinner center of scapular spine; CoGN, coracoglenoidal notch; SP, spinal pillar; LP, lateral pillar.

Superior shoulder suspensory complex



Blood vessels and nerves of the scapula

- Brachial plexus--> suprascapular nerve--> scapular notch: supraspinatus and infraspinatus muscle.
- Scapular circumflex artery: + suprascapular artery

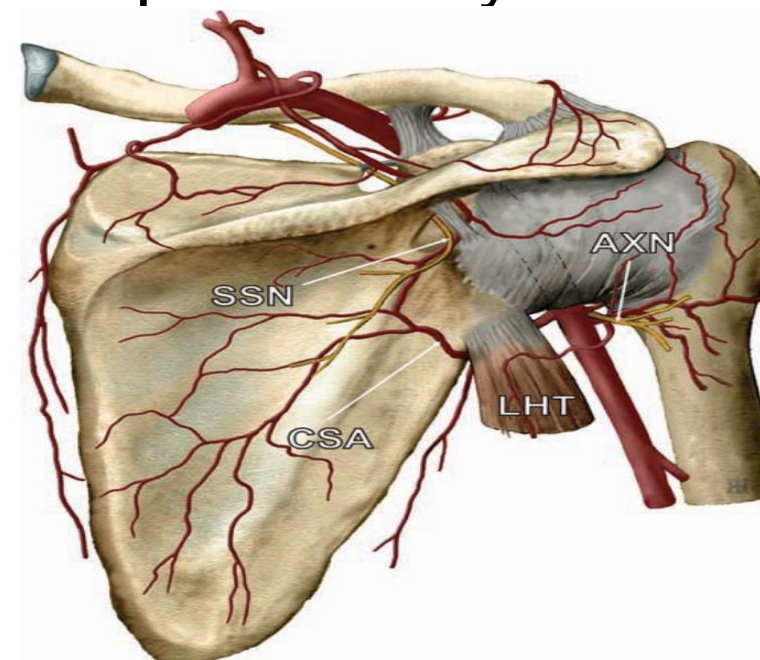
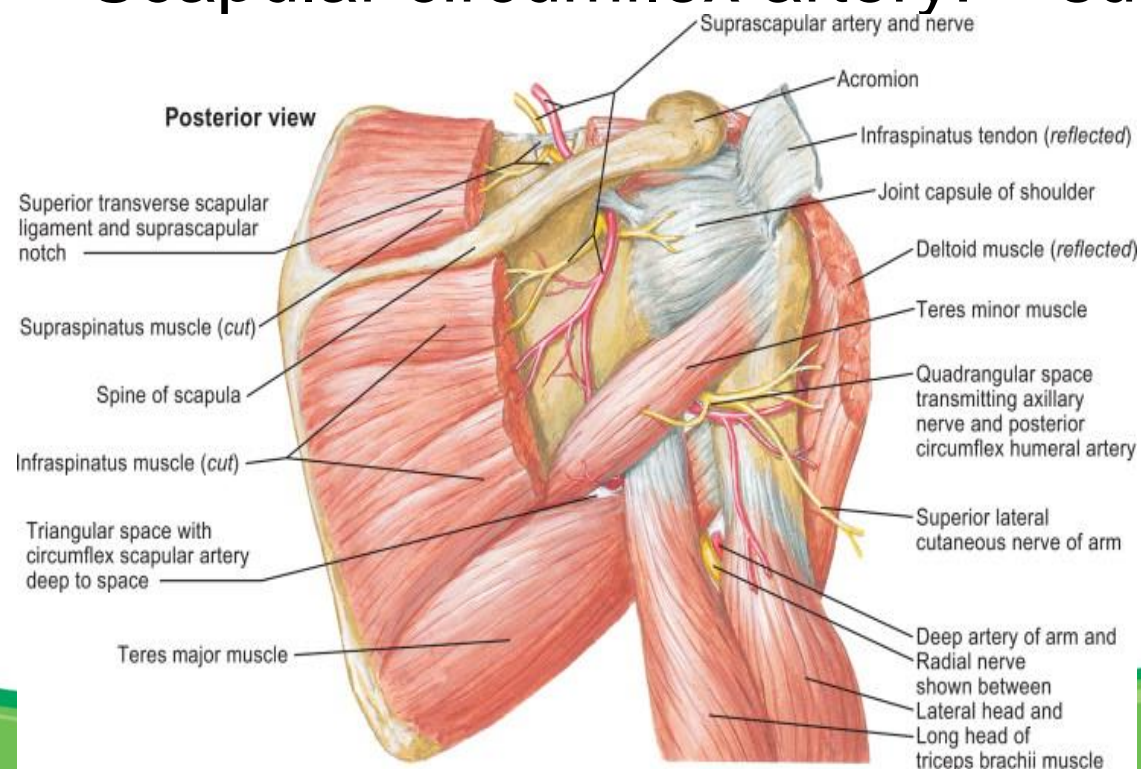


FIGURE 39-3 Course of suprascapular neurovascular bundle on posterior aspect of the right scapula. AXN, axillary nerve; CSA, circumflex suprascapular artery; LHT, long head of triceps; SSN, suprascapular nerve accompanied by suprascapular artery.

Mechanisms of injury

- A direct blow to the scapula: traffic accident, fall from height, a heavy object on shoulder
- Humeral head.
- Violent muscle contracture: electrical injury, epileptic seizure
- Gunshot injuries, pathologic fracture ,fatigue fracture.



Associated injuries

- Isolated scapula fracture
- Ribs
- Thoracic cavity and lungs
- Shoulder girdle: clavicle, proximal humerus, AC joint
- Head injuries: 10-42%
- Other injuries: pelvic, brachial plexus.
- Mortality: 2%-14%



Signs and Symptoms

- Polytrauma patients: **save life**, thorough comprehensive examination.
- Medical history: mechanism
- Visual assessment
- Palpation: Neurovascular function.
- Range of motion
- Periphery



Imaging and other diagnostic methods

- **Radiology**

- Neer I projection:

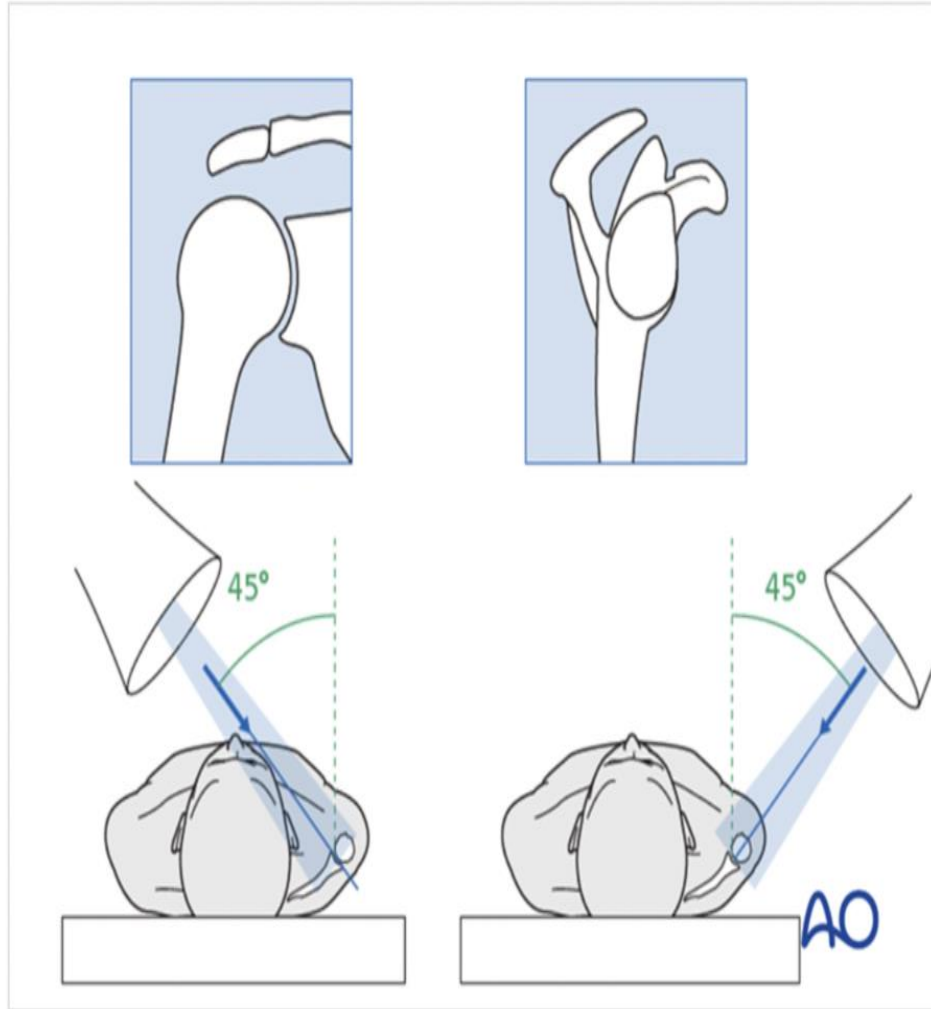
- Neer II projection: Y-view

- Chest radiograph: scapulothoraci dissociation.

- Axillary view.

- **CT scans**





For the diagnosis of scapular injuries two X-ray projections at 90 degrees to one another are routinely taken:

- 45 degree antero-lateral (trans glenoid view or epsilon view)
- 45 degrees antero-medial (trans scapular view)

The trans glenoid or epsilon view is taken with the beam at 45 degrees to the sagittal plane. The anode is positioned anteriorly and the cathode posteriorly in line with the orientation of the scapula. This anterolateral orientation of the C-arm will produce a trans glenoid projection and an AP of the glenoid neck and body of the scapula.

<https://surgeryreference.aofoundation.org>



Classification

- In 1975, Tscherne and Christ
- In 1991, Ada and Miller
- In 1992, Euler-->revised by Euler and Rudei in 1996
- In 1996 OTA (principles of the Muller/AO classification
- In 1984, and again in 1995, Ideberg
- In 1992, Goss modified the Ideberg classification.
- In 1998, Mayo revised the Ideberg classification.

Rockwood and Greens Fractures in Adults



- Combined fracture:
 - Combination of the four basic scapula fracture patterns
 - Combination of one or two basic scapula fractures with injuries to other bones, joint of shoulder girdle.
- Floating shoulder: unstable fracture of the surgical neck of scapula + fracture of the shaft of the clavicle
- Scapulothoracic Dissociation



Treatment

Nonoperative treatment of scapula fractures:

Undisplaced fracture (intra or extra-articular), patient's general , local, condition do not allow operation.

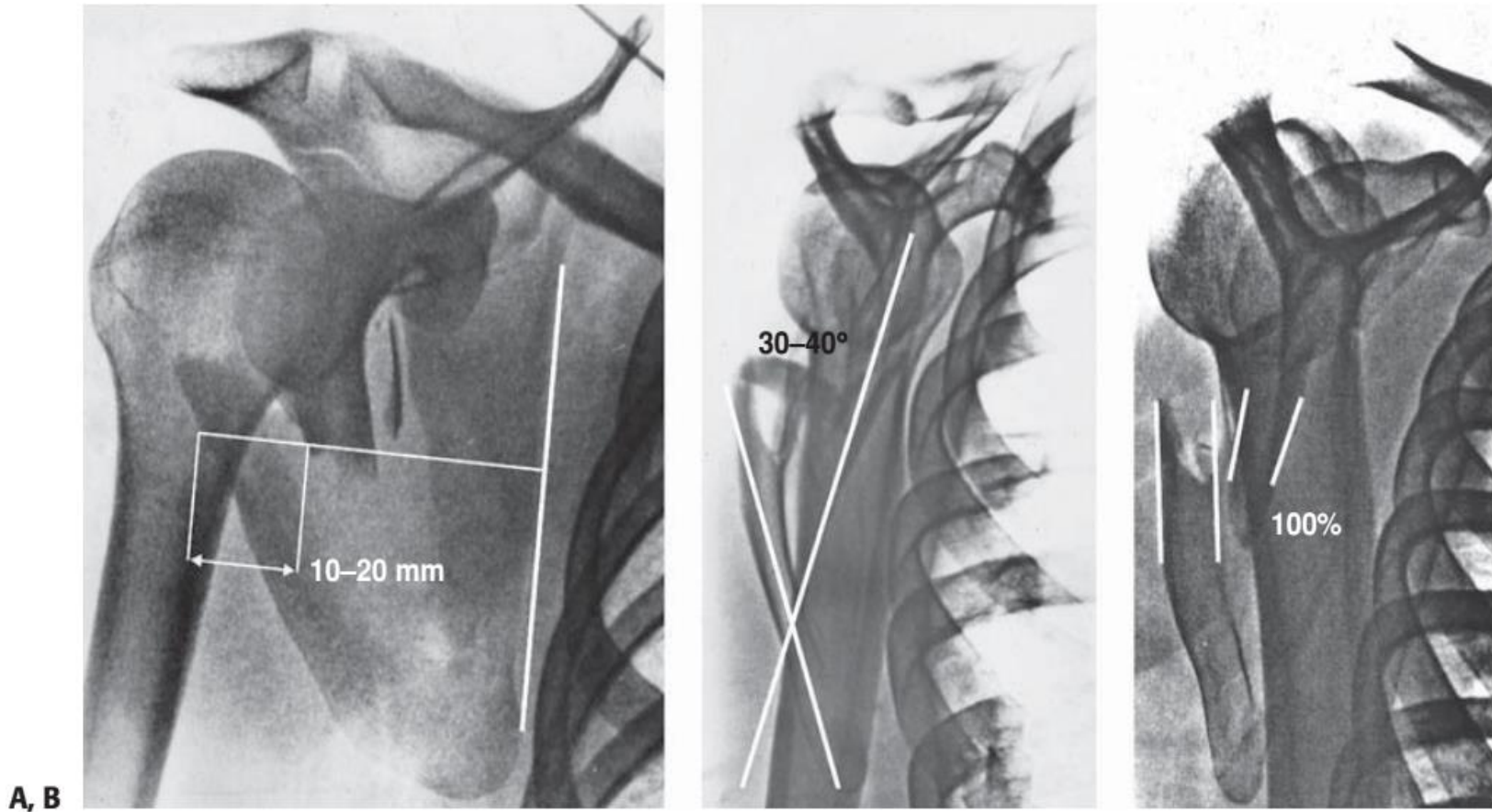
- Pain relief
- Sling immobilization:2 weeks
- PROM

->Deformity scapula, incongruity, instability of glenohumeral joint



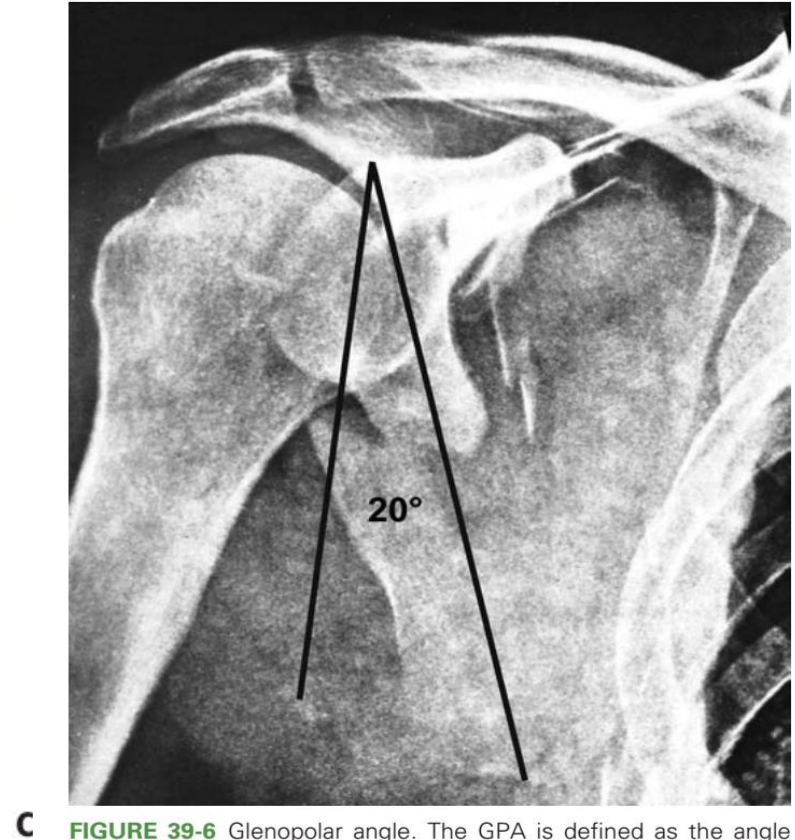
- Displace extra-articular fractures of the scapular body and neck:
 - Glenoid with the scapular body (GPA):orientation of glenoid->scapular body,humeroscapular rhythm (shoulder imbalance), normal course muscle
 - Restore the congruence between its anterior surface and the chest wall.
- 100% translation of fragments of the lateral border
- 30- to 40-degree angulation of main fragments of the lateral border
- Mediolateral displacement of the glenoid in relation to the lateral border of the scapular body of more than 1 to 2 cm
- GPA less than 20 degrees





A, B

FIGURE 39-5 Measurement of displacement of fractures of the scapular body or scapular neck.
A: Mediolateral displacement. **B:** Angular displacement. **C:** Translational displacement.



C

FIGURE 39-6 Glenopolar angle. The GPA is defined as the angle between the line connecting the superior and inferior poles of the glenoid and the line connecting the superior pole of the glenoid and the center of the inferior angle of scapula. A GPA of less than 20 degrees is one of the criteria for operative treatment.

Comprehensive anatomical classification

- Fractures of the processes

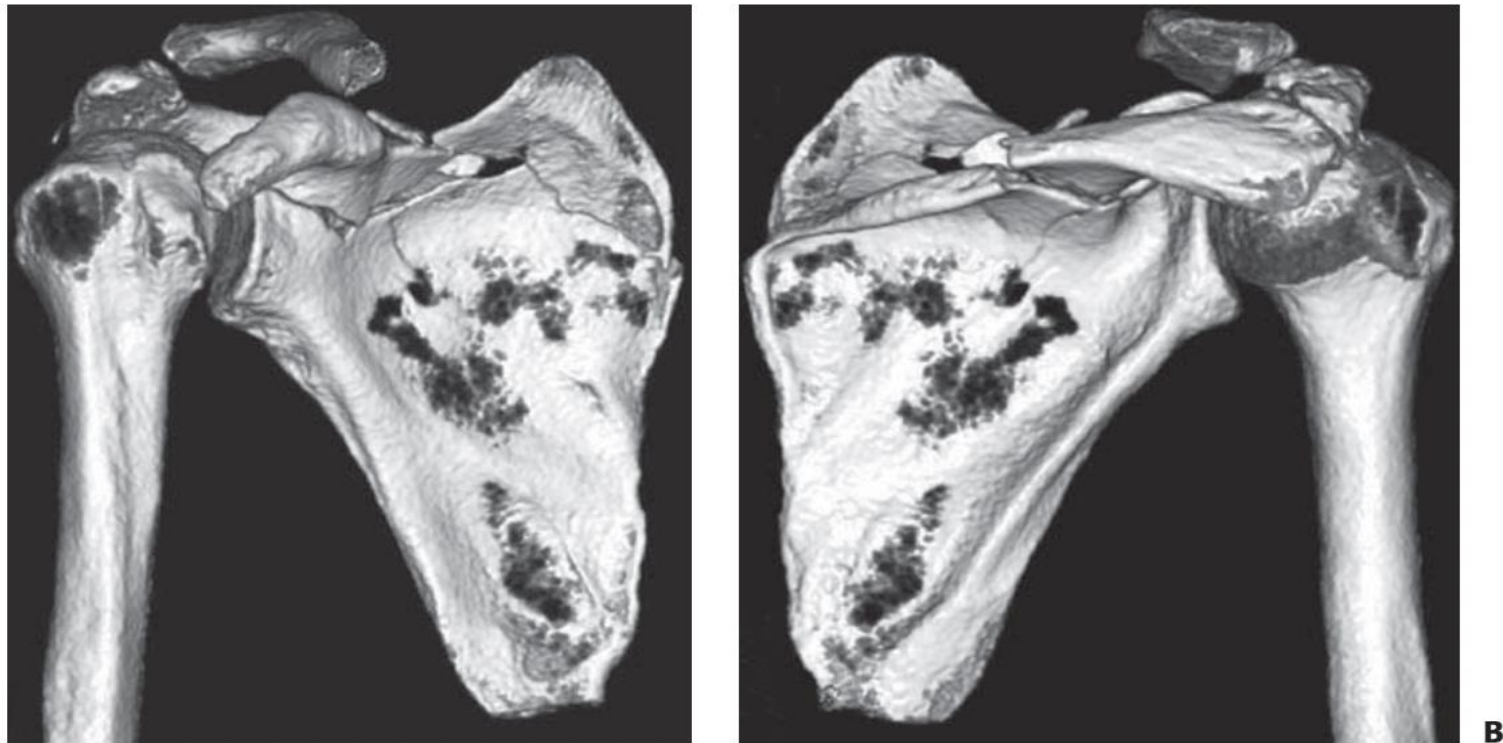


FIGURE 39-8 Fractures of the scapular processes (fractures of “upper” scapula) in 3D CT reconstruction. **A:** Anterior aspect. **B:** Posterior aspect. Both views demonstrate an intra-articular fracture of the coracoid base, a fracture of the superior angle, a fracture of the scapular spine, and a fracture of acromion. (Courtesy Prof. Zwipp.)

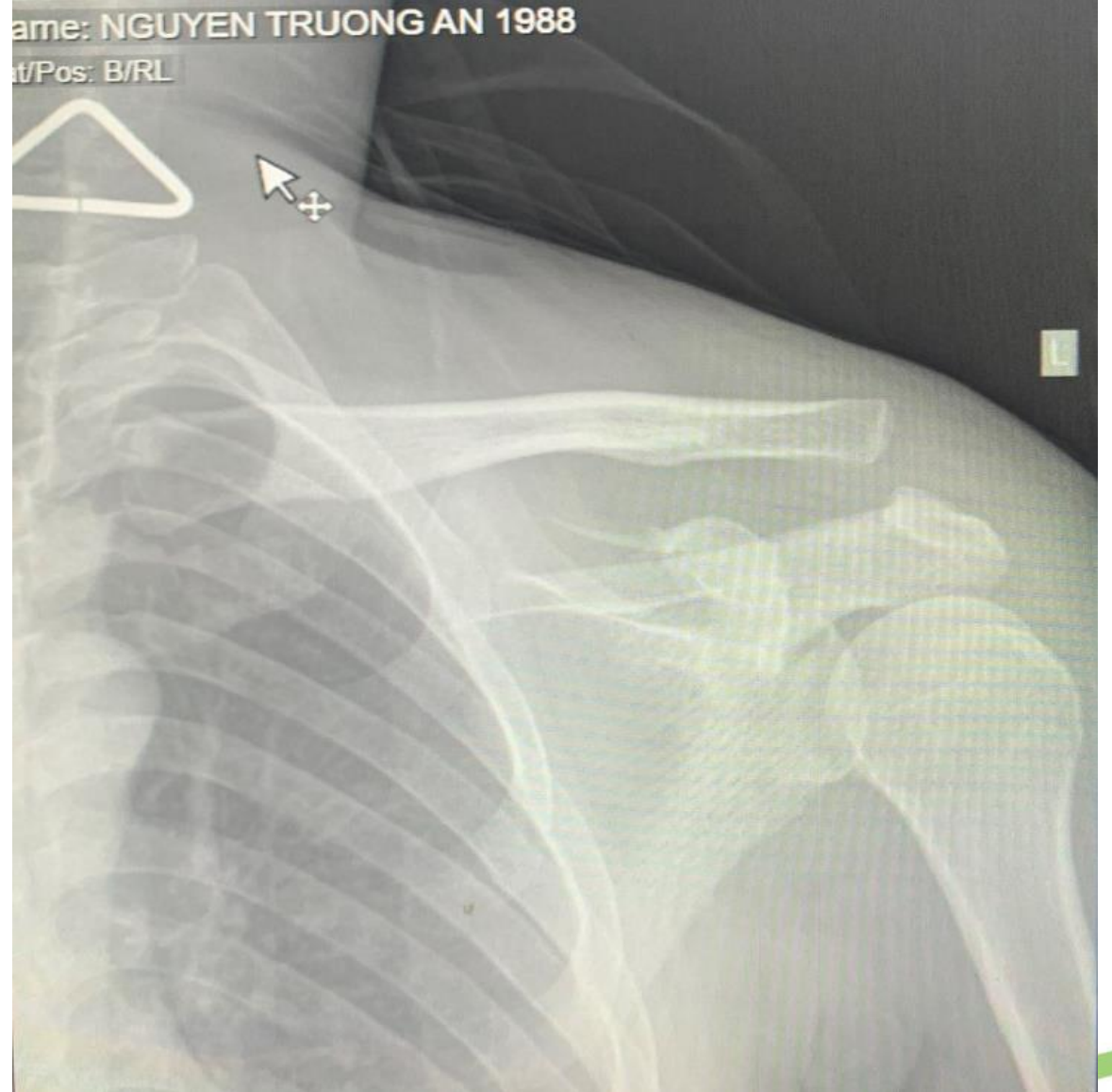
Displace fractures of processes:

- Impingement syndrome and compromise the rotator cuff
- Nonunion of processes of scapula is often painful
- Coracoid or acromion : displace more than 1cm.

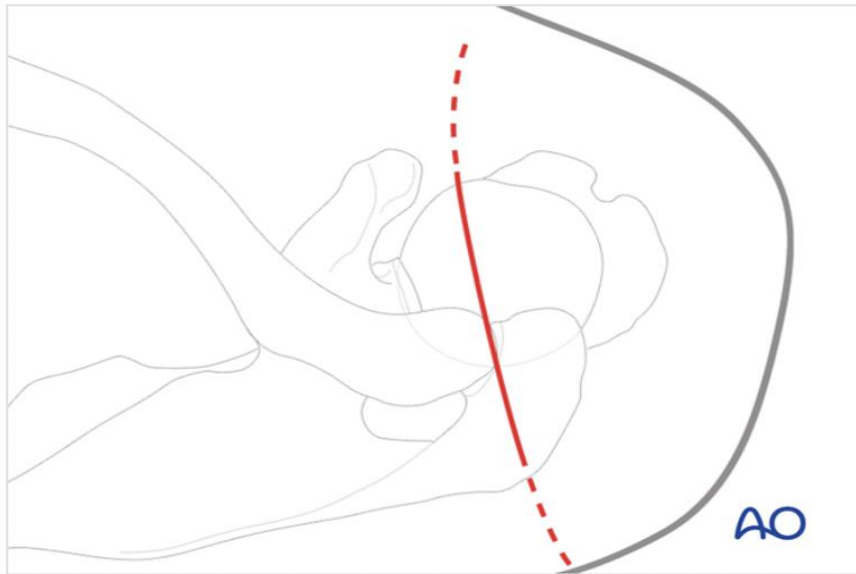


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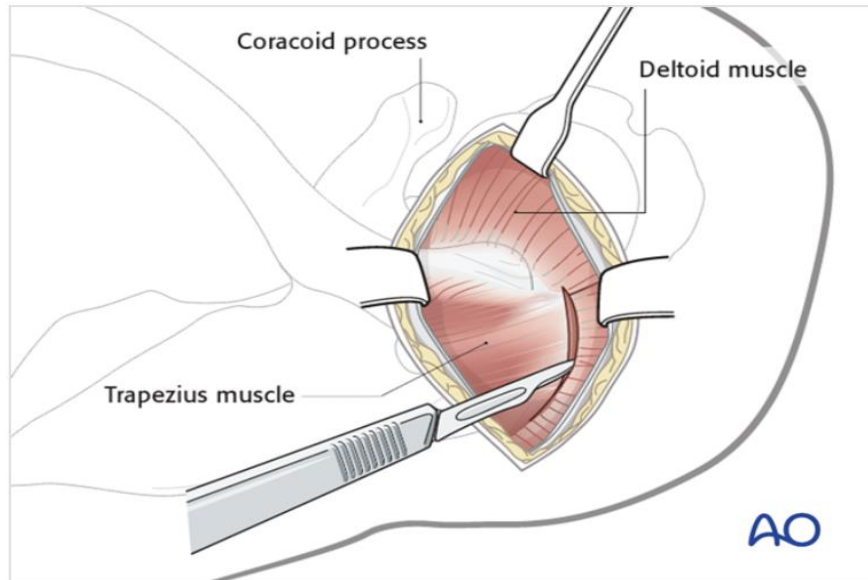
**Chẩn đoán: Trật khớp
cùng đòn độ V theo
Rockwood, gãy mỏm quạ,
gãy mỏm cùng vai
bên trái**







Begin anteriorly over the humeral head, carry the incision over the AC joint and end at the posterior aspect of the acromion. If necessary the incision can be extended to join the deltopectoral approach anteriorly. Dorsally this approach can be extended to join a standard posterior approach.

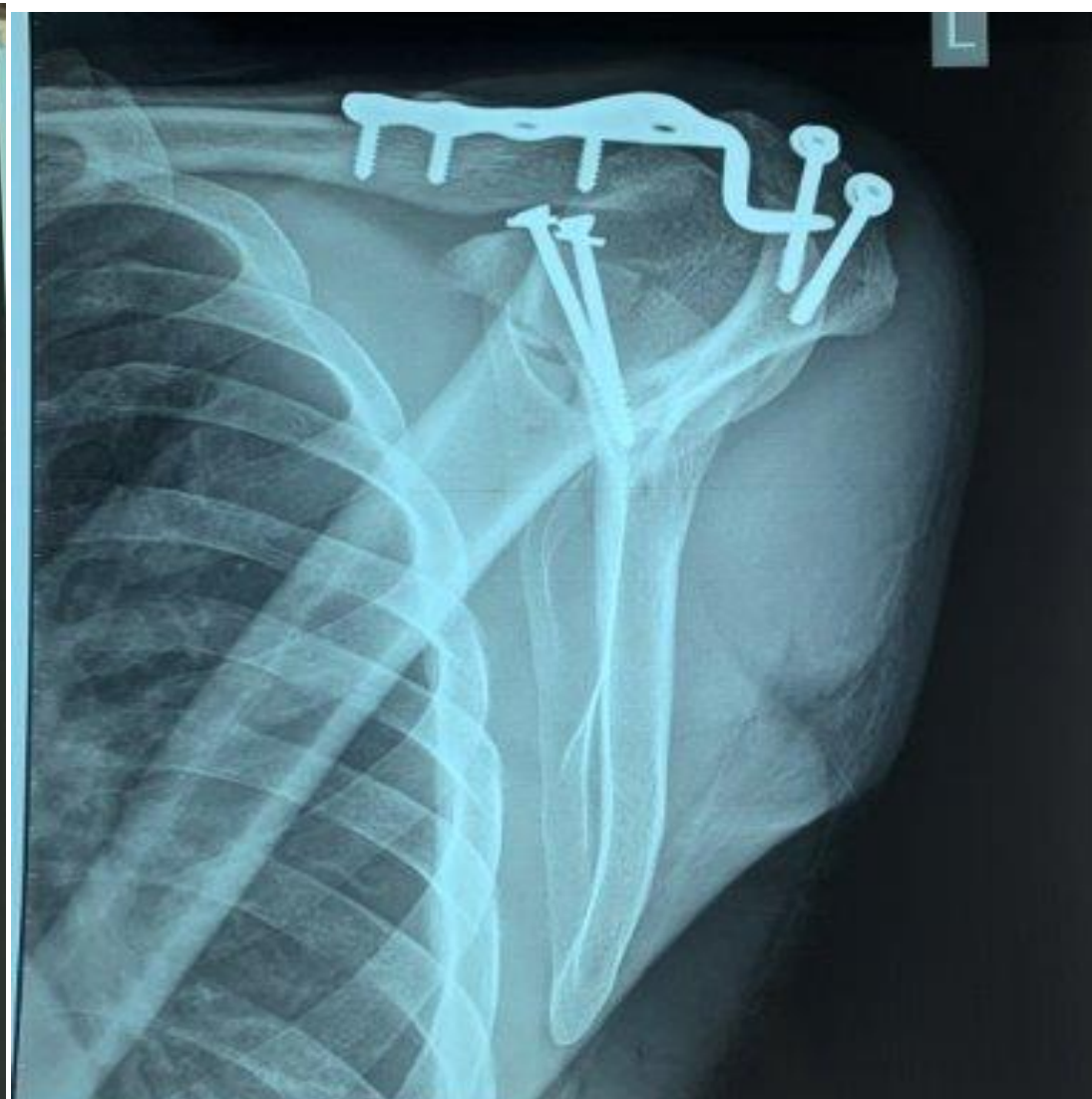


The superior or **saber** cut approach is a straight incision running directly from front to back.

It is used to expose the AC-joint and the acromion.



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Body fractures

- Anatomical body
- Biomechanical body

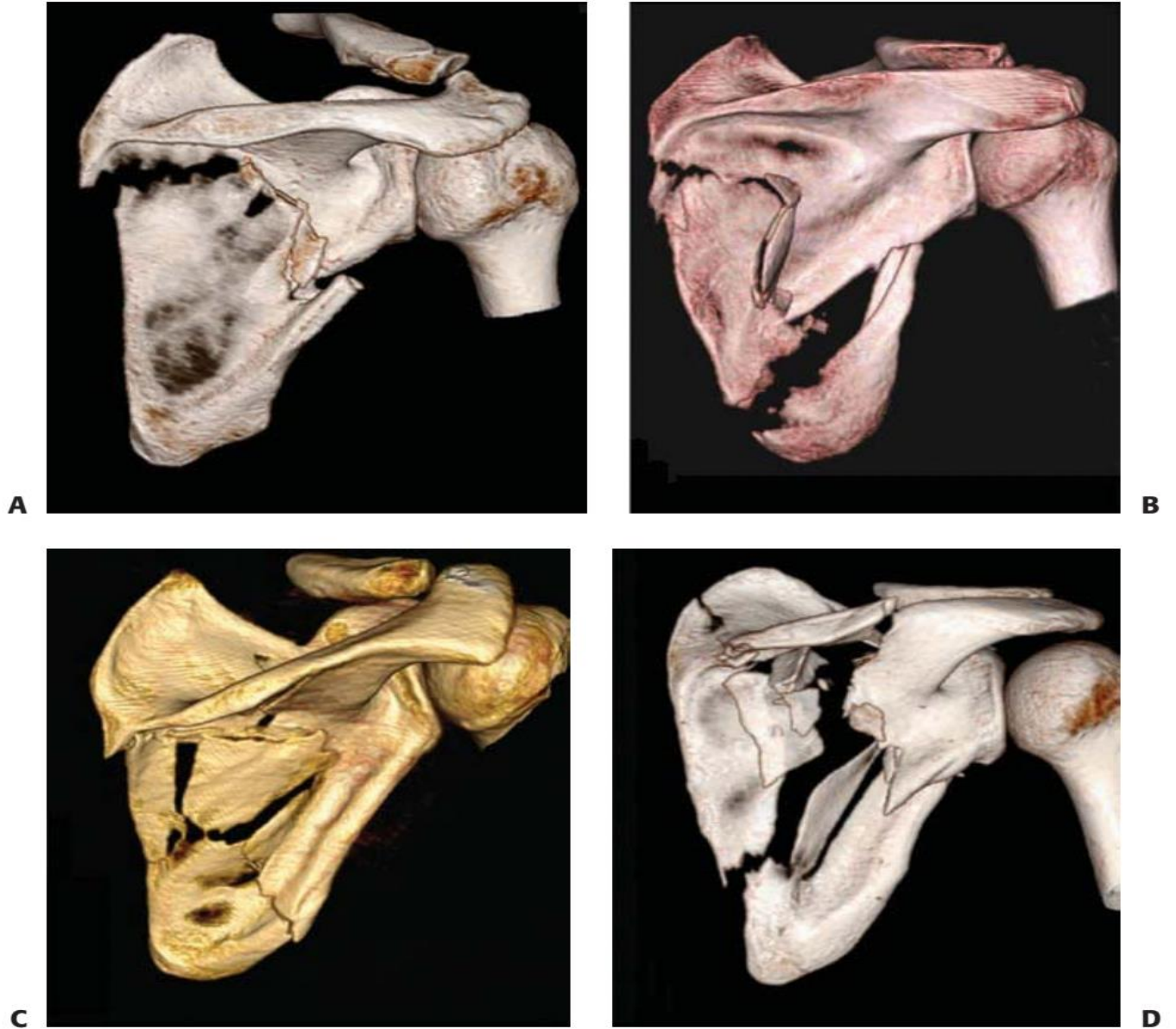
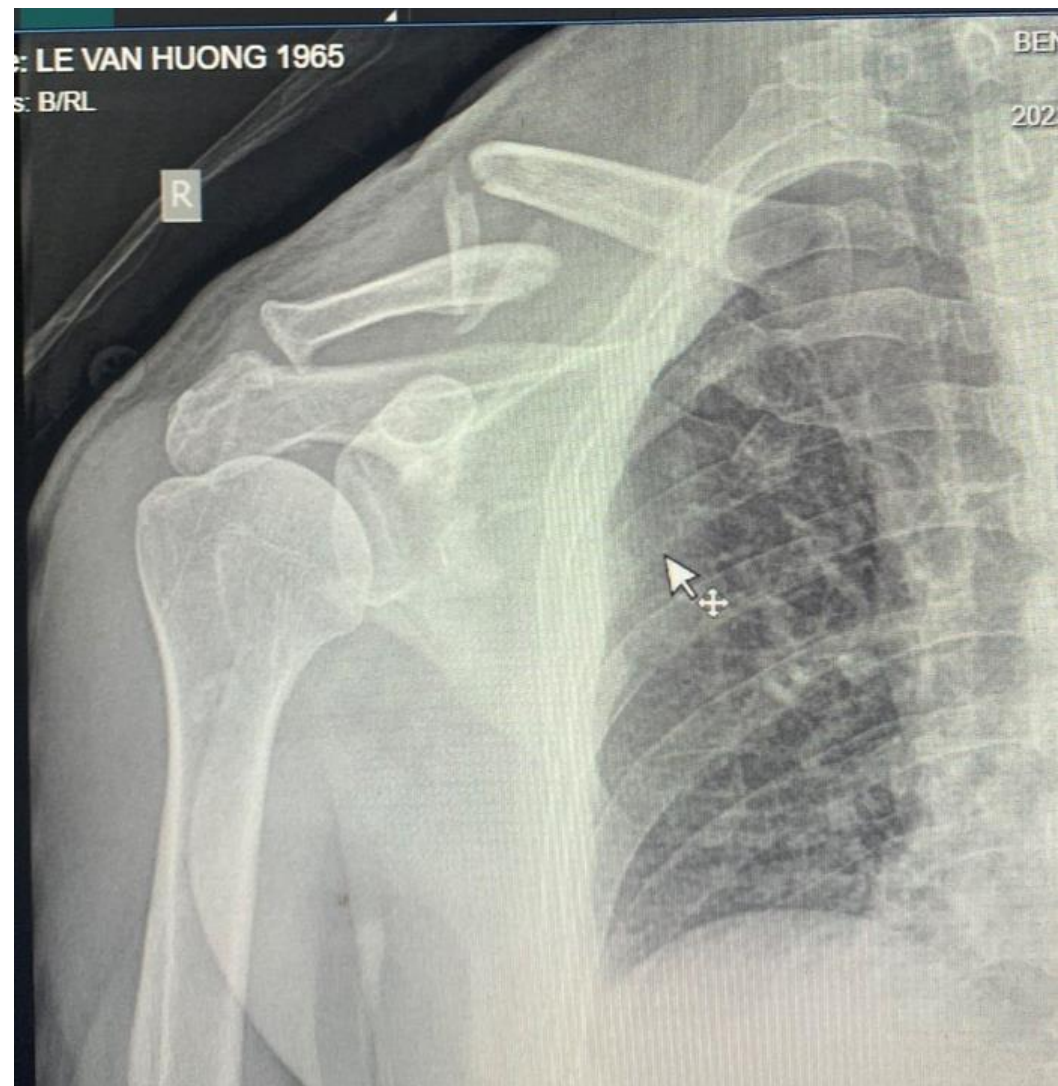
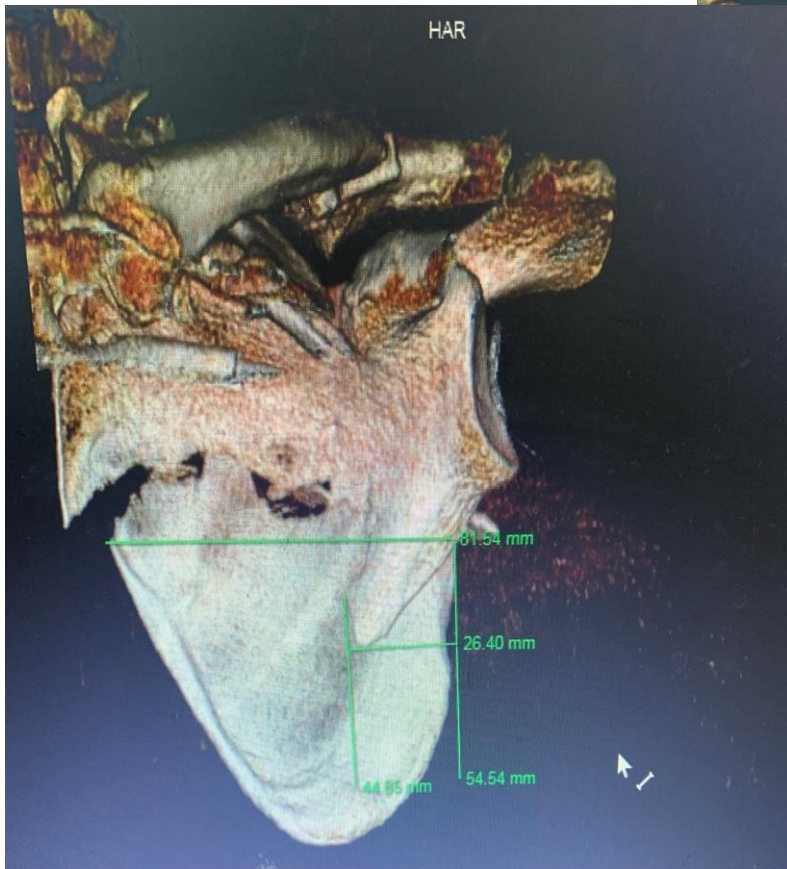


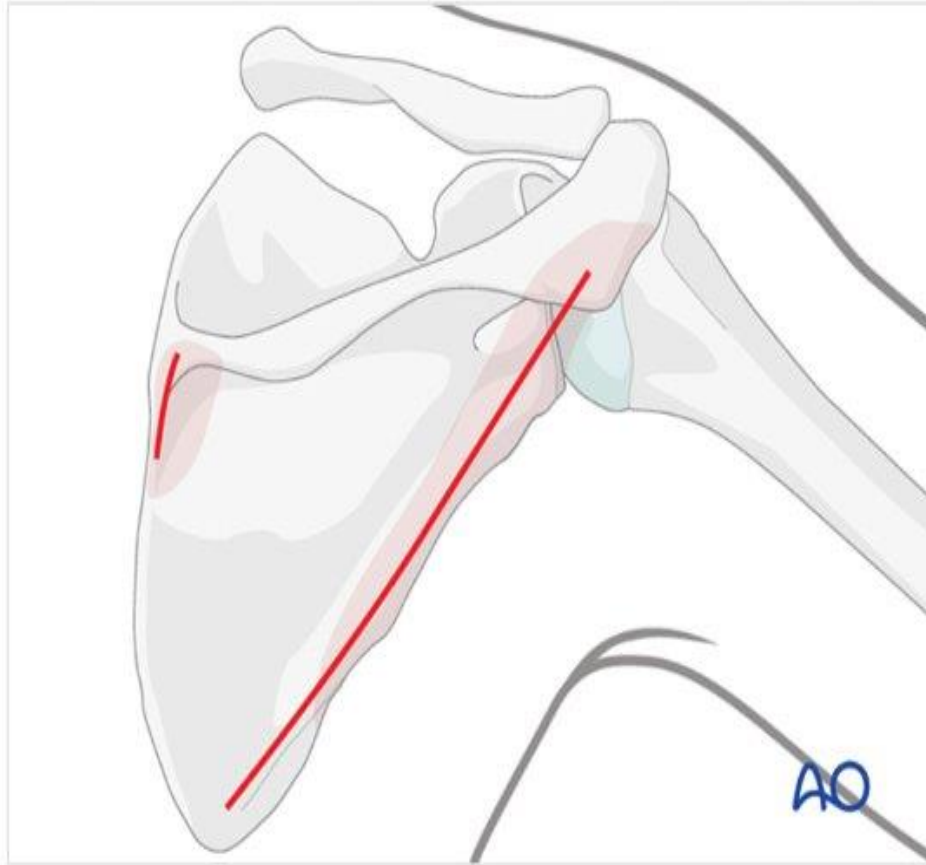
FIGURE 39-9 Fractures of the scapular body. **A:** A two-part fracture of the biomechanical body, **(B)** a three-part fracture of the biomechanical body, **(C)** a comminuted fracture of the biomechanical body involving the base of the scapular spine, **(D)** a comminuted fracture of the anatomical body.

BN nam, 59 tuổi
**Chẩn đoán: TDMP phải ,
gãy xương sườn, gãy
xương đòn,
gãy thân xương bả vai phải.**



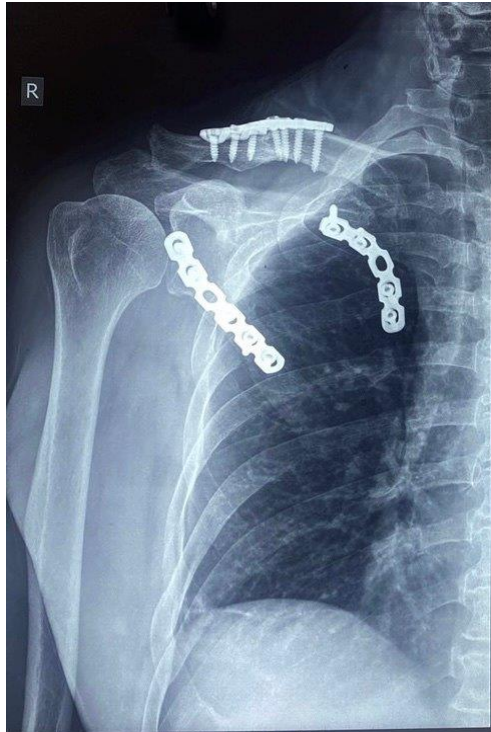






The Brodsky approach may be combined with a limited incision over the medial end of the scapular spine to control a medial border exit fracture line.

Little, if any, muscular detachment is needed for extensile exposure of relevant regions.



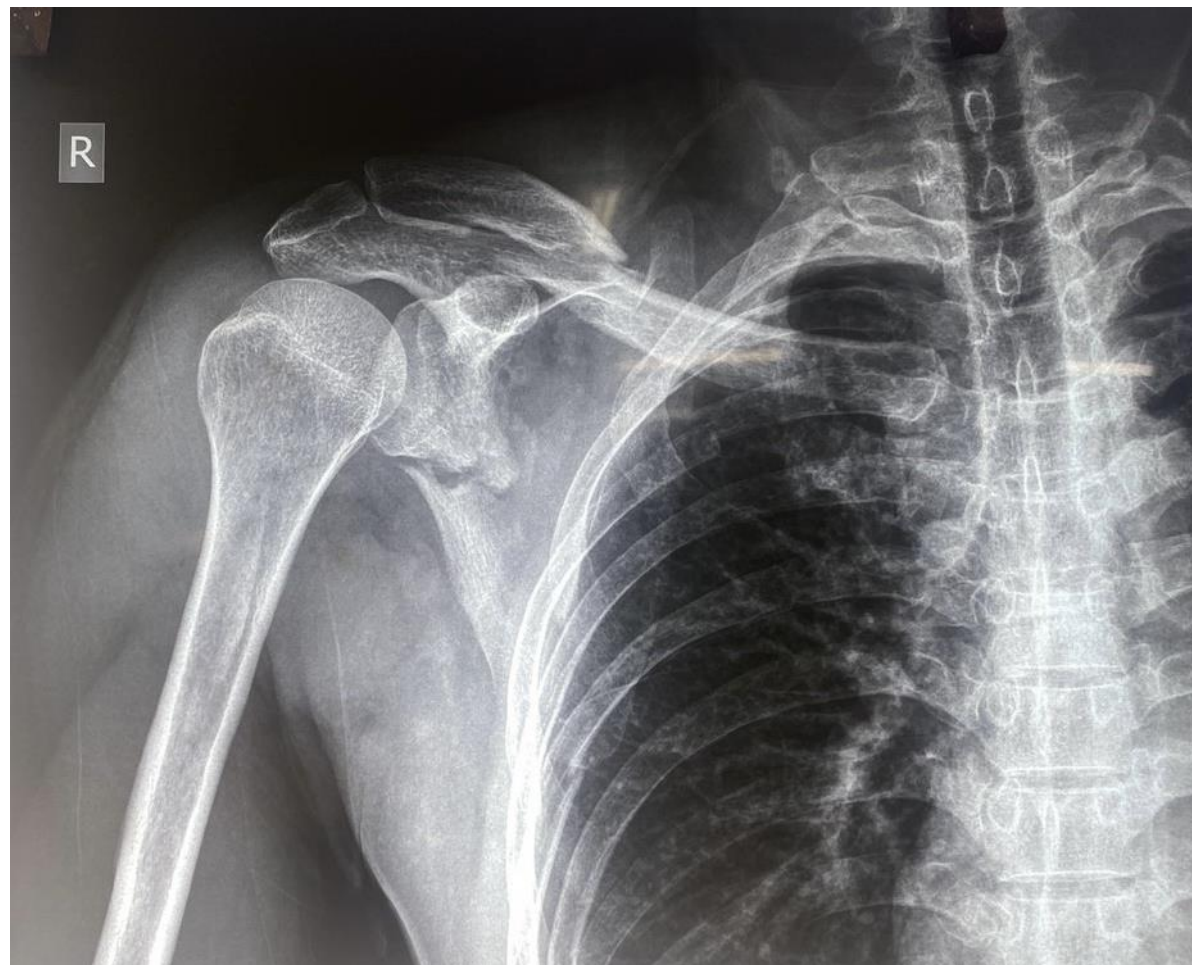
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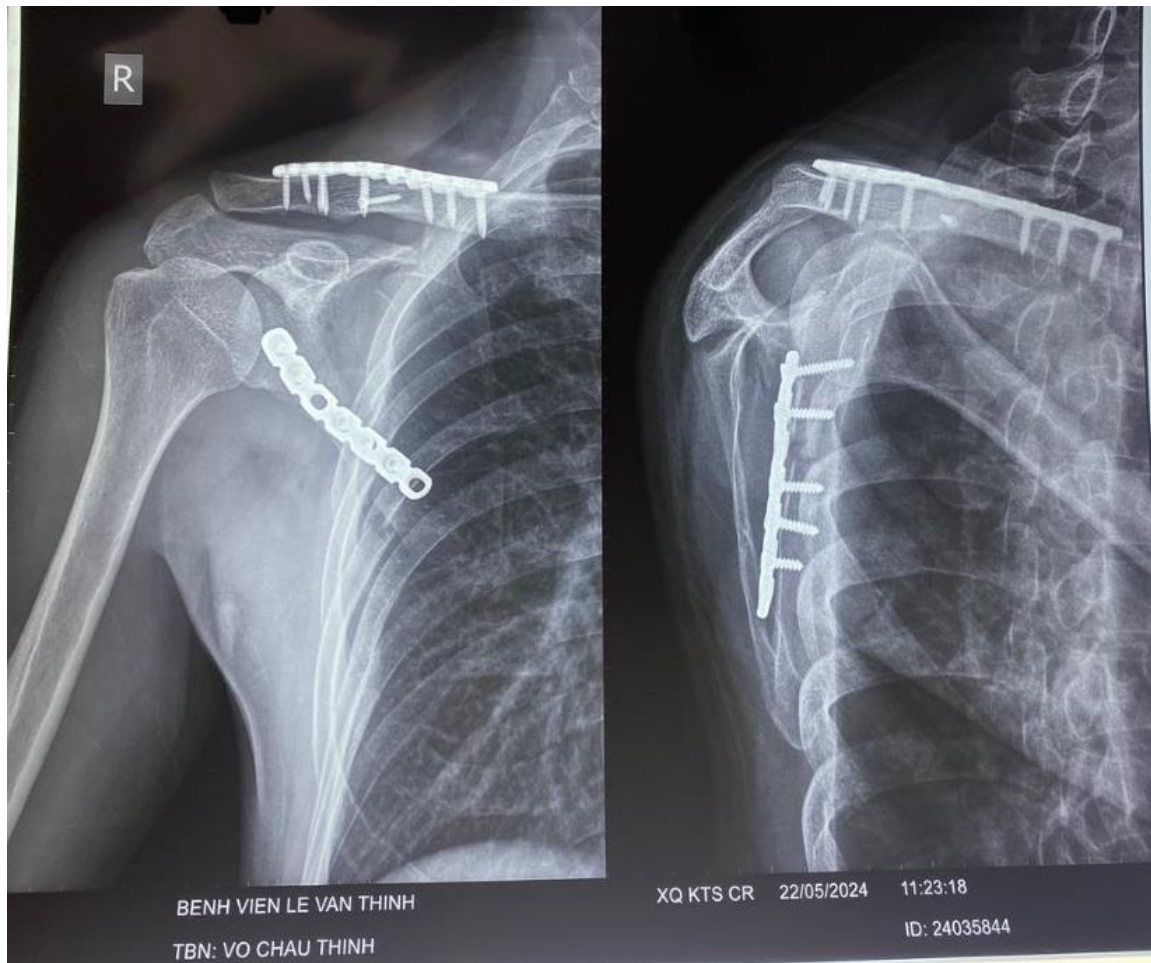
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Trào trọn niềm tin, trao trọn trái tim

BN nam 50 tuổi
Chẩn đoán: Gãy xương xương
đòn, gãy thân xương bả vai bên
phải





Neck fracture

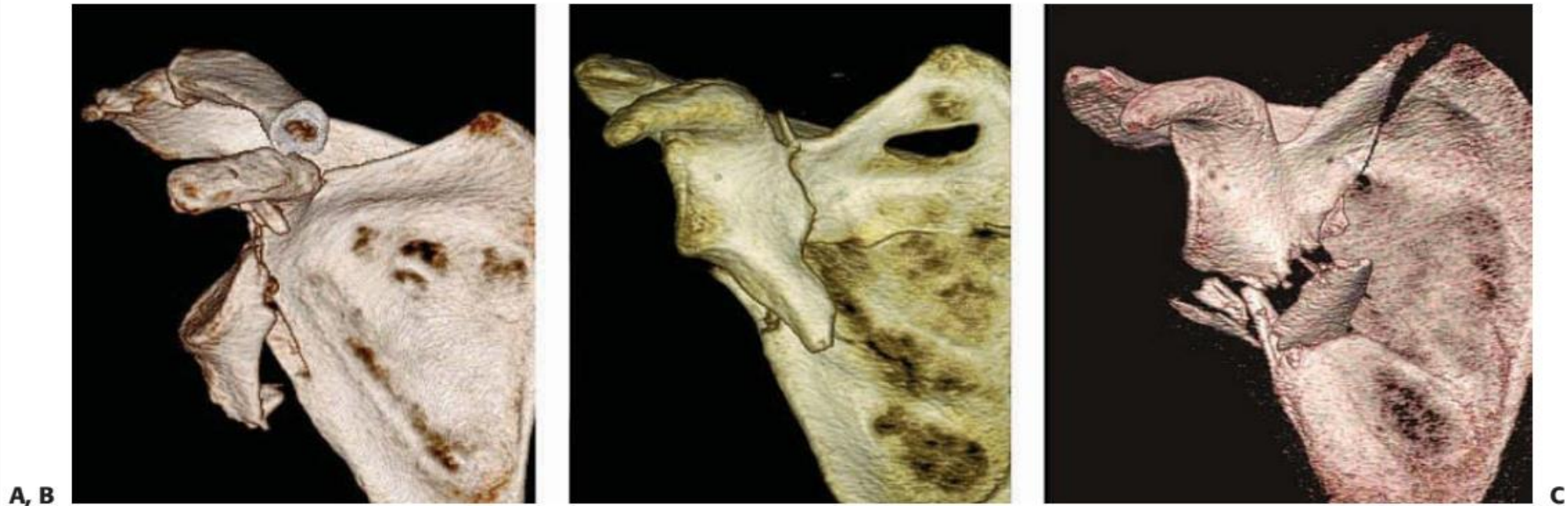
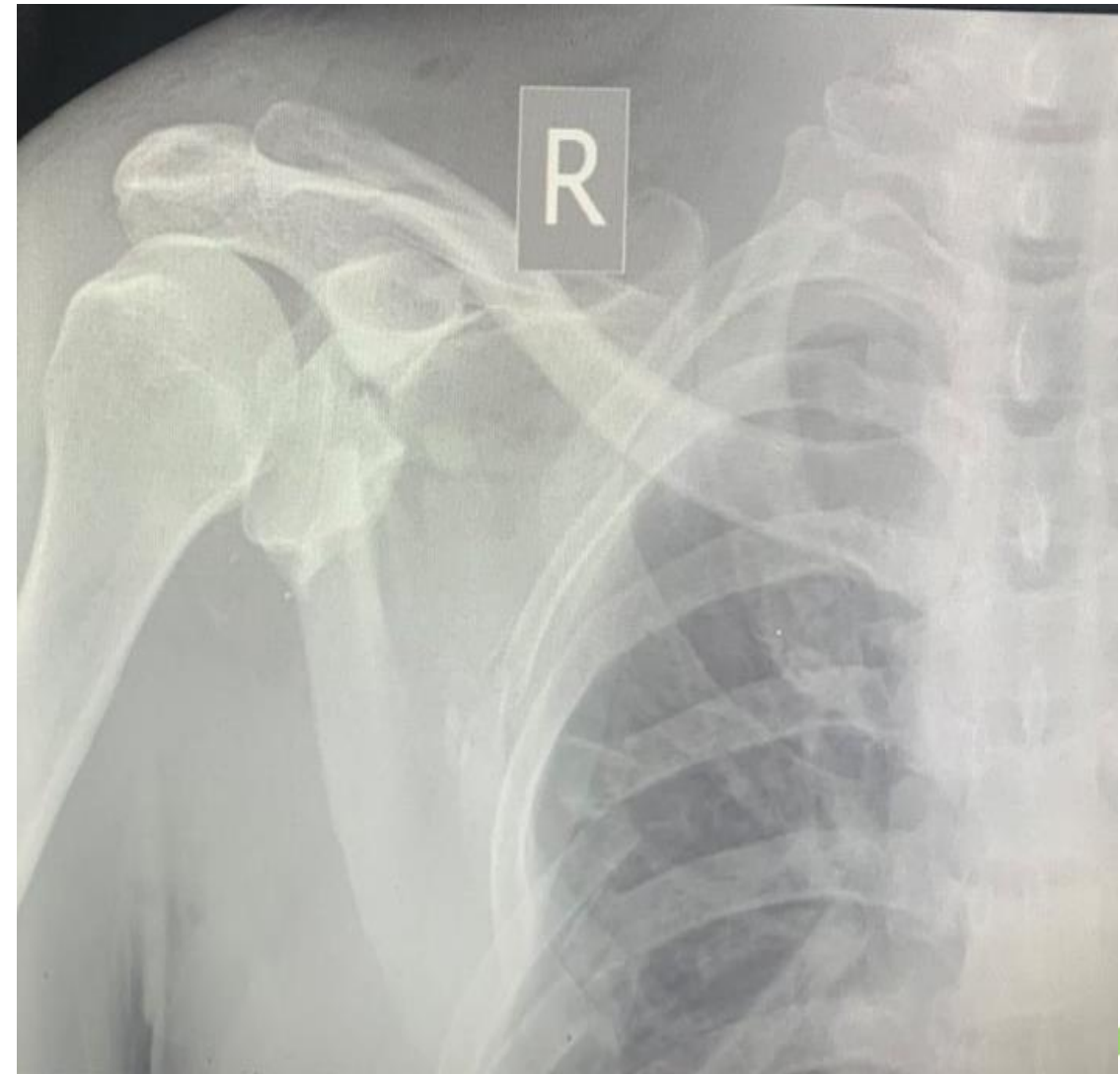
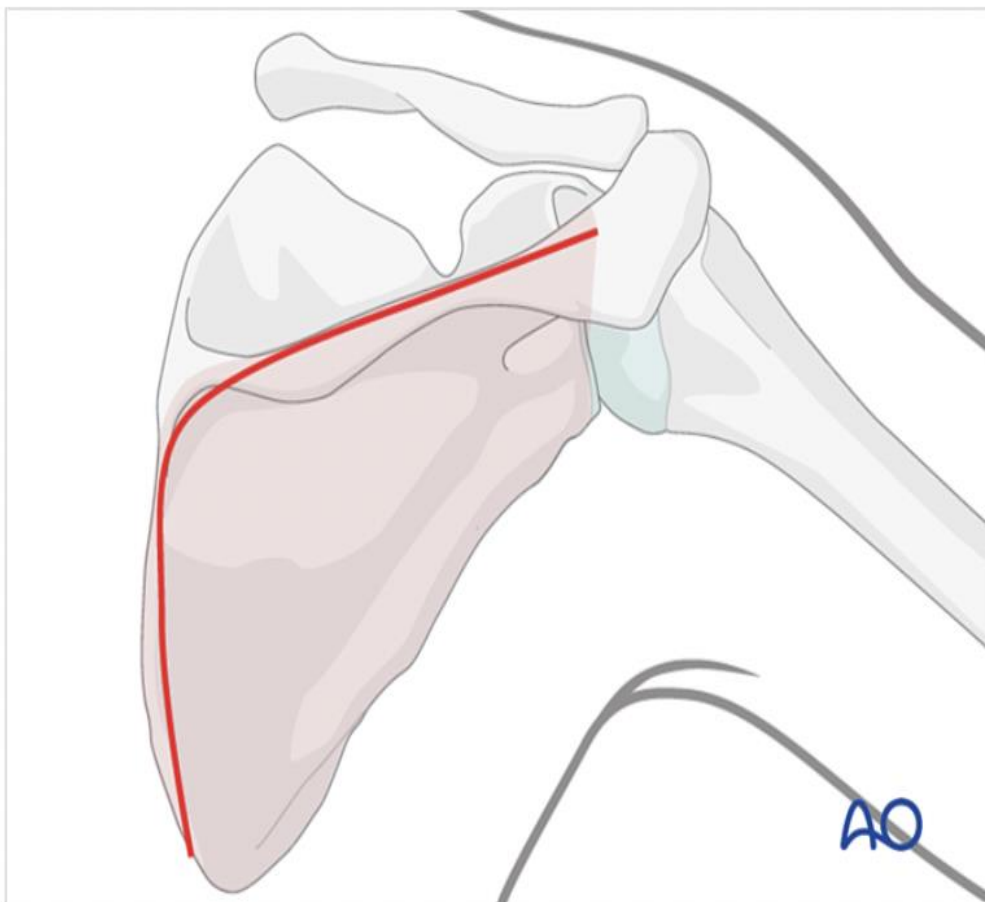


FIGURE 39-11 Fractures of the scapular neck in 3D CT reconstruction—anterior aspect. **A:** A fracture of the anatomical neck. The fracture line passes through the coracoglenoid notch, lateral to the coracoid process. **B:** Fracture of the surgical neck. The fracture line passes through the suprascapular notch medial to coracoid process. The glenoid fragment bears the coracoid process. **C:** A transspinous neck fracture. The fracture line passes medial to the suprascapular notch. The glenoid fragment bears the coracoid process, acromion, and the lateral part of the scapular spine.

BN nam 47 tuổi
Chẩn đoán: Tràn dịch MP phải-
gãy xương sườn phải,
gãy cổ+thân xương
bả vai, gãy mỏm quạ, gãy xương
đòn





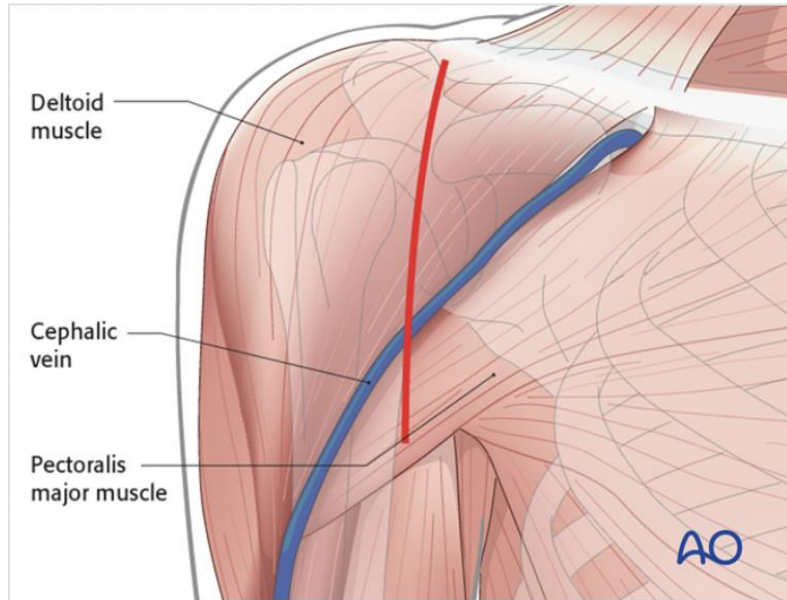


Exposure of the body and articular segment of the scapula is based on the extensile Judet approach.

The modified Judet approach avoids detachment of the deltoid muscle and gains almost the same exposure.

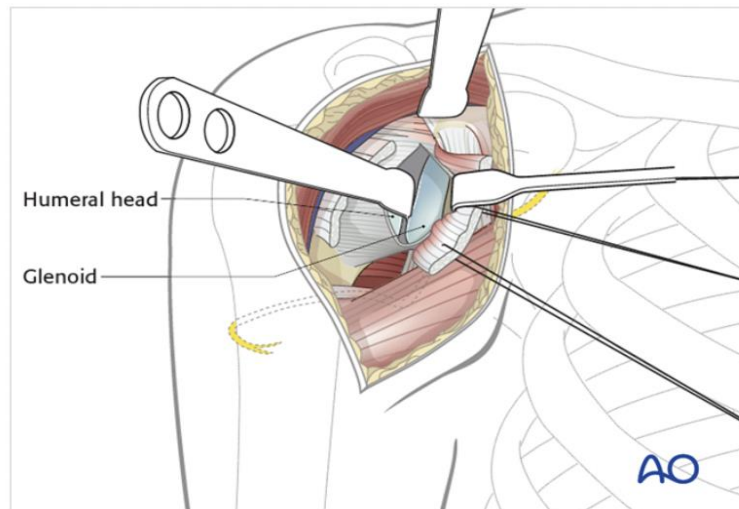
This approach permits exposure of the

1. lateral column
2. articular segment
3. medial border and body



Make a 12-14 cm long skin incision between the coracoid process and the proximal humeral shaft towards the deltoid insertion.

A superior extension can be made by extending the incision superiorly to the AC joint or the acromion.



The (anterior) deltopectoral approach can be used for almost any shoulder fracture treatment and is often the preferred approach, especially in anterior glenoid fractures.

This approach is also highly recommended for extensile exposures.



Glenoid fossa fracture



FIGURE 39-12 Types of glenoid fractures in 3D CT reconstruction, right scapula. **A:** Superior glenoid fracture. **B:** Fracture of anterior glenoid rim. **C:** Inferior glenoid fracture.

Glenoid Fracture

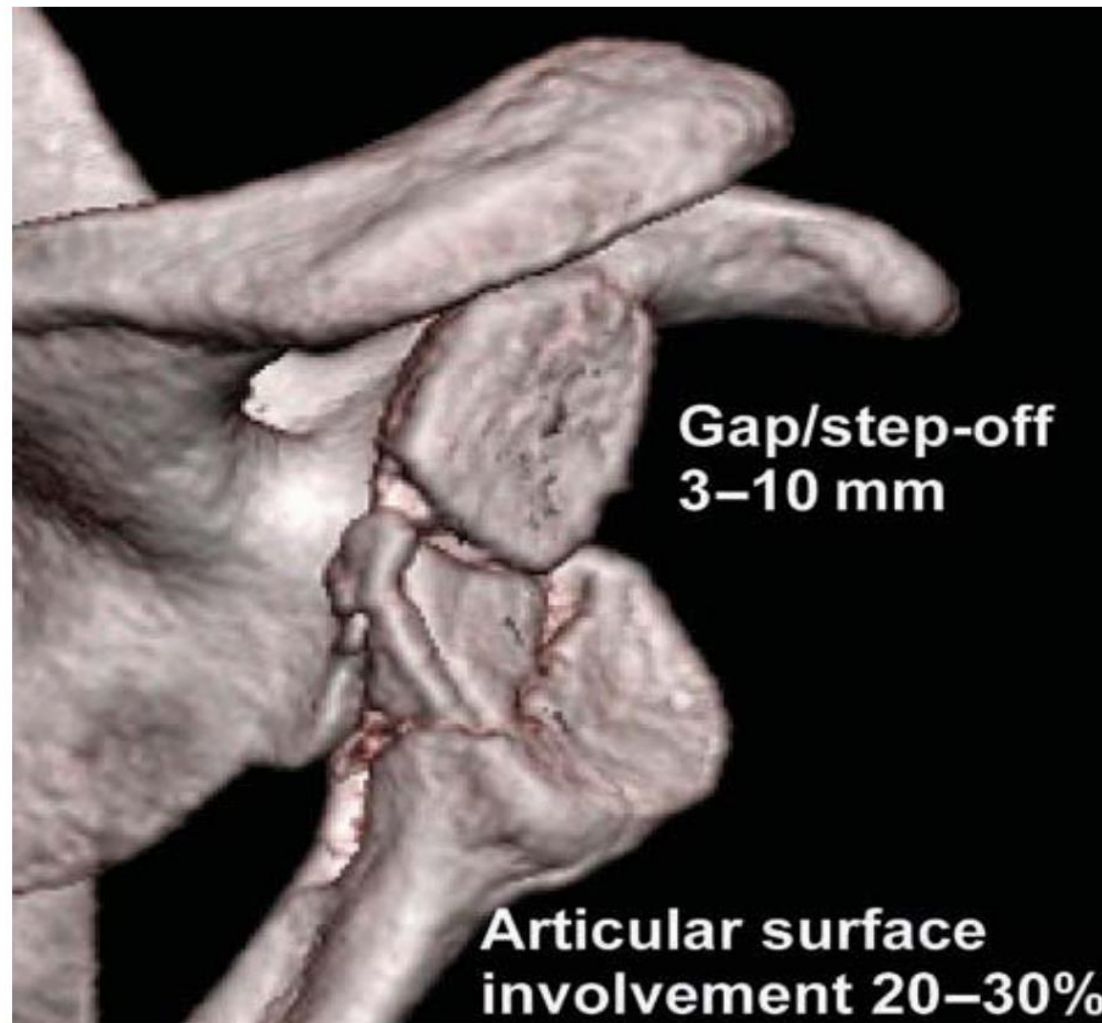
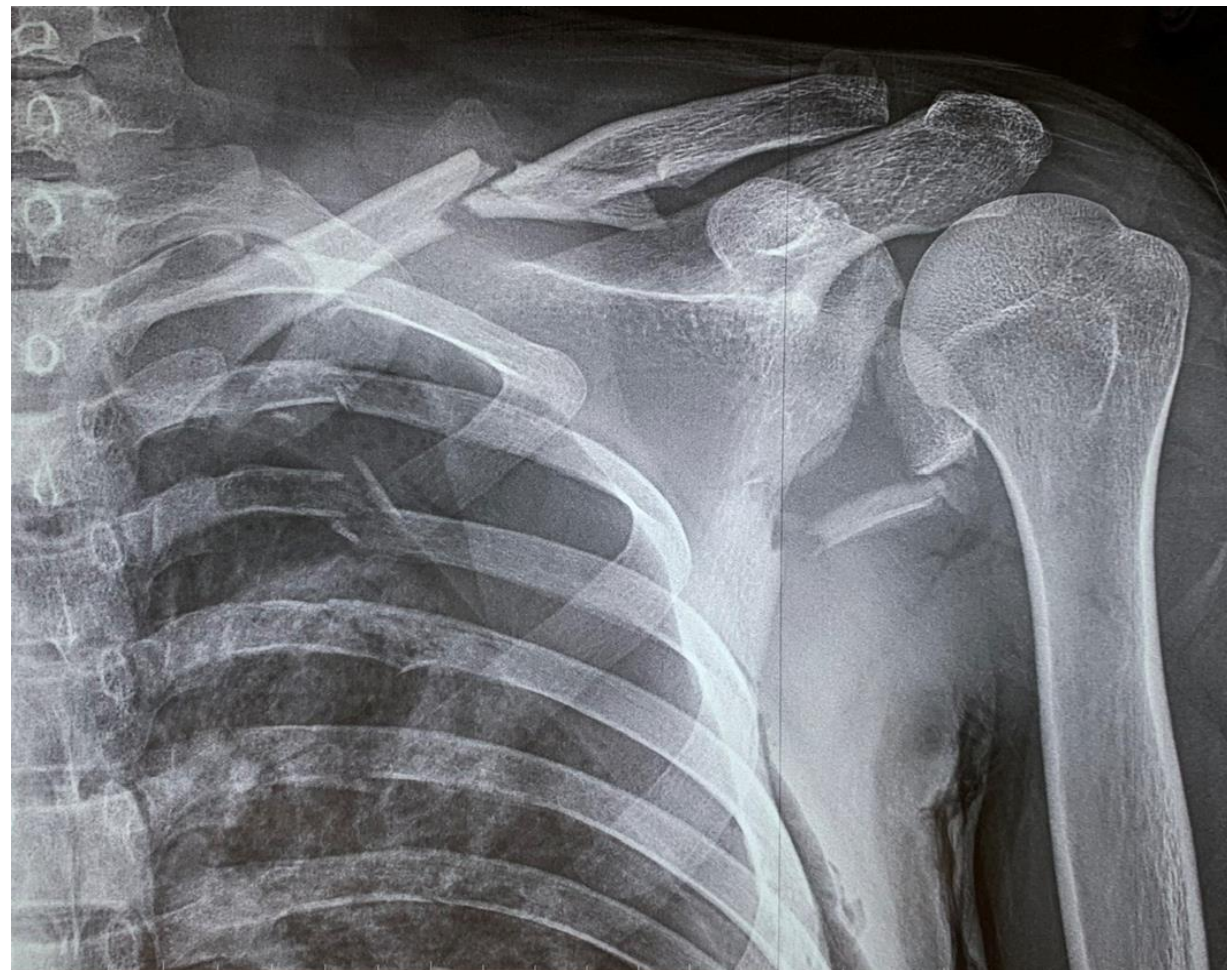


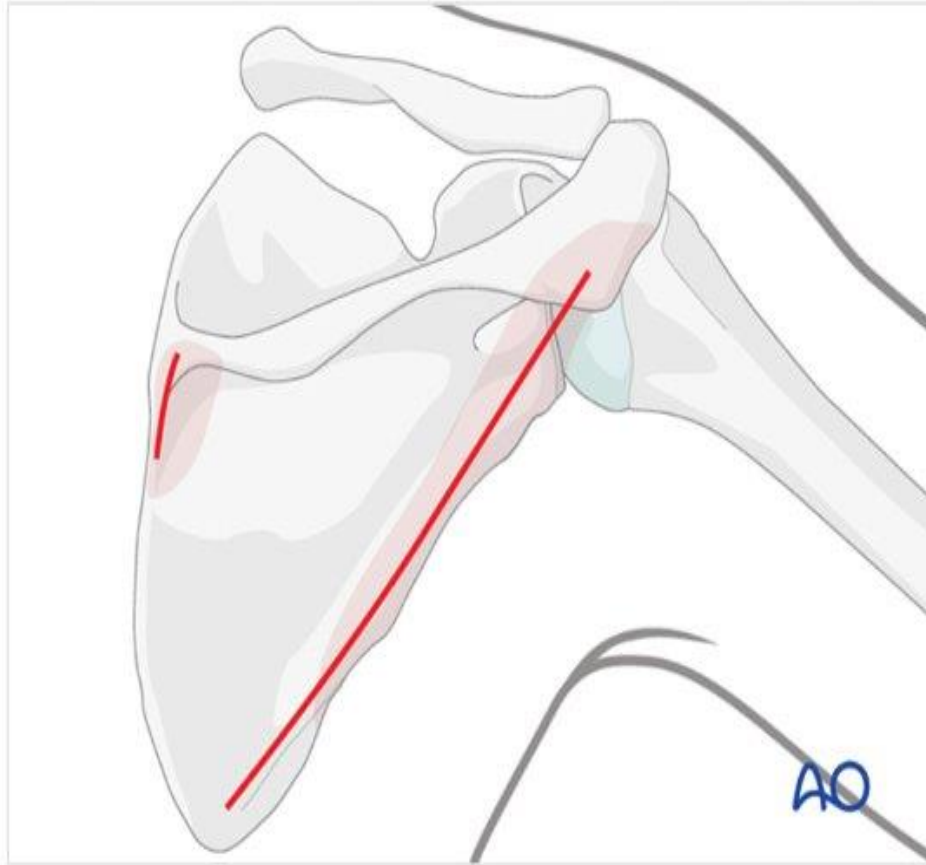
FIGURE 39-13 Criteria for operative treatment of intra-articular fractures of the scapula.

BN nam 22 tuổi

Chẩn đoán: Dập phổi, gãy đa xương sườn trái, vỡ lách, gãy xương đòn, gãy ổ chảo xương bả vai trái

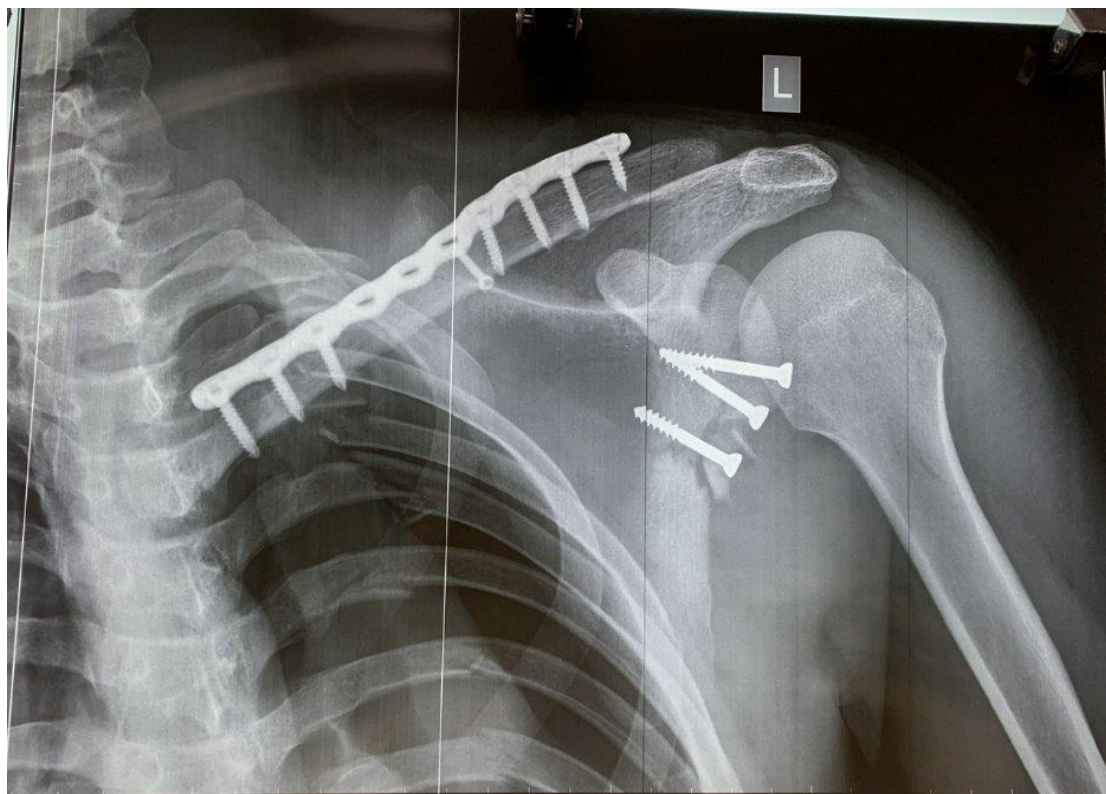






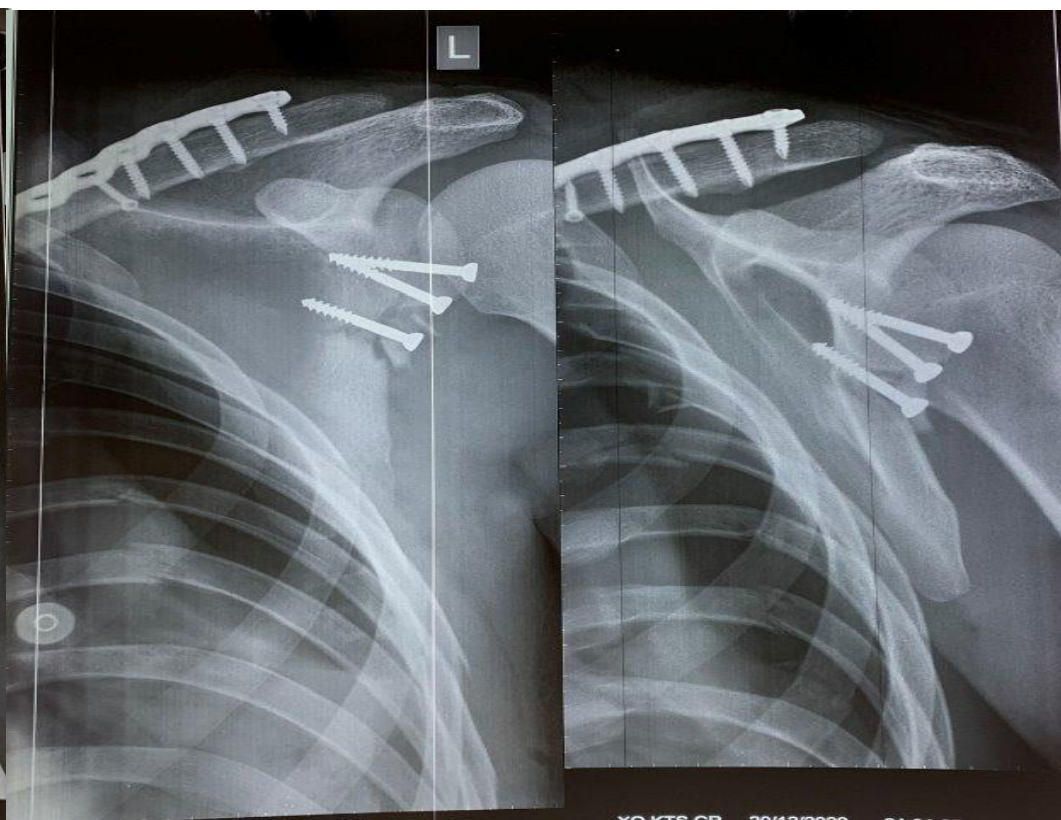
The Brodsky approach may be combined with a limited incision over the medial end of the scapular spine to control a medial border exit fracture line.

Little, if any, muscular detachment is needed for extensile exposure of relevant regions.



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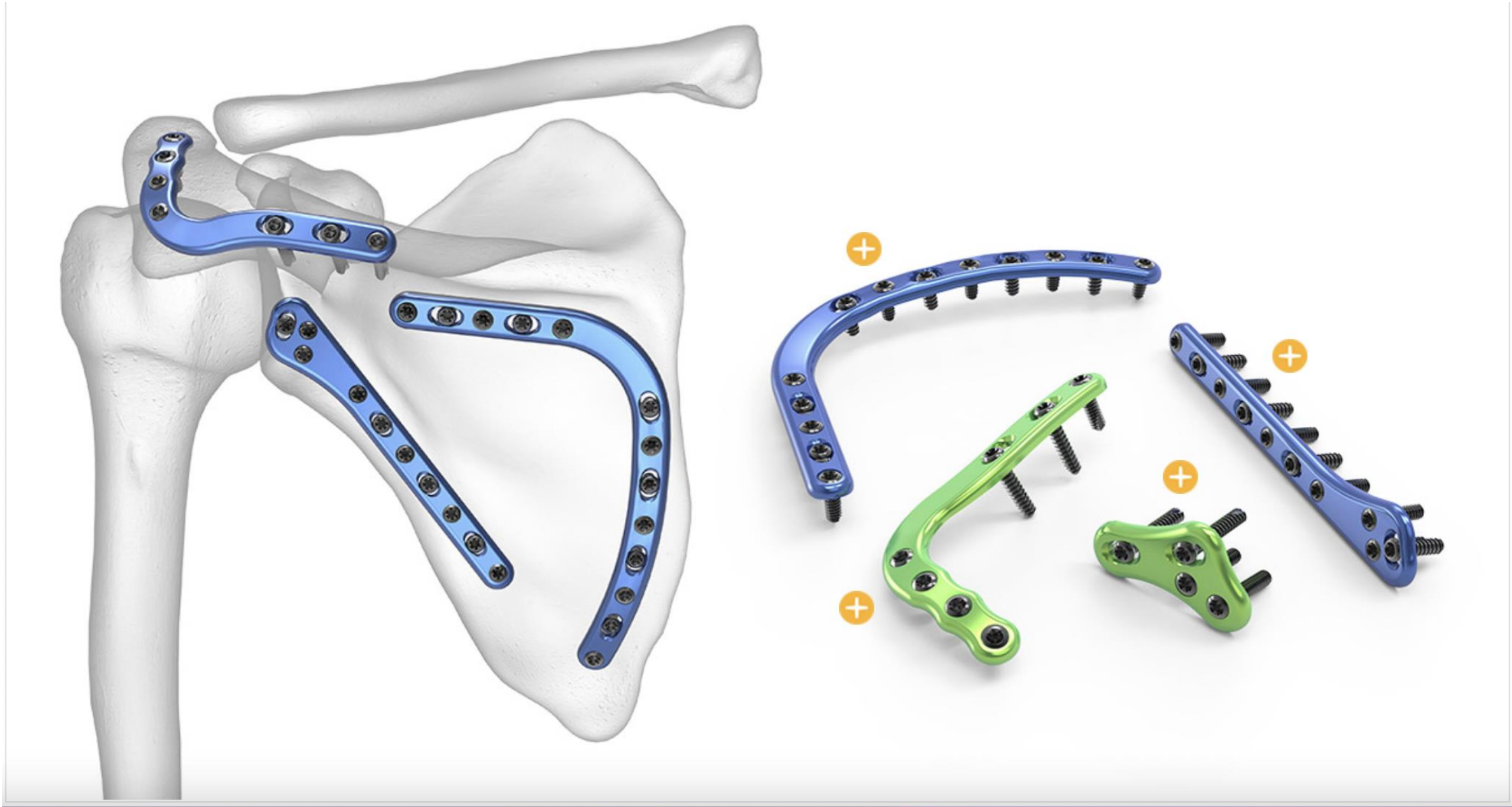


Name	Age	Associated injuries	Classification fracture
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VO THI T	56	ipsilateral acromioclavicular dislocation	coracoid process
BUI XUAN T	22	ipsilateral clavicle fracture,rib fractures,spleen injury	glenoid fossa
NGUYEN VIET A	47	ipsilateral clavicle fracture,rib fractures,pneumothorax	body,neck,coracoid process
NGUYEN MINH S	60	ipsilateral clavicle fracture	body
LE THANH TR	39	rib fractures	body
LE VAN H	59	ipsilateral clavicle fracture,rib fractures,pneumothorax	body
PHAM THI TUYET N	66		body
VO CHAU TH	50	ipsilateral clavicle fracture,rib fractures	body
DO THANH N	56	ipsilateral clavicle fracture,rib fractures	body
NGUYEN VAN PH	33	ipsilateral clavicle fracture,rib fractures	body
TRAN TAN V	54	ipsilateral clavicle fracture,proximal humerus fracture	body

NGUYEN TRUONG AN	36	ipsilateral acromioclavicular dislocation	coracoid process,acromion process
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<https://www.acumed.net/products/shoulder/scapula-plating-system/>



Trầu tròn niềm tin, trầu tròn trái tim

Postoperative treatment

- The arm is immobilized in a sling
- Drainage is removed by 48 hours after surgery
- PROM exercises: 1st day
- AROM: 4-5 weeks postoperatively
- ROM is assessed at 6 weeks.
- Active resistance exercises start 8 weeks after operation.





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