

THE MINISTRY OF PUBLIC HEALTH OF UZBEKISTAN

STUDY-METHODICAL CABINET OF HIGH AND SECONDARY

MEDICAL EDUCATION

TASHKENT MEDICAL ACADEMY

REDUCTION OF FRACTURE OF CLAVICLE AND SHOULDER

(with e-version)

Workbook

Workbook for MA course students to traumatology-orthopedic speciality

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Key words: fracture, reduction, adduction, abduction, pronation, supination

Close reduction is used when fracture complicated with displacement.

1. Reduction should make early, completely, painless and atraumatically.
2. Main principle –is traction in contraposition direction.
3. Close manual reduction is made with respect of rule traumatology.
 - 1) peripheral fragment should stay directly to central
 - 2) Reduction doing against to mechanism of injury

Reduction of fragment can make manual or with traction apparatus, taking into account of fractures localization and displacements”s character .

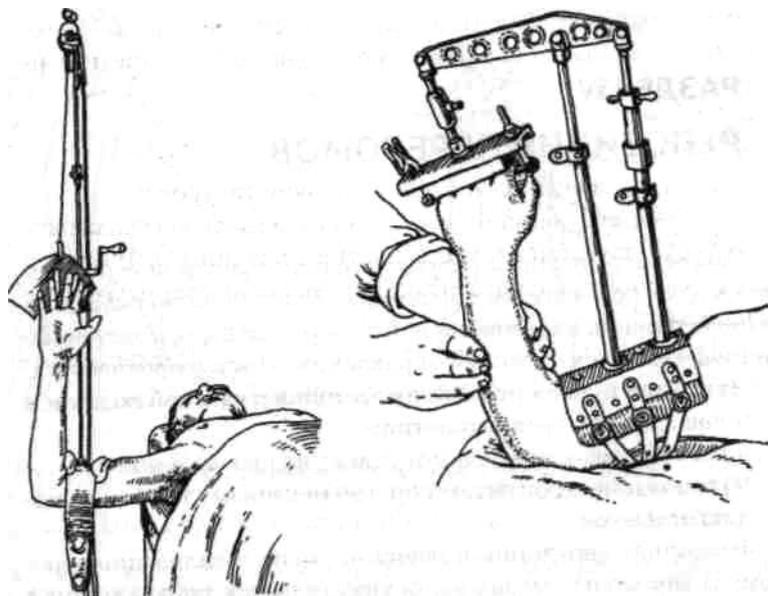
It is necessary, that for successfully primarily reduction to make completely local anesthesia. In addition it gives relax of muscle. Manipulation is finished with plastering of extremity.

Positive result of reduction should confirmed radiographically.

CLAVICLE FRACTURES

REDUCTION FRACTURED CLAVICLE

Purpose of reduction – leveling peripheral fragment to central by lifting up and abduction a shoulder. There are many kind of reduction.



Anaestheization: local.

Patients position: lying or sitting.

Manipulation:

1-st method

- Patient lying to spine and has vallum between shoulder-blide
- Injured side is hanging on edge of table.
- After 10-15min assistant comes from head side of patient and with both hands puts axillary region, than draws shoulder it to himself.
- Traumatologist stands face to face to patient, one hand is fixing shoulder girdle, 2-nd hand makes reduction and holding fragments.

2-nd method

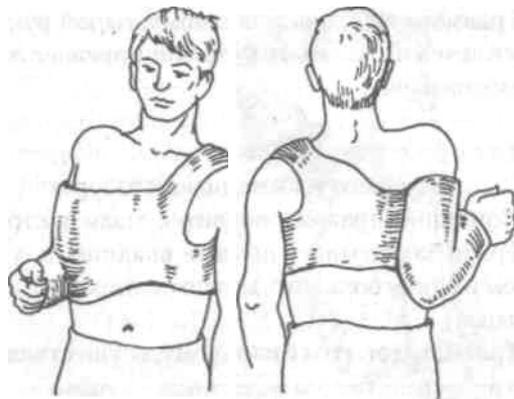
- Patient sits on stool.
- assistant comes from back side patient, assistants rests knee on back of patient and with both hands puts shoulder, than draws shoulder it to himself.
- Traumatologist stands face to face to patient, makes reduction and holding fragments.

3-rd method

- Doing without assistant.
- Two stools for patient and traumatologist, they sits side by side.
- Traumatologist by one hand holds injured side on abduction position and by chest holds patient.
- 2-nd hand makes reduction and holding fragments.

Keep to your mind, making any kind of method of reduction, abducting humerus may be reason to incompletely reduction. Cause it is tension of m. pectoralis major.

After reduction, the injured side should plasters on reduced position. There are many kind of plastering. From those its well known such as Wanstein's plaster, Kuzminski's splint. Before immobilization it is necessary to put cotton roller in axillary region.

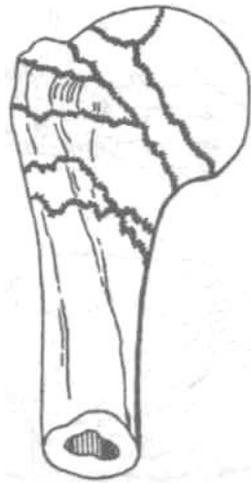


In case, if primarily reduction unsuccessfully Kuzminski's splint may be used as gradually reduction apparatus-splint. (2-3 days).

Fixation by bandage is useless, because it could not to establish fixation in all period of treatment. In addition, it only abduct of shoulder, without lifting which necessary for holding reducing fragments

FRACTURE OF PROXIMAL END OF HUMERUS

It may be: intra-articular (head, anatomical neck), extraarticular (intertubercle, surgical neck), avulsion fracture of major tubercle.



Reduction fractured surgical neck

The mechanism of the injury should be considered carefully in planning reduction. Particularly be alert to potential torsional problems that can be magnified or corrected by method of fracture immobilization.

Recognizing the mechanics of these fractures helps one anticipate potential complications as well as select the most effective treatment. The majority (80%) of proximal humeral fractures occur in elder patients and result from indirect

twisting mechanism sustained in a fall on the outstretched arm with the elbow extended.

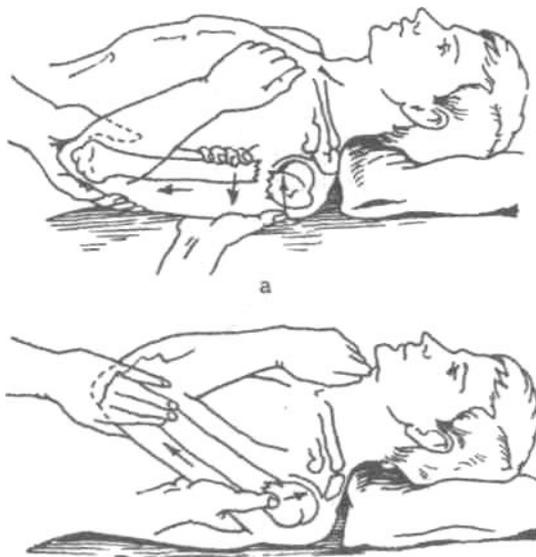
Anaestheization: local.

Patients position: lying.

Manipulation:

Abducted fractured surgical neck

- assistant holds distal end of humerus and elbow flexed under 90° and gradually draws in axis to shoulder to himself. Simultaneously adducts humerus to chest and does external rotation.



- Traumatologist controls reduction and carries out correcting manipulation locally, with thumb presses fractured place reducing angle displacement.

- Assistant gradually slackens traction. Its gives to close fragments
- Shoulder is fixed by thoracobrachialy plaster in position abducting shoulder to 90-100°. Adduction to forward to 30-45°, external rotation and flexed elbow under 80-90°.
- Positive result of reduction should confirmed radiographically.
- Immobilization 6-8 weeks, after 5-weeks shoulder joint is released and arm is immobilized on abducted splint.

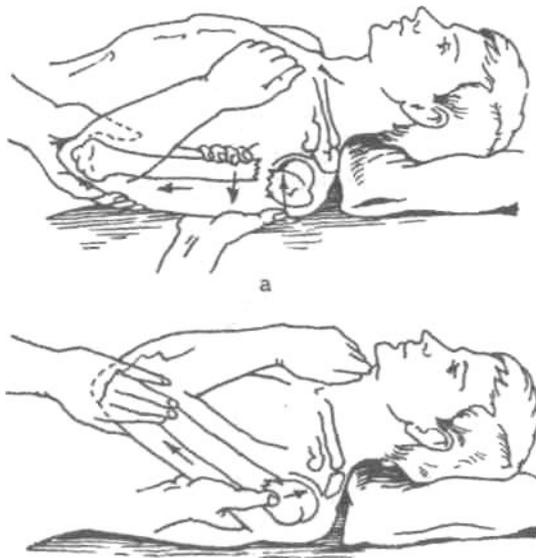
Adducted fractured surgical neck

Anaestheization: local.

Patients position: lying.

Manipulation:

-



- assistant holds distal end of humerus and elbow flexed under 90° and gradually draws in axis to shoulder to himself. Simultaneously abducts humerus to 90° , forward to $30-45^{\circ}$ and external rotation to 90° .

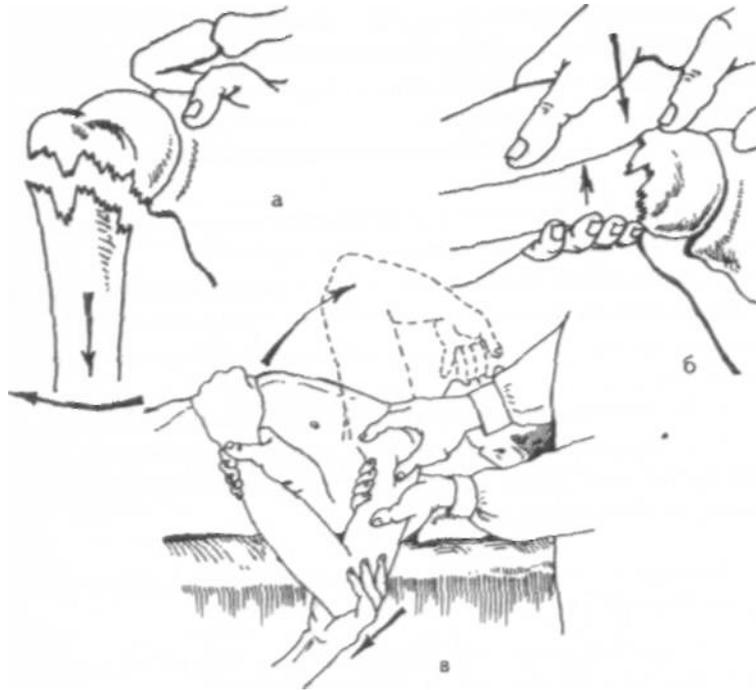
Traction should be strongly.

- Traumatologist controls reduction and carries out correcting manipulation locally, with thumb presses fractured place reducing angle displacement and tract distal end shoulder externally.

- Shoulder is fixed by thoracobrachial plaster in position abducting shoulder to $90-100^{\circ}$. Adduction to forward to $30-45^{\circ}$, external rotation and flexed elbow under $80-90^{\circ}$.

- Assistant gradually slackens traction. Its gives to close fragments
- Positive result of reduction should confirmed radiographically.
- Immobilization 6-8 weeks, after 5-weeks shoulder joint is released and arm is

immobilized on abducted splint.



Reduction of avulsion fracture of major tubercle

Anaestheization: local.

Patients position: sitting.

Manipulation:

- traumatologist lifts arm and abduct to 90° and simultaneously flexes elbow under 90° and rotates arm externally to 90° .

It gives doing reduction of displaced fragment.

- Shoulder is fixed by thoracobrachial plaster in position abducting shoulder to 90-100°. External rotation and flexed elbow under 80-90°.
- Positive result of reduction should be confirmed radiographically.
- Immobilization 3-4 weeks.

Humeral shaft fractures

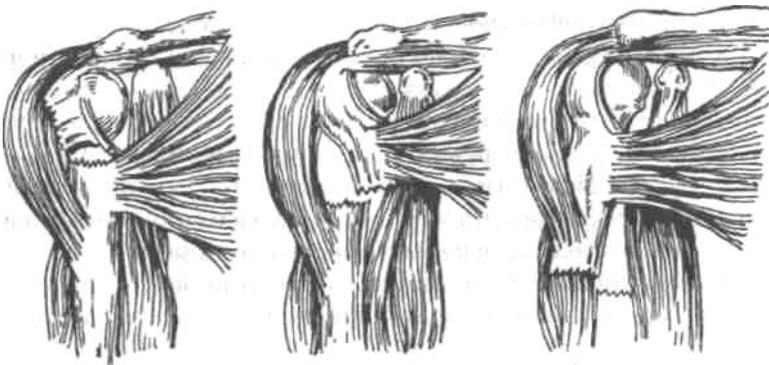
In contrast to proximal fractures that fail by indirect loading, shaft fractures usually result from direct loading in accident, falls. Commonly, the fracture is produced in an active, young adult by bending mechanisms. An abduction force is applied while the elbow is flexed and the arm is locked in internal rotation under the acromion. This action produces the typical transverse fracture in the midshaft.

There are three variants of displacing fragments:

1. Type: line of the fracture over the place of insertion of **m. pectoralis major**. Consequence of traction of the rotator muscle proximal fragment abducts externally and moves upward. Peripheral fragment adducts to a chest and internal rotation in result of contracts **m. pectoralis major**.
2. Type: line of the fracture below the place of insertion of **m. pectoralis major**, but over the place of insertion of deltoid muscle. Consequence of contracts **m. pectoralis major**. proximal fragment adducts

internally and moves upward. Peripheral fragment in result of contracts of deltoid muscle abducts externally and moves upward.

3. Type: line of the fracture below the place of insertion of deltoid muscle, which abducts proximal fragment and moves forward. Peripheral fragment in result of contracts humeral muscles moves upward.



Reduction of humeral shaft fractures

Close primarily manual reduction is carried out only in transverse fractures.

Anaestheization: General, infiltration, may local .

Patients position: sitting.

Manipulation:

Reduction of this fracture is - traction in contraposition direction to axis of humerus. Reduction done against to mechanism of injury.

- independently from fracture's level shoulder should abducted to 90° and moved to forward to 30-40°.
- Reducing fragments is fixed by thoracobrachialy plaster in physiological position.
- Result of reduction should confirmed radiographically.
- Immobilization 6-8 weeks.

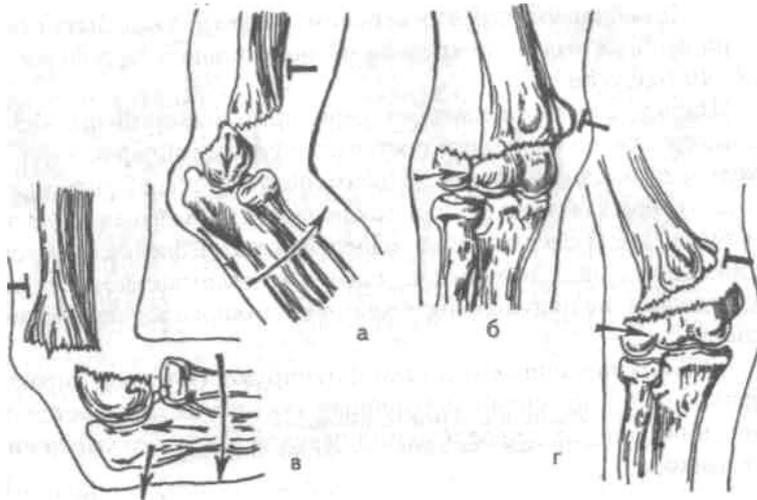
FRACTURE OF DISTAL END OF HUMERUS

SUPRACONDYLAR FRACTURES. The fracture's line over condylar region. Those fractures known as extraarticular fractures. The amount and direction of the supracondylar fracture displacement should cause us to consider the possibilities of both permanent deformity of the elbow and significant vascular compromise.

There are two variants of displacing fragments: flexing and extending .

Flexing fractures occur when patient falls to elbow in flexing position. The fracture's line follows in oblique direction. Proximal fragment displaced posteriorly, distal fragment displaced antero-laterally. Angle between fragments open to forward and inward.

Extending fractures occurs when patient falls to extending elbow. When the fracture's line follows as a flexing fractures displacing will be such: distal fragment displaced postero-exteriorly and proximal fragment displaced antero-interiorly. The fracture's line follows in oblique direction from forward to outward and from downward to upward.



Condular fractures.

Probably variants: medial or lateral condular, capitulum of lateral condular, T- or Y- figurative fractures.

Reduction Supracondular fractures

Anaestheization: General, infiltration, may local .

Patient position: sitting.

Manipulation:

Reduction of this fractured is - traction in contraposition direction to axis of humerus. Reduction doing against to mechanism of injury.

Flexing fractures

- Reduction is carried out in extended elbow.
- Traction of arm in contraposition direction to axis of humerus.
- distal fragment is reduced to backward and inward. Reduction is made smoothly, gradually.
- After reduction elbow is flexed under 90-100°. Position of forearm between supination and pronation.
- Reducing fragments is fixed by plaster from MP joint to acromion in physiological position.
- Result of reduction should confirmed radiographically.
- Immobilization 6-8 weeks.

Extending fractures

Anaestheization: General, infiltration, may local .

Patients position: sitting.

Manipulation:

Reduction of this fractured is - traction in contraposition direction to axis of humerus. Reduction doing against to mechanism of injury.

- Reduction is carried out in flexed elbow under right angle. First assistant does traction from middle shoulder, second assistant from hand.
- distal fragment is reduced to forward and inward. Reduction is made smoothly, gradually.
- After reduction elbow is flexed under 60-70°. Position of forearm between supination and pronation.
- Reducing fragments is fixed by plaster from MP joint to acromion in physiological position.
- Result of reduction should confirmed radiographically.
- Immobilization 6-8 weeks.

Reduction Condular fractures

- Reduction is carried out in extended elbow.
- Forearm is deviated towards injury side and displaced epicondyle is reduced by pressing fragment.

- Reduction is made smoothly, gradually.
- After reduction elbow is flexed under right angle. Position of forearm between supination and pronation.
- Result of reduction should confirmed radiographically.
- Reducing fragments is fixed by plaster from MP joint to acromion in physiological position. After 3 weeks plaster is changed to removable and is began restorative treatment.

Reduction fractures of capitulum and trochlea humerus

- Reduction is carried out in extended elbow.
- First assistant does traction from middle shoulder, second assistant from hand.

It gives to extending of joint's cavity.

- Avulsed fragment commonly, locating superficially on front side is reduced by pressing fragment.
- After reduction elbow is flexed on pronation position under right angle.
- Reducing fragments is fixed by plaster from MP joint to acromion in physiological position. After 3 weeks plaster is changed to removable and is began restorative treatment.

Reduction T and Y figurative fractures of Condular of humerus

Methods of reduction is nonstandard and is selected for each situation individually.

- Principle of reduction is traction arm on flexed elbow under right angle for relaxing muscles, than deviating forearm outward or inward for reducing angle displacement.

- After reduction elbow is flexed under right angle. Position of forearm between supination and pronation.

- Result of reduction should confirmed radiographically.

- Reducing fragments is fixed by plaster from MP joint to acromion in physiological position. After 4-6 weeks plaster is changed to removable plaster to 3 weeks and is began restorative treatment.

MULTIPLE CHOICE QUESTIONS IN TRAUMA

1. Which of the following muscle does not form rotator cuff of shoulder:

A Subscapularis

B Supraspinatus

C Infraspinatus

D Teres minor

E Teres major.

E Except teres major all other muscles mentioned are closely applied to the capsule of shoulder joint and form rotator cuff.

2. Which of the following bursa produces symptoms in shoulder

impingement syndrome:

- A Subacromial bursa
- B Subdeltoid bursa
- C Bursa in relation of subscapularis tendon
- D Bursa in relation to latissimus dorsi
- E Bursa between coracoid process and capsule.

A Symptoms of impingement syndrome are produced when subacromial bursa is pressed between humeral head and undersurface of coraco-acromial arch.

3. A collar and cuff bandage will be most suitable treatment for which of the following injury:

- A Midshaft fracture of humerus
- B Undisplaced fracture of neck of humerus
- C Monteggia fracture
- D Dislocation of elbow
- E Fracture of radial head.

B All undisplaced humeral neck fractures at all ages and most displaced fractures in elderly can be safely treated in collar and cuff sling. All other injuries mentioned need more elaborate treatment. After reduction of elbow dislocation elbow can sometimes be immobilized in flexion in collar and cuff bandage but this is not a safe method of treatment.

4. Which of the following statement is true about supracondylar fracture of humerus:

- A Anterior displacement of distal fragment is common than posterior displacement

- B Cubitus valgus is common than cubitus varus following malunion
- C Neurological complications are usually transitory
- D Weakness of elbow flexion is a common complication of this injury
- E Quite often elbow joint develops bony ankylosis following this injury.

C Injury to any of three major nerves can occur but it is more likely to be neurapraxia or axonotmesis. Complete division of nerve is rare. Posterior displacement of distal fragment is common and so is development of varus deformity following malunion. Weakness of elbow flexion and bony ankylosis do not occur.

5. Which of the following scaphoid fracture is most prone to develop avascular necrosis:

- A Fracture of waist of scaphoid
- B Fracture of tubercle
- C Fracture of distal pole
- D All of above
- E None of above.

A Almost 90% scaphoid fractures occur through its waist. Blood supply to scaphoid enters at tubercle and in a narrow ridge at waist. Due to this peculiar arrangement of blood supply proximal half often becomes avascular after fracture at waist.

6. Best treatment for humeral neck fracture in a 60 year old patient will be:

- A Collar and cuff bandage followed by physiotherapy
- B Open reduction and plaster spica

- C Open reduction and internal fixation
- D Closed manipulation and plaster spica
- E Hanging cast

A Shoulder stiffness is most serious problem than the worry about alignment (malalignment can be taken care by wide range of shoulder motion) and union (union always occurs as this is mainly cancellous bone with good vascularity). Plaster spica is contraindicated as this will make shoulder stiff and painful. Hanging cast is the treatment for humeral shaft fracture. Internal fixation of humeral neck fracture may be required rarely in displaced fractures in young age.

7. What is the usual treatment for symptomatic old acromio-clavicular dislocation:

- A Arthrodesis of acromio-clavicular joint
- B K-wire fixation of joint
- C Lag screw fixation of joint
- D Resection of outer end of clavicle
- E Acromionplasty.

D Resection of outer 1" of clavicle and capsulorrhaphy produces satisfactory amelioration of symptoms. Transfer of tip of coracoid with its attached muscles is next best method of treatment. K-wire and lag screw fixation are the treatment of acute dislocation. Arthrodesis of acromio-clavicular joint is almost impossible to achieve and if achieved will greatly impair the mobility of shoulder girdle. Acromionplasty is used for intractable cases of impingement syndrome

8. Regarding fracture of clavicle which of the following

statement is incorrect:

- A Fracture is commonest in medial third
- B Non union is rare
- C Most cases can be treated conservatively
- D Fracture usually occurs due to indirect injury
- E Fracture is common in middle third.

A Clavicle fractures usually by fall on outstretched hand and the force transmitted breaks the bone at place where two curves meet and therefore fractures are most common in the middle third of bone. All other statements about union and treatment of clavicle fracture are correct.

9. Which of the following is not true about posterior dislocation of shoulder:

- A Recurrent dislocation can develop
- B Reduction can be unstable
- C Patients with unreduced dislocation can have good function
- D Clinical diagnosis is easy
- E Axillary nerve injury is uncommon.

D Diagnosis of posterior shoulder dislocation can be often missed and is not easy both clinically and radiologically. Reduction is quite often unstable and shoulder spica is required with shoulder in abduction and external rotation. Recurrent dislocation can develop and axillary nerve injury is uncommon since posterior dislocation does not stretch the nerve which courses from posterior to anterior.

10. What is the commonest complication of supracondylar fracture of humerus:

- A Malunion
- B Myositis ossificans

- C Stiffness of elbow
- D Volkmann's contracture
- E Non union.

A Mal union, especially rotational malalignment; is the commonest complication and results in the deformity of cubitus varus. Non union is very rare and all other complications are not common, Most serious complication is Volkmann's ischaemia.

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12. What is the earliest indication of Volkmann's ischaemia:

- A Pain
- B Pallor and poor capillary filling
- C Paraesthesia in median nerve area
- D Contracture of fingers
- E Gangrene of tips of fingers.

A Earliest sign of vascular compromise is persistent pain which is exacerbated on passive extension of fingers. Action must be taken at this

stage. Pallor, poor capillary filling, absent radial pulse and paraesthesia in median nerve area are also early signs but may not be present in every case and one should not wait for these signs. Contracture and gangrene is a very late phenomenon.

13. What is the commonest complication of fracture of mid shaft of humerus:
- A Malunion
 - B Non union
 - C Radial nerve paralysis
 - D Brachial artery injury
 - E Ulnar nerve injury.

A Most of humeral shaft fractures are treated conservatively and malunion (usually neither cosmetically disfiguring nor functionally impairing) is the commonest complication. If fracture has been treated by internal fixation this will become rare complication. Next commonest complication is radial nerve injury in spiral groove where nerve is in direct contact with bone. Non union is uncommon and brachial artery injury is rare.

14. Commonest cause of cubitus varus deformity following malunited supracondylar fracture of humerus is:

- A Rotational malalignment
- B Medial displacement
- C Proximal displacement
- D Posterior displacement
- E Epiphyseal damage.

A Internal rotation deformity of distal fragment mainly contributes to cubitus varus. Second factor is medial displacement of distal fragment. Proximal and posterior displacement do not cause cubitus varus. The fracture

occurs well above the epiphyses of distal humerus and epiphyseal injury does not occur.

15. Which of the following is the earliest laboratory finding in a case of fat embolism:

- A Increased serum cholestrol
- B Increased serum lipase
- C Increased serum fatty acids
- D Lipuria
- E Increased alkaline phosphatase.

D Presence of fat droplet in urine is the earliest laboratory finding in fat embolism. But it must be remembered that the diagnosis is mainly clinical and one should not wait for any inves before instituting treatment.

16. First treatment priority in patient with multiple injuries is:

- A Airway maintenance
- B Bleeding control
- C Circulatory volume restoration
- D Splinting of fractures
- E Reduction of dislocation.

A A.B.C. (Airway, bleeding and circulation) are the priorities in management of seriously injured patient in that order.

17. What is the earliest indication of Volkmann's ischaemia:

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A Earliest sign of vascular compromise is persistent pain which is exacerbated on passive extension of fingers. Action must be taken at this stage. Pallor, poor capillary filling, absent radial pulse and paraesthesia in median nerve area are also early signs but may not be present in every case and one should not wait for these signs. Contracture and gangrene is a very late phenomenon.

18. Which of the following is incorrect about dislocation of sternoclavicular joint:

- A Anterior dislocation occurs due to indirect injury and is common type of dislocation
- B Posterior dislocation is rare and occurs due to direct injury over medial end of clavicle
- C Sternoclavicular dislocation is common compared to acromioclavicular dislocation
- D Trachea can be compressed in posterior dislocation
- E Manipulative reduction is often unstable and fixation with wire may be required.

C Dislocation of sternoclavicular joint is much less frequent than acromioclavicular joint dislocation. All other statements are true and briefly describe the salient features of sternoclavicular joint dislocation.

19. Commonest cause of failure of internal fixation of fracture is:

- A Infection

- B Fatigue fracture of implant
- C Corrosion in implant
- D Loosening of implant
- E Metal reaction.

A Infection following an open operation is the commonest cause of failure following internal fixation. All other factors can also lead to complications but, statistically they are not as important

Criterion of a mark.

<i>Nº</i>	<i>Progress (%)</i>	<i>Mark</i>	<i>Level of student's knowledge</i>
1	96-100	Excellent «5»	<p>Gives right decision and closes summary in every situation.</p> <p>To a practice lesson uses additional literature (English books)</p> <p>Independently analyses essence of the problem.</p> <p>Independently may to examine patient and to put right diagnosis.</p> <p>Shows high activity, and approaches creative to interactive games</p> <p>Rightly decides situational problem with whole explanation answers</p> <p>In a discussion time asks questions, does addition</p> <p>Practice skill makes completely, understands main point</p>
2	91-95		<p>Gives right decision and closes summary in every situation.</p> <p>To a practice lesson uses additional literature (English books)</p> <p>Independently analyses essence of the problem.</p>

			<p>Independently may to examine patient and to put right diagnosis.</p> <p>Shows high activity, and approaches creative to interactive games</p> <p>Rightly decides situational problem with whole explanation answers</p> <p>In a discussion time asks questions, does addition</p> <p>Practice skill makes completely, understands main point</p>
3	86-90		<p>Gives right decision and closes summary in every situation.</p> <p>Knows completely etiology, clinic symptoms of the disease.</p> <p>Puts primarily diagnosis.</p> <p>Independently may to examine patient.</p> <p>Shows high activity to interactive games</p> <p>Rightly decides situational problem</p> <p>Practice skill makes completely</p>
4	76-80		<p>Shows high activity to interactive games</p> <p>Knows completely etiology, clinic symptoms of the disease but doesn't know completely plan of the treatment.</p> <p>Practice skill makes step by step</p>

			<p>Rightly gets anamnesis, examines of the patient</p> <p>Puts primarily diagnosis.</p> <p>Can interprets laboratory results</p> <p>Shows high activity to interactive games</p> <p>Active takes place in discussion</p>
6	71-75	Good «4»	<p>Rightly decides situational problem by classification. Knows to put clinic diagnosis by classification but doesn't know plan of the treatment.</p> <p>Knows completely etiology, clinic symptoms of the disease and can does differential approach.</p> <p>Practice skill makes but not step by step</p> <p>Rightly gets anamnesis, examines of the patient</p> <p>Puts primarily diagnosis.</p> <p>Can interprets laboratory results</p> <p>Active takes place in discussion</p>
7	66-70		<p>Rightly decides situational problem but can't gives proof to clinic diagnosis</p> <p>Knows incompletely etiology, clinic symptoms of the disease, doesn't know plan of the treatment.</p> <p>Practice skill makes but not step by step</p>

		Satisfactory «3»	Incompletely gets anamnesis and examines of the patient Puts primarily diagnosis. Can interprets laboratory results Shows high activity to interactive games Active takes place in discussion
8	61-65		Does mistakes in situational problem and can't gives proof to answer Knows incompletely etiology, clinic symptoms of the disease, doesn't know plan of the treatment. Doesn't know to do practice skill Cant interprets laboratory results Passive to interactive games
9	55-60		Had common presentation about disease Cant interprets laboratory results Doesn't take place to interactive games
10	54 -30	Unsatisfactory «2»	Hadn't common presentation about disease
11	20-30	Unsatisfactory y «2»	For presents student in lesson

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