
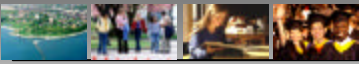


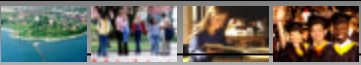
Orthopedics and Neurology of the Elbow

James J. Lehman, DC, MBA, DABCO
University of Bridgeport College of Chiropractic





Elbow Examination

■ What do you observe with these four elbows?

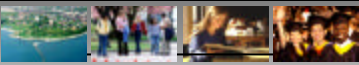


Osseous Anatomy of the Elbow




- Ginglymus or hinge joint
- Relatively stable joint
- Firm osseous support
- Composed of three articulations

Figure 3. Osseous anatomy of the elbow.




Three Elbow Articulations



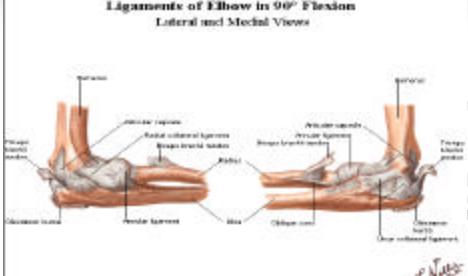

1. Humeroulnar
2. Humeroradial
3. Radioulnar

Figure 3. Osseous anatomy of the elbow.




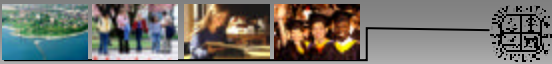
Elbow Ligaments

Ligaments of Elbow in 90° Flexion
Lateral and Medial Views





Elbow Muscles



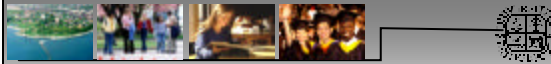


Elbow Muscle Conditions




Lateral Elbow (Anterior View)

- Strain
- Ruptured muscle or tendon
- Myofascial Pain
- Myositis ossificans



Myositis Ossificans of the Elbow



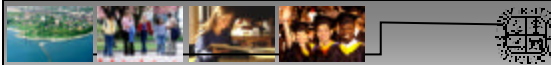
- What might cause myositis ossificans?




Causes of Myositis Ossificans



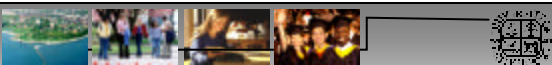
- Poor management of strain or contusion
- No RICE
 - Rest
 - Ice
 - Compression
 - Elevation



Causes of Myositis Ossificans




- Applying heat to muscle tissue in place of ice with an acute contusion or strain



Causes of Myositis Ossificans


Jordan Pacheco



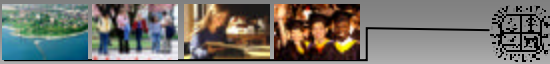
- Premature return to activities



Causes of Myositis Ossificans

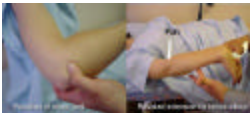


- Premature and/or aggressive massage or physical therapy

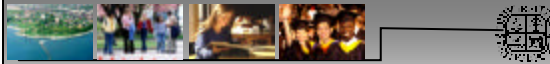


Palpation of the Elbow

Check for the following

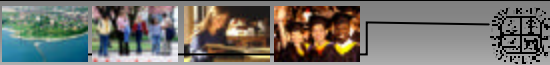


1. Crepitation
2. Pain
3. Swelling
4. Temperature elevation




Crepitation

- A grating or crackling sensation or sound, as that produced by rubbing two fragments of a broken bone together, or by pressing upon cellular tissue containing air

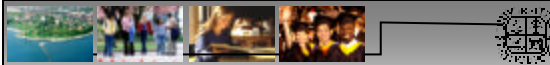


Inspection of Elbow

Carrying Angle

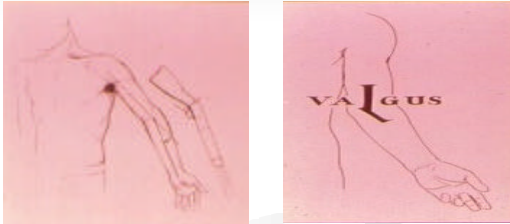
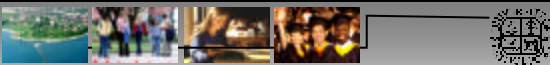


- Carrying angle is a valgus angle
- 1. 5 degrees in males
- 2. 10-15 degrees in females



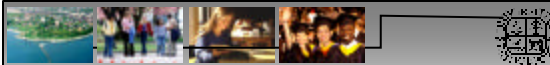
Varus Deformity

“Gunstock deformity”

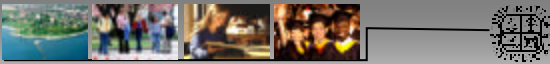
Cubitus Valgus

- Increased carrying angle above 5-15 degrees
- May be caused by epiphyseal injury secondary to lateral epicondylar fracture
- May cause delayed ulnar nerve palsy



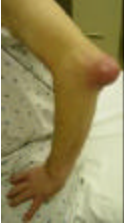
Cubitus Varus

- Decrease in the carrying angle is referred to as the “gunstock deformity ”
- Post-traumatic childhood supracondylar fracture
- Malunion or growth retardation of the epiphyseal plate

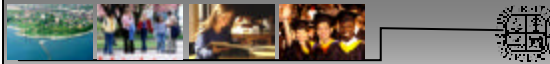


Olecranon Bursitis


Localized edema



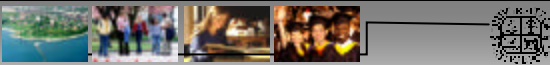
1. Swollen bump
2. Small, specific subcutaneous mass
3. Contained within a joint capsule or bursa
4. Normally visible



Diffuse Edema




1. May fill entire joint
2. Elbow flexed to 45 degrees
3. Fractures
 - Supracondylar of humerus
 - Crush injury of elbow



Scars or Cicatrix Formations

Burn patients



1. General surface scarring
2. May develop joint contractures

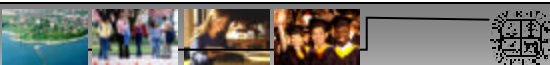


Cicatrix Formations


Needle-puncture scarring



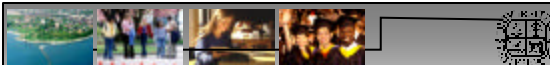
1. Secondary to multiple injections from intravenous infusions
2. Drug abusers or addicts



Elbow Palpation



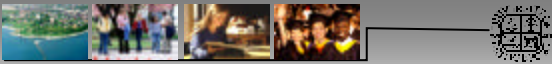
- Stand at patient's side
- Hold anterior lateral aspect of arm
- Extend and abduct arm
- Have patient flex elbow to 90 degrees




Elbow Palpation

Crepitation

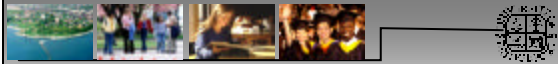
1. Synovial or bursal thickening
2. Fracture
3. Osteoarthritis or degenerative joint disease



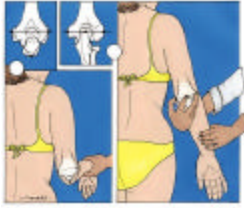
Palpation of the Medial Epicondyle



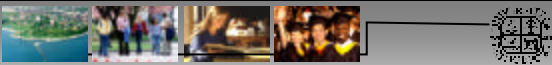
1. Frequently fractured in children
2. Note tenderness, inflammation, and temperature elevation
3. May indicate medial epicondylitis or strain



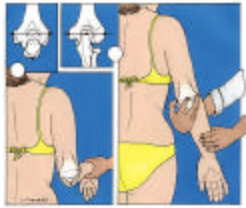
Posterior Elbow Isosceles triangle



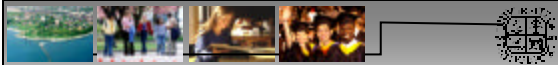
- Place thumb on lateral epicondyle, index finger upon the olecranon and middle finger upon the medial epicondyle with elbow flexed




Isosceles Triangle



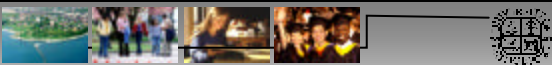
- Use this process to reveal any deviations may indicate anatomical problem that warrants further investigation




Posterior Elbow Palpation of the Olecranon process and bursa



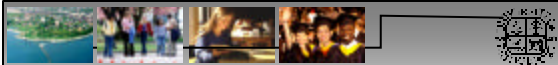
- Thick, boggy feeling may indicate olecranon bursitis
- Posterior nodules may indicate rheumatoid arthritis




Palpation of the Lateral Epicondyle



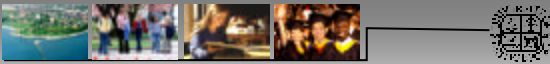
- Note tenderness, inflammation, and temperature elevation
- May indicate lateral epicondylitis or strain




Palpable Pain in Radial Head



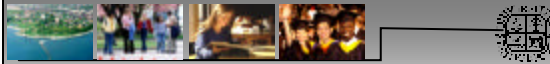
1. Synovitis
2. Osteoarthritis or degenerative joint disease
3. Congenital or traumatic dislocation
4. Strain or sprain




Palpation of Ulnar Nerve



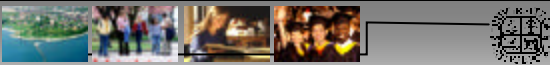
- Tenderness may indicate nerve compression
- Thickening may indicate cicatrix formation




Ulnar Nerve Injury



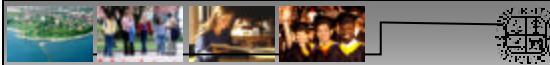
- Cicatrices may cause nerve compression
- Too much force with palpation may cause temporary paresthesia
- May be injured secondary to supracondylar or epicondylar fracture or by direct trauma



Ulnar Nerve Entrapment

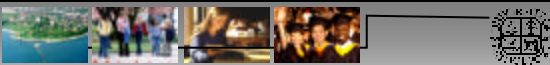


- Josh Johnson incurred ulnar nerve irritation upon throwing on a flat surface.
- What does that indicate to you?



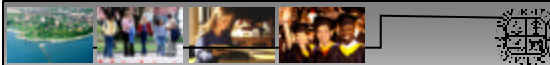
Ulnar Nerve

- Situated in sulcus between the medial epicondyle and the olecranon process
- Palpates as a soft, round, and tubular
- Follow course up arm and down to sulcus
- Gently palpate and attempt to displace from its groove



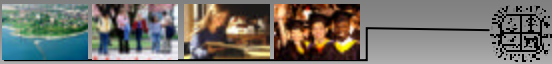
Paresthesia

- An abnormal sensation of the skin, such as numbness, tingling, pricking, burning, or creeping on the skin that has no objective cause. Paresthesia is the usual American spelling and paraesthesia the preferred English spelling.
- Pronounced pares-the-sia. From the Greek para-(abnormal) + esthesis (feeling) = an abnormal feeling.
- Common Misspellings: parasthesia, parathesia



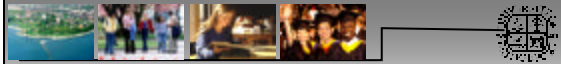
Active Elbow Range of Motion

1. Flexion = 135 degrees
2. Extension = 0 to -5 degrees
3. Supination = 90 degrees
4. Pronation = 90 degrees


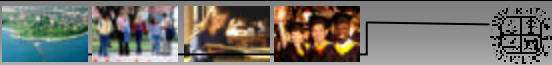


Passive Elbow Range of Motion


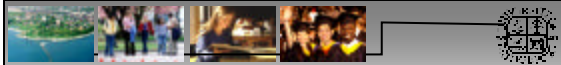
1. Performed when active ROM is limited
2. Compare passive with active
3. Differentiate strain/sprain




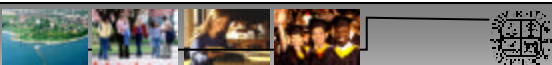
Muscle Test for Supination


Muscle Test for Pronation

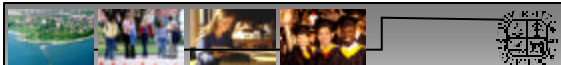
Tinel's Sign


Lateral Epicondylitis



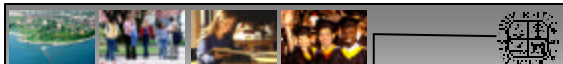
- Repetitive injury to the extensor tendon of the elbow
- Extensor carpi radialis brevis, digitorum, digiti minimi, and carpi ulnaris



Lateral Epicondylitis Examination


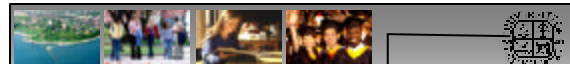


- How would we test for this condition?




Lateral Epicondylitis

Tennis Elbow Test or Cozen's test

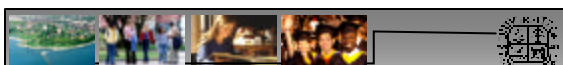



Lateral Epicondylitis

Specialized Tests




- A positive Mill's test indicates lateral epicondylitis
- Presence of a Kaplan's sign with reduced pain and increased strength



Lateral Epicondylitis

Treatment



- How should we treat this condition?



Aircast Brace Support



- RICE
 - Rest
 - Ice or cryotherapy
 - Compression
 - Elevation

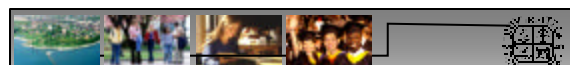


Lateral Epicondylitis

Treatment




- ICE is nice
- Rest is best
- Stretching
- Manipulation
- Exercise
- Support

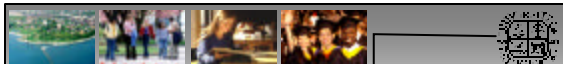


Medial Epicondylitis

“Golfer’s elbow”




- Repetitive injury to the flexor tendon
- Microavulsion or microtearing of the flexor carpi radialis tendon

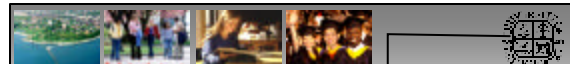


Medial Epicondylitis Examination


Medial epicondylitis



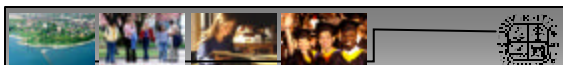
- Golfer's elbow test is a reverse "Cozen's" test




Valgus Testing



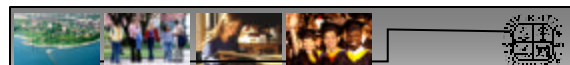
- Challenge the flexor muscles
- Strain the medial ulnar collateral ligaments




Ligamentous Instability



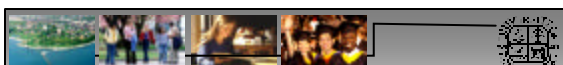
- Extremely rare
- Radial collateral ligament (lateral)
- Ulnar collateral ligament (medial)
- Trauma



Ligamentous Instability Mechanisms of injury




- Forced abduction will injure the ulnar ligament
- Forced adduction will injure the radial ligament
- Arm is extended

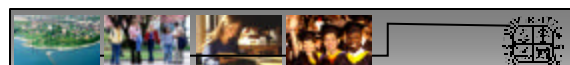


Ligamentous Instability Adduction and Abduction Stress Tests

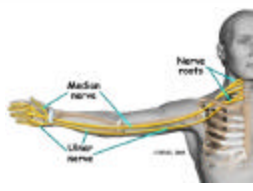
Ligaments of Elbow in 90° Flexion
Lateral and Medial Views



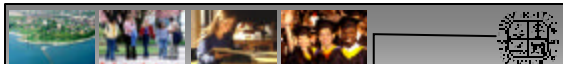
- Gapping and pain indicate a positive test for instability




Elbow Neuropathy and Compression Syndromes



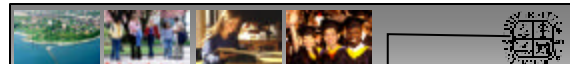
- Ulnar nerve most often affected




Ulnar Neuropathy



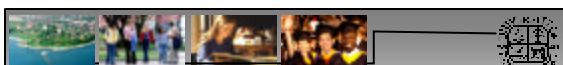
- Excessive use
- Repetitive injury
- Cubital tunnel compression
- Postural habits
- Recurrent nerve subluxations or dislocations



Ulnar Nerve Compression or Entrapment Clinical signs and symptoms


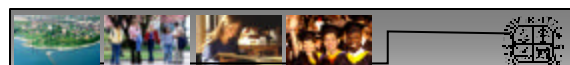


- Forearm and/or hand paresthesia
- Forearm and/or hand weakness
- Tinel's sign present
- Wartenberg's Sign present




Tinel's Sign

- Palpate or tap the ulnar nerve with neurological reflex hammer to elicit pain

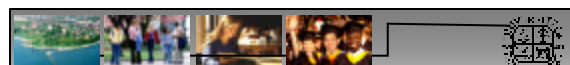
Tinel's Sign

- Tap the ulnar nerve, which is located at the groove between the olecranon process and the medial epicondyle





Froment's Sign Test for ulnar nerve palsy

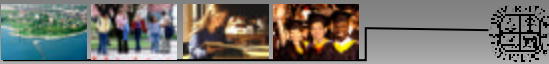
- Tests the action of adductor pollicis
- Patient holds a piece of paper between the thumb and a flat palm as the paper is pulled away.

Froment's Sign and Finger Pinch Test

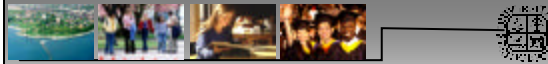
- Patient with an ulnar nerve palsy will flex the thumb to try to maintain a hold on the paper.
- There are variations of this test





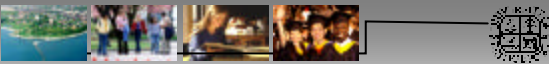
Anterior Interosseous Nerve

- Arises from median nerve, 5 cm above medial epicondyle
- Runs on volar surface of flexor digitorum profundus and along interosseous membrane between ulna & radius
- Supplies flexor pollicis longus, lateral half of flexor digitorum profundus & pronator quadratus
- May supply sensory branches to distal radius and ulna and carpal joints



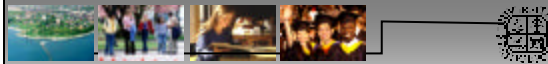
Martin Gruber Anastomosis

- Occurs in 10-15% of all forearms and in half of these cases, the nerve communication arises from the anterior interosseous nerve branch
- Hence, palsy of the anterior interosseous nerve could lead to palsy of the hand intrinsic normally supplied to the ulnar nerve



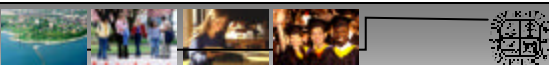
Causes of Anterior Interosseous Nerve Compression

- Tendinous origin of deep head of pronator teres (most common)
- Enlarged bicipital tendon bursa may impinge anterior interosseous nerve



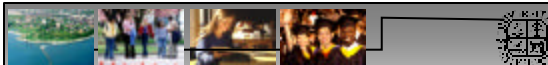
Causes of Anterior Interosseous Nerve Compression

- Aberrant or thrombosed radial artery in mid-forearm
- Thrombosed ulnar artery
- Fascial band at the origin of flexor digitorum profundus



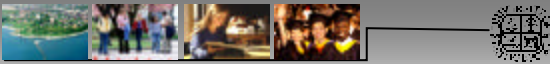
Causes of Anterior Interosseous Nerve Compression

- Compression within deep palmar compartment from aberrant accessory muscles such as flexor profundus longus (gantzer's) muscle, palmaris profundus mass, or enlarged flexor carpi radialis brevis



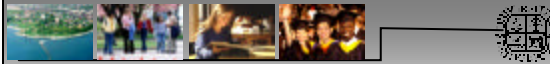
Differential Diagnosis

- Lateral cord lesion
- Flexor digitorum profundus or index profundus tendons avulsion
 - Tendon ruptures are noted by placing digits in different positions and applying tension to the flexor tendons
 - Electrical stimulation may indicate whether muscle belly is partially denervated



Exam


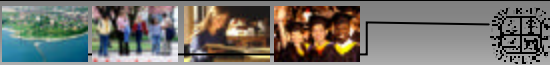
- Principal weakness
- Difficulty moving index & middle fingers with weakness in flexors of interphalangeal joint of thumb (FPL) & dip joints of index and middle fingers (FDP)



Pinch Grip Test

Anterior interosseous nerve trauma


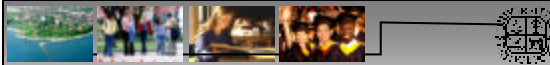
- Observe pitch attitude of the hand
- Normally when individual pinches something between index finger & thumb, MP & IP joints of thumb and index finger are flexed;

Pinch Grip Test

Anterior interosseous nerve trauma

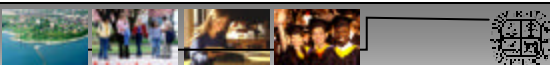
- With nerve deficit, terminal phalanges of thumb and index finger are extended or hyperextended
- EMG needle examination is difficult because of the deep location

Pinch Grip Test


Anterior interosseous nerve trauma

- Unusual innervation patterns of hand will confuse picture
- Median nerve hand (martin gruber) anastomosis
- Entire hand is innervated by the median nerve
 - Cross over ulnar innervations of flexor digitorum profundus
 - Superficial innervations by anterior interosseous nerve

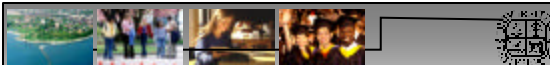


Ulnar Nerve Compression

Cubital Tunnel Syndrome




- Affected patients often experience numbness and tingling along the little finger and the ulnar half of the ring finger.

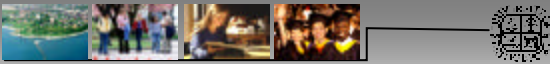


Ulnar Nerve Compression

Cubital Tunnel Syndrome



- This discomfort is often accompanied by weakness of grip and, rarely, by intrinsic wasting.



Elbow Flexion Test

Ulnar nerve compression at cubital tunnel


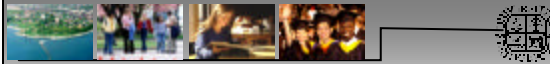



Figure 4. Many people bring their elbow curled up like this. Flexing with your elbow bent can aggravate symptoms of cubital nerve compression and cause you to wake up at night with your right hand.

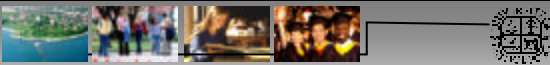
- The elbow is the most common site of compression of the ulnar nerve.
- Second most common compressive neuropathy (after carpal tunnel syndrome).
- Cubital tunnel syndrome affects men 3-8 times as often as women.




Normal Pediatric Elbow



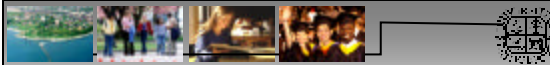
- Do not confuse epiphyseal growth plates or centers with fractures




Normal Epiphyseal Growth Plates



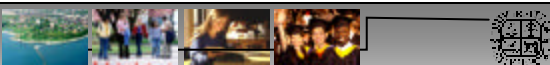
- Sprains and strains occur in growing children and often result in the potentially more serious growth plate or physal fracture.




Partial Dislocation of Elbow



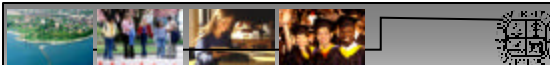
- Is this an adult or a pediatric case?




Dislocation of Elbow



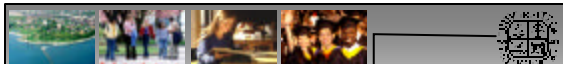
- How would you manage this case of dislocation?




Complete Elbow Dislocation



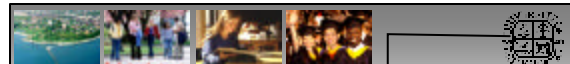
- An elbow dislocation may occur when the radial and ulnar ligaments are sprained




Elbow Dislocation



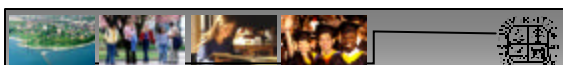
- An elbow sprain with dislocation may occur with a fall onto an extended elbow or due to a motor vehicle accident




Reduced Dislocation of Elbow



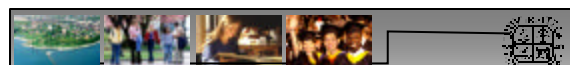
- Are you trained to reduce a dislocated elbow?




Instability of Elbow



- Posterolateral instability following elbow dislocation, in a 25-year-old patient.



Radiographic Examination



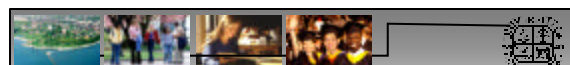
- Radiographs taken under general anesthesia show posterolateral subluxation of the radial head during forearm supinating stress.



Complex Dislocation and Fracture



- Please explain your treatment plan?



Examination of Related Areas

