CASE 1
Dystocia

http://www.skepticalob.com/2012/10/except-for-the-nerve-damage-the-baby-was-unscathed.html
Upper Lesions of the Brachial Plexus (Erb-Duchenne Palsy)

- excessive displacement of the head to the opposite side
- depression of the shoulder on the same side

- in infants during a difficult delivery
- in adults after a blow to or fall on the shoulder
Upper Lesions of the Brachial Plexus (Erb-Duchenne Palsy)

C5 and C6 roots

- suprascapular nerve
- the nerve to the subclavius
- musculocutaneous nerve
- axillary nerve

1. supraspinatus - abductor of the shoulder
2. infraspinatus - lateral rotator of the shoulder
3. subclavius - depresses the clavicle
4. biceps brachii - supinator of the forearm, flexor of the elbow, weak flexor of the shoulder
5. greater part of the brachialis - flexor of the elbow
6. coracobrachialis - flexor of the shoulder
7. deltoid - abductor of the shoulder
8. teres minor - lateral rotator of the shoulder

Sensation loss over the lateral side of the arm
**Dorsal scapular nerve:** Levator scapulae, rhomboids (Retracts (adducts) and elevates scapula)

**Lateral pectoral nerve:** Pectoralis major (medial rotation, flexion and adduction of the arm) extension

Lattisimus dorsi= thoracodorsal nerve
Lower Lesions of the Brachial Plexus (Klumpke Palsy)

ulnar and median nerves

all the small muscles of the hand

Claw(ed) hand

hyperextension of metacarpophalangeal joints
flexion of the interphalangeal joints
Lower brachial plexus injury (Klumpke's palsy)

Deficits in a lower brachial plexus injury (Klumpke's palsy):
- paralysis of all the small muscles of the hand causing clawing
- loss of sensation along the medial aspect of the arm
Lower Lesions of the Brachial Plexus
(Klumpke Palsy)
C8 and T1 roots
loss of sensation
along the medial side of the arm
8th cervical nerve damaged
+ medial side of the forearm, hand, and medial two fingers

Foerster (1933)
The pattern of distribution of peripheral nerve involvement is very helpful in reaching a diagnosis.

Mononeuropathies, especially if an entrapment site, are often an isolated phenomenon, possibly related to pregnancy, DM, thyroid disease or occupation, but importantly may also occur as features of a more generalised disorder, such as hereditary neuropathy with liability to pressure palsies (HNPP) or amyloidosis.
Mononeuropathies occurring outside entrapment sites are more important to investigate fully, especially if vasculitis is suspected as this need careful evaluation for treatment. If the pattern suggests a single nerve or plexus lesion at an unusual site of compression or invasion, such as a radial nerve lesion compressed on a chair in a patient following an overnight binge, or invasion of the brachial plexus with breast malignancy, this is clearly important to detect.
Focal and multifocal neuropathies

**Entrapment neuropathy**—for example, carpal tunnel syndrome (CTS), ulnar nerve at elbow

**Myxoedema, acromegaly**

Amyloidosis

Diabetes

**Hereditary neuropathy with liability to pressure palsies (HNPP A)**

Vasculitis

**Multifocal motor neuropathy**
Entrapment neuropathies occur when nerves chronically compressed or mechanically injured at specific locations.

Isolated peripheral nerve injuries occurring at specific locations where a nerve is mechanically constricted in a fibrous or fibro-osseous tunnel or deformed by a fibrous band.

In some instances the nerve is injured by chronic direct compression, and in other instances angulation or stretching forces cause mechanical damage to the nerve.
Angulation and stretch injury are important mechanisms of nerve injury for ulnar neuropathies associated with gross deformity of the elbow joint ("tardy ulnar palsy").

Recurrent compression of nerves by external forces may also cause focal nerve injuries such as ulnar neuropathy at the elbow and deep branch lesions of the ulnar nerve in the hand. Although these latter neuropathies do not satisfy the strict definition of “entrapment neuropathies”, they are often considered in a discussion of the topic.
Long Thoracic Nerve Injuries

C5, C6, C7

blows to or pressure on the posterior triangle of the neck during the surgical procedure of radical mastectomy

- Difficulty in raising the arm above the head
- Inferior border of scapula not closely applied to the chest wall
  Protrude posteriorly

Winged scapula
Here is the shoulder’s x-ray of the patient!

**SYMPTOMS**

- Loss of skin sensation over the lower half of the deltoid muscle.

What is your possible diagnosis?
Axillary Nerve Injuries
posterior cord of the brachial plexus (C5 and 6)
pressure of a badly adjusted crutch pressing upward into the armpit
shoulder dislocations

Quadrangular space

fractures of the surgical neck of humerus
deltoid and teres minor

Loss of skin sensation
over the lower half of deltoid region (lateral part of the arm)

Upper lateral cutaneous nerve of the arm

Impaired abduction of the shoulder (the other one: Supraspinatus only)
Shoulder weakness
Difficulty lifting the arm above the head
Axillary Nerve Injuries
posterior cord of the brachial plexus (C5 and 6)

I.M. injections
Operations around the shoulder

runs transversely under cover of the deltoid
at the level of the surgical neck of the humerus
You are taking the history from your patient. Here is what he says (his symptoms)

He says he was painting the ceiling and fell, suddenly. He has a terrible pain in his arm.

Here is what you find (his clinical findings)

Localized pain in his right forearm
No sensory loss
No wristdrop, the wrist can be extended.
Radial Nerve Injuries
commonly damaged in the axilla & in the spiral (radial) groove

Radial Nerve
1- Formed from posterior cord
2- Supplies Triceps and passes behind humerus in spiral groove
3- Lies between Brachioradialis and Brachialis at Elbow
4- Gives off Superficial and Deep terminal branches
Radial Nerve Injuries @ Axilla

pressure of the upper end of a badly fitting crutch
drunk falling asleep with one arm over the back of a
fractures and dislocations of the proximal end of the humerus

Motor

Triceps, anconeus, and long extensors of the wrist

No extension of the elbow joint, wrist joint, and the fingers

Wristdrop (flexion of the wrist)

Supination good brachioradialis, supinator down, but biceps brachii
Radial Nerve Injuries @ Axilla

**Sensory**

A small loss of skin sensation
down the posterior surface of the lower part of the arm
down a narrow strip on the back of the forearm

A variable area of sensory loss
on the lateral part of the dorsum of the hand
on the dorsal surface of the roots of the lateral 3 ½ fingers

*Trophic Changes*

Slight
Radial Nerve Injuries @ Spiral Groove of Humerus

At the time of fracture of the shaft of the humerus
Following the formation of the callus
Pressure of the back of the arm on the edge of the operating table

Prolonged application of a tourniquet to the arm in a person with a slender triceps temporary radial palsy
Radial Nerve Injuries @ Spiral Groove of Humerus
most commonly @ distal part of the groove

**Motor**
Inability to extend the wrist & fingers
Wrist drop

**Sensory**
A variable small area of anesthesia
dorsal surface of the hand
dorsal surface of roots of lateral 3 ½ fingers

**Trophic changes**
Very slight or absent
potential space located **anterior to the proximal radius**

starting from the level of the humeroradial joint

extending past the proximal edge of the supinator

*posterior interosseous nerve*

The *radial nerve* bifurcates into *deep* and *superficial branches* anterior to the lateral epicondyle of the humerus, between the brachialis and the brachioradialis, in the lateral border of the cubital fossa.

After passing through the two heads of the supinator muscle, the deep branch becomes the *posterior interosseous nerve*. 
Radial tunnel syndrome

**DIAGNOSIS**

Radial nerve

**Lateral part of the elbow, radial tunnel below the supinator**

Tenderness and pain @ lateral side of the elbow
sudden and often repeated use of the forearm extensor muscles

Tenderness

Pain on wrist extension, pain when shaking hands, and frequently a weakened grip.

In tennis elbow, the tenderness is mostly right where the tendon attaches to the lateral epicondyle of the elbow.

In radial tunnel syndrome, the place that is most tender is about two inches further down the arm, right over where the radial nerve goes into the supinator muscle.
Deep branch of the Radial Nerve Injuries
Motor nerve
Extensor muscles @ posterior compartment of the forearm fractures of the proximal end of the radius dislocation of the radial head

Supinator

**Intact**

*Extensor carpi radialis longus*

No wrist drop
No sensory loss
Superficial Radial Nerve Injuries

a variable small area of anesthesia over the dorsum of the hand
dorsal surface of the roots of the lateral 3 ½ fingers
Musculocutaneous Nerve Injuries
Rarely injured (protected position)

- Weak flexion @ shoulder joint
  Flexion of the forearm @ elbow by remainder of brachialis + flexors of forearm

- Weak supination supinatar radial nerve

- Sensory loss along the lateral side of the forearm
  lateral cutaneous nerve of the forearm
Median Nerve Injuries occasionally in the elbow region supracondylar fractures of the humerus most commonly by stab wounds or broken glass just proximal to the flexor retinaculum
Injuries to the Median Nerve @ the Elbow

**Motor**

- Pronator & flexor muscles of forearm (EXCEPT?)
- Thenar muscles

Forearm in supine position:
- Weak wrist flexion—accompanied by adduction
- No flexion @ interphalangeal joints of index & middle fingers
- Weak flexion @ metacarpophalangeal joints —interossei—

Middle & index fingers remain straight (extended)
Injuries to the Median Nerve @ the Elbow

**Motor**

- No Flexion of the terminal phalanx of the thumb
- Thenar eminence flattened
- Thumb laterally rotated & adducted

**APE HAND DEFORMITY**
Injuries to the Median Nerve @ the Elbow

Sensory

Lost skin sensation @ lateral half or less of the palm of the hand
palmar aspect of lateral 3 1/2 fingers
distal part of dorsal surfaces of lateral 3 1/2 fingers
Injuries to the Median Nerve @ the Elbow

**Vasomotor changes**
Skin area affected warmer & drier
Arteriolar dilatation and absence of sweating / loss of sympathetic control

**Trophic changes**
Chronic cases
dry and scaly skin
nails crack easily
atrophy of the pulp of the fingers
Injuries to the Median Nerve @ the Wrist

**Motor**

Thenar muscles & first two lumbricals
Thenar eminence flattened
Thumb laterally rotated and adducted

Ape-like hand

No opposition of the thumb

**MAKE A FIST, SLOWLY**

Index & middle fingers lag behind the ring & little fingers
Dr. Eda, a gynecologist sends her patient, a 25 years old pregnant female, a cashier at a mall in downtown, to the end of her first trimester to Dr. Süleyman who is an internist.

An expert from Dr. Eda’s request of consultation letter for Dr. Süleyman:

**Free T4 0.4 ng/dl** 0.8 – 2.4 ng/dl

Hypothyroidism?
Dr. Süleyman examines the patient as a consulting internist,
Finds the following during his examination:
Symptoms of depression
Increased sensitivity to cold
Poor muscle tone
Burning sensations in the thumb & index finger

The anxious patient asks: What is wrong with me, doctor?

Dr. Süleyman replies with a tone of affection in his voice:
«You are pregnant and your thyroid gland does not work efficiently and plus you have .........................X......................»

What is X?
Carpal tunnel syndrome (CTS) is a frequent diagnosis considered in such patients and is the most frequent entrapment neuropathy. Approximately 1.6% of adults describe symptoms consistent with CTS. Clinically, the syndrome consists of a burning pain or “pins and needles” along the distribution of the median nerve to the lateral three and a half fingers and weakness of the thenar muscles. It is produced by compression of the median nerve within the tunnel. The syndrome can often be treated effectively with splinting and avoidance of repetitive motions and awkward wrist positions; however, carpal tunnel release is ultimately performed in 25% to 50% of these patients.


Pregnancy experience CTS due to hormonal changes (high progesterone levels) and water retention, which is common during pregnancy. During hypothyroidism and pregnancy fluid is retained in tissues, which swells the tenosynovium. Obesity also increases the risk of CTS: individuals classified as obese (BMI > 29) are 2.5 times more likely than slender individuals (BMI < 20) to be diagnosed with CTS.

*CTS is also work-related, occupational disease and associated with overuse.*

Carpal Tunnel Syndrome
MOST COMMON PERIPHERAL NERVE INJURY IN THE UPPER LIMB
Carpal Tunnel Syndrome

Burning pain or “pins and needles” along the distribution of the median nerve to the lateral 3 ½ fingers

Weakness of thenar muscles

No paresthesia over the thenar eminence palmar cutaneous branch of the median nerve
Ulnar Nerve Injuries

most commonly injured @

@ elbow
where it lies behind the medial epicondyle usually associated with fracture

@ wrist
where it lies with the ulnar artery in front of the flexor retinaculum.
Injuries to the Ulnar Nerve @ the Elbow

CUBITAL TUNNEL SYNDROME (2ND most common)

Motor

Flexor carpi ulnaris & medial half of flexor digitorum profundus
ring & little fingers

No flexion of the terminal phalanges of the ring & little fingers

Flexion of wrist = abduction paralysis of flexor carpi ulnaris

medial border of the front of the forearm flattened/wasted

All the small muscles of the hand paralyzed EXCEPT?

 fibro-osseus tunnel between the medial epicondyle and flexor carpi ulnaris
Injuries to the Ulnar Nerve @ the Elbow

Motor

Extensor digitorum can abduct the fingers to a small extent when metacarpophalangeal joints are hyperextended
Impossible to adduct the thumb adductor pollicis paralyzed

Froment’s sign
Grip a piece of paper between the thumb and index fingers

Froment sign: The patient is asked to hold the paper between the thumb and index finger.
(A) With the intact ulnar nerve, the patient is able to make use of the adductor pollicis. (B) When the ulnar nerve is deficient, the patient compensates for the denervated adductor by using the flexor pollicis longus (median nerve innervated).
Injuries to the Ulnar Nerve @ the Elbow

**Motor**

2 medial lumbricals & interossei  Hyperextended metacarpophalangeal joints
Flexed interphalangeal joints
fourth & fifth fingers

“claw” deformity main en griffe
Injuries to the Ulnar Nerve @ the Elbow

Motor

Flattening of hypothenar eminence
Loss of the convex curve to the medial border of the hand

Hollowing between metacarpal bones @ dorsum of the hand
Wasting of dorsal interossei
Injuries to the Ulnar Nerve @ the Elbow

**Sensory**

**Loss of skin sensation**
anterior & posterior surfaces of medial 1/3 of the hand
medial 1 ½ fingers

**Vasomotor Changes**
warmer and drier skin area
arteriolar dilatation and absence of sweating / loss of sympathetic control
Injuries to the Ulnar Nerve @ the Wrist

Motor

Small hand muscles paralyzed, wasted – EXCEPT 3 thenar @ first 2 lumbricals

Claw hand

More obvious
Flexor digitorum profundus intact
Marked flexion of the terminal phalanges

Ulnar paradox

Higher lesion
Less obvious claw deformity

More proximal injury
Less claw
PROXIMAL/ @ ELBOW
CUBITAL TUNNEL SYNDROME BETWEEN MEDIAL EPICONDYLE & FLEXOR CARPI ULNARIS

DISTAL/ @ WRIST
GYON’S CANAL
Roof:
Palmaris brevis, hamate, pisiforme bones & Flexor carpi ulnaris

Q: Medial half of Flexor digitorum profundus affected in which one most?
Injuries to the Ulnar Nerve @ the Wrist

**Sensory**

Main ulnar nerve

Palmar cutaneous branch

**Posterior cutaneous branch**

6.25 cm, 2 inch above the pisiform bone

palmar surface of the medial 1/3 hand

medial 1 ½ fingers

the dorsal aspects of the middle and distal phalanges of the same fingers
Rotator Cuff Tendinitis

Subscapularis
Supra-infra spinatus
Teres MINOR

Lesions of the cuff - common cause of pain in the shoulder region

Subacromial bursitis
Supraspinatus tendinitis
Pericapsulitis - spasm of pain in the middle range of abduction when the diseased area impinges on the acromion

Stabilizing the shoulder joint
Rupture of the Supraspinatus Tendon

**advanced cases of rotator cuff tendinitis**
- necrotic supraspinatus tendon
- calcified or rupture

Hold humeral head @ glenoid fossa at the beginning of abduction
No initiation of abduction of the arm, unless passively assisted for the first 15°
Anterior interosseous nerve syndrome

- flexor pollicis longus
- flexor digitorum profundus to index, sometimes middle fingers
- pronator quadratus

Pinch deformity

Pronation
Venipuncture

- obtaining blood for laboratory testing
- administering fluid and intravenous drugs
OTHER
Auscultatory Triangle

latissimus dorsi
trapezius
medial border of scapula
STIFF NECK
Levator scapulæ

levator scapula which connects the neck and shoulder.

most usual complaint pain when trying to turn the head to the side where it hurts, often turning the body instead of the neck to look behind.

It is often associated with a headache but not always.

The most common causes for developing this kind of stiff neck are; turning the head to one side while typing, long phone calls without a headset, sleeping without proper pillow support with the neck tilted or rotated, sitting in a chair with armrests too high and exposure of the neck to a cold draft. There are other causes basically from shortening of this muscle as illustrated with using a cane that is too long. Activities such as vigorous tennis, swimming the crawl stroke and watching a tennis match rotating the head back and forth can also cause a stiff neck.