Samiran's NOTE

ON

Approach To Surgical Examination

Edited By
Kabirul Islam
Ishtiaque Ahmed Imon
Mostafa Hossain

Dedicated to

UTTAL 69

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Examination of an Ulcer

Inspection

1. Size & shape of ulcer:- measure the size in centimeters in two dimensions with a measuring tape.
2. Number : Single or multiple.
3. Location of the ulcer.

❖ Many ulcer have a characteristic site where they occur. For example:
   i) A **varicose ulcer** is located on the medial aspect of the lower third of the leg.
   ii) **Rodent ulcer** (An ulcerating basal cell carcinoma) are confined to an area of the face above the line joining the angle of the mouth to the ear lobule.
   iii) **Tuberculous ulcer** are common in the neck over the sites of tubercular lymphadenopathy.
   iv) An ulcer in a weight bearing area is usually a **Trophic ulcer** / **Neuropathic ulcer** e.g. over the heels, over the sacrum & other bony points in a bed-ridden pt.

4. Margin & Edge of the ulcer.

Margin: Margin is the 'border' or 'Transitional zone' of the skin around the ulcer.
(It is the line demarcating the ulcer from the intact skin)

There are 3 types of margin:
   i) A healing ulcer shows typical bluish line of growing epithelium which is squamous epithelium without cornification > Hence looks **'Bluish'**.
   ii) Inside this line, is the **'red'** granulation tissue covered by a single layer of epithelium which is transparent & shows the red color of the underlying granulations.
   iii) And outside, it is the **'white'** zone of newly cornified epithelium.

Margin of healing ulcer:
1. **W**hite ~ Outer
2. **B**lue ~ Central
3. **R**ed ~ Inner

WBR

***A spreading ulcer shows a red, inflamed & irregular margin with inflamed surrounding skin.

*** A chronic, non-healing ulcer shows marked fibrosis with thickened white skin margins without the blue line of growing epithelium.

Edge: **Edge is the mode of union/ junction between the floor & the margin of the ulcer**.

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So, ulcer has thickness, a third dimension & it can be inspected as well as palpated.

Types of edges:

1) Sloping edge ~ Healing ulcer
2) Punched out edge ~ Syphilitic ulcer, trophic ulcer
3) Undermined edge ~ Tuberculous ulcer
4) Raised & everted edge ~ malignant ulcer (squamous cell carcinoma)
5) Rolled out (raised, but not everted) edge ~ rodent ulcer (basal cell carcinoma)

Explanation of different types of edges:

** **Sloping edge**: In a healing ulcer, the healthy granulations over the floor are slightly below the skin surface & the skin is sloping down to it. Also the skin thins out gradually seen under a microscope.
So, healing ulcer has a sloping edge.

** **Punched out edge**: In a trophic ulcer, the tissue destruction is equal in all planes from skin to bone; so ulcer is deep with a vertical edges if the tissue has been punched-out.

** **Undermined edge**: In a tubercular ulcer, the tissue destruction is more in the sub-cutaneous plane than in the skin. So, the skin overhangs at the edge.
That's why, it is called undermined edge.

** **Raised & everted edge**: In a malignant ulcer, the malignant tissue grows very fast and overhangs the skin margin. The ulcer itself is raised above the skin level. (N.B.: the overhanging tissue is particularly seen at the lower border.)

** **Rolled up edge (raised, but not everted):** It is characteristic of a rodent ulcer/ basal cell carcinoma which is a slow growing malignancy. Due to slow growth rate, it becomes raised with rolled up edge but doesn't overhang. (It is usually seen in the nasal ala)

5. Floor of the ulcer: **Floor is the exposed surface of the ulcer.**

Note- i) Type of granulation tissue

ii) The amount of slough

iii) The nature of discharge

- A healthy ulcer shows healthy granulation tissue, no slough & a small amount serous discharge.
- A spreading or infected ulcer shows areas of unhealthy granulation tissue & areas of slough.
(Slough is the necrotic soft tissue not yet separated from living tissue)

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- A chronic, non-healing ulcer shows **pale**, flat granulation tissue which does not bleed easily on touch.
- A large sized ulcer, where epithelialization is not completed in time shows hypertrophic granulation tissue (exuberant granulation raising above the surface of the skin). This is also termed as "**Proud flesh**". It is accompanied by an excessive serosanguinous or purulent discharge.

6. Inspection of the surrounding skin:

> If the ulcer is spreading & infected, the surrounding skin is shiny, red & edematous due to cellulitis.

> Dark pigmentation & eczema surrounding the ulcer is typical in varicose ulcer i.e. ulcer associated with varicose veins.

> Multiple scars & puckering of the skin surrounding the ulcer in the neck are suggestive of tubercular ulcer.

> Hypopigmentation of surrounding skin is common in non-healing ulcer.

> Ulcer within the large scars suggests the possibility of a **Marjolin's ulcer** (an ulcer located over an old scar).

Revision Panel of Inspection of Ulcer

1) shape & size
2) Number
3) location
4) Margin
5) Edge
6) Floor
7) surrounding skin

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Palpation

1. First palpate the surrounding skin for **Temperature** & **Tenderness**.

2. Then, wear gloves and palpate the ulcer: Its edge, floor & base.

3. Test the fixity of the ulcer to the structures in its base.

Procedure:

- Begin the palpation by noting the temperature of the surrounding skin, palpating with the back of the fingers & compare it with the opposite normal side.
- Then note the tenderness over the surrounding area.

  (Warmth & tenderness are suggestive of inflammation. They are seen in acutely inflamed & spreading ulcers.)
- Now palpate with a gloved hand over the edge & floor of the ulcer.

  Edge: i) Soft = Healing ulcer
  ii) Firm = Non-healing ulcer (due to Fibrosis)
  iii) Hard = Malignant ulcer
- Now palpate the granulation tissue over the floor & note whether it bleeds on touch.
  - A healthy granulation tissue shows pin-point hemorrhagic spots.
  - A malignant ulcer may bleed profusely (as seen in epithelioma over the scalp).
  - If there is slough over the floor, note whether the slough is attached loosely or firmly.
- Now palpate through the floor to note the consistency of the base & to note the underlying structure whether it is a muscle, a fascia or a bone.

  (**Base**: Base of an ulcer is the tissue on which the ulcer rests.)
  - If the ulcer is small, pinch it up & palpate the base between the fingers.
  - But if the ulcer is large, the base has to be felt over the floor of the ulcer with gloved fingers.
    - All chronic ulcers have a firm base due to fibrosis.
    - But a hard feel or a marked induration should rise the suspicion of malignancy.
- Now try to move the ulcer from side to side in two different directions & note whether it is fixed to the underlying structures.
  - If the ulcer is over a muscle mass, ask the patient to contract the muscle & test the mobility again over the contracted muscle at right angles to the direction of muscle fibers.
    - Reduced mobility implies fixity to the underlying muscles. This is the Mobility Test.

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Focal Examination

1. Regional lymph nodes
2. State of arteries, venous circulation & nerves (depending on the type of ulcer)
3. Movement of the neighbouring joints.

Procedure:

1. *Examination of regional lymph nodes*:

- Start with the palpation of regional lymph node groups.
- If the regional lymph nodes are palpable, then palpate the higher group of lymph nodes also.

Characteristics of lymph nodes:

i) Hard, discrete, non-tender ~ Malignant
ii) Soft, tender, enlarged ~ Infective
iii) Non-tender, matted ~ Tuberculous

2. Examination of related vessels & nerves :

- If the ulcer is situated in the lower half of the leg, ask the patient to stand & look for varicose veins. Examine the long & short saphenous veins & also look for scattered & irregular varicosities which are more commonly associated with varicose ulcer.
  - If a varicose ulcer is suspected, also test for DVT by testing caff tenderness, Homan's sign, Mose's sign. (Reference : Examination of varicose vein)

- For every ulcer, anywhere on the leg, foot or over the hands, palpate all the related arteries on both sides to rule out vascular disease & arterial insufficiency.
- If the ulcer is located over the tips of the fingers or toes or over the dorsum of the foot, then a detailed examination of the vascular system must be done (to rule out the ischemic ulcer).
- Then test the sensation of the skin surrounding the ulcer using a sharp pin. If the sensations are diminished & particularly the ulcer is of trophic type over a pressure bearing area, then the detailed neurological examination must be conducted.
  - Map the area of diminished sensation
  - Search features of leprosy
    (Palpate posterior tibial, ulnar & greater auricular nerves for thickening as observed in leprosy.)
  - Look for hypo-pigmented anesthetic patches over the limbs, back & face & also look for features of Leonine Face.
  - And if a spinal cord lesion is suspected, test accordingly.

3. Examination of joints close to the ulcer:
   Test the active & passive movements.

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- Restriction of movements of the joints indicates muscle or tendon involvement or a painful inflammation.

Systemic Examination

1. CVS > for evidence of congestive cardiac failure which delays ulcer healing.
2. Respiratory System > For tuberculosis & secondaries
3. Alimentary system > for evidence of splenomegaly in Hemolytic anaemia in leg ulcer.

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Examination of a Swelling

Inspection

1. Site: exact anatomical location
2. Number: whether it is single or multiple

Some swellings have a typical position which is diagnostic of the swelling. For example:

i) Post-auricular dermoid> behind the ear

ii) Thoracic meningocele> over the back the on the midline

iii) External angular dermoid> at the lateral end of eyebrow

Then, note the number.

- Most swelling will be solitary; but some are typically multiple. For example:
  i) Multiple cutaneous swellings in multiple neurofibromatosis
  ii) Multiple sub-cutaneous swellings in multiple lipomatosis

3. Shape
4. Size (in centimeters)

Shape may be regular one like spherical, oval or kidney shaped; or it may be irregular shaped swelling.

Then measure the exact size in centimeters using a measuring tape. Measure in longitudinal & transverse axis & where possible the depth.

(The depth of the swelling can be better judged on palpation; so measurement with a scale/ measuring tape should be done during palpation)

5. Surface of the swelling:

a) colour

b) surface

c) overlying skin

colour :

- Capillary haemangioma is of bright red in colour
- Malignant melanoma is black in colour

Is the surface smooth or irregular?

- Typical filiform branches over papilloma

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- Cauliflower surface in squamous cell carcinoma

Now note the skin over the swelling: whether it is normal, inflamed or ulcerated.

Example: i) A tense, shiny skin with prominent veins suggests sarcoma.
ii) A black punctum on the skin over the swelling is diagnostic of a sebaceous cyst.
iii) Red, edematous skin over the sebaceous cyst indicates an inflammation or infected cyst.
iv) presence of a scar of previous surgery suggests that the swelling is a recurrent one.
v) An edematous skin with multiple pits like an orange peel is termed as *Peau D' Orange* appearance > suggests an infiltrating lump blocking cutaneous lymphatics.

4. Movements: visible peristalsis

- Now inspect the swelling for few seconds for any visible pulsation (a movement or an increase in size, synchronous with each heart beat)
  - Swelling arising from the arteries like aneurysm will be pulsatile. (Swelling should not be touched during inspection)

5. Site related: e.g. i) Cough impulse
ii) Pressure effects
iii) Movement on deglutition

- Depending on the site & type of the swelling a few specific signs should be looked for:
  - Cough impulse: If the swelling over the abdomen, chest or the spinal canal; ask the patient to cough & look for any impulse on coughing. A visible increase in the size of the swelling, synchronous with the cough, is termed as impulse on coughing (seen in inguinal hernia)
  - Pressure effects: If the swelling is on the limbs, inspect the distal limb for any pressure effects like edema or nerve palsy. (Foot drop caused by a bone tumor in the upper tibia)
  - Movements on deglutition: If the swelling is in front of the neck, look for movement on deglutition.

Palpation

1. Temperature: 1st test of palpation. Test the temperature of the skin over the swelling & compare it with the normal skin.

- Local rise of temperature: i) cellulitis & abscess

ii) sarcoma

iii) vascular swelling

2. Tenderness: (Pain, due to pressure exerted over the swelling.)

Palpate gently all over the swelling to look for tenderness.

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- Tenderness is a feature of inflammation
- A swelling related to a nerve e.g. solitary neurofibroma may also be tender.

****** It is an absolute standard routine work for palpation to test for "Temperature" & "Tenderness" before proceeding to palpate the swelling in details.**

3. Confirm the size & shape of the swelling & note the 3rd dimension i.e. the depth of the swelling which could not be correctly judged during inspection.

- Palpate the swelling from all sides, as sometimes it may be much larger than what is seen during inspection. In such case, measure the size again in 3 dimensions using a measuring tape.

4. Palpation of the surface:

- The surface is smooth in cystic swelling as seen in the bursa over the leg.
- Or, it may be lobular as seen in a lipoma
- Or, it may be nodular as seen in multinodular goiter
- Or, it may be irregular, as seen in a carcinoma

5. Edge:

Now carefully palpate the edge of the swelling with the tips of the fingers & note whether it is –

I) well defined & regular = most of the benign swellings
II) well defined & irregular = malignant swellings infiltrating into the surrounding tissues.
III) diffuse & ill-defined =inflammatory swellings like abscess & cellulitis.

Slipping edge: It is the characteristic edge of a subcutaneous lipoma which slips under the palpating finger.

6. Consistency: It may be-

a) Soft
b) Cystic
c) Firm
d) Hard
e) Bony hard
f) Variable

- In a very small swelling, if it is difficult to determine whether the swelling is solid or cystic, perform Paget's Test.

Procedure: Hold the swelling fixed with the left hand & palpate with the tip of the index finger of the right hand, 1st at the center & then at the periphery.

A cystic swelling is softer at the center than at the periphery, while a solid swelling feel firmer at the center than at the pariphery.

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- If the swelling is soft or cystic >> look for signs of moulding / indentation
  Procedure: Press a finger into the swelling for 1-2 seconds & remove it. If the swelling remains indented, it indicates the presence of sticky materials typically seen in a sebaceous cyst.
  Sign of moulding is seen in: 1) sebaceous cyst
  2) dermoid cyst
  3) colonic mass with faecal matter

- Sometimes the swelling has a variable consistency i.e. some parts are cystic & some are solid/firm/hard.
  Variable consistency is usually seen in malignant lump.

******* If the swelling is soft/cystic, some special tests should be carried out. They are:

- Fluctuation
- If the swelling is fluctuant, then Trans-illumination.
- If the swelling is related to abdomen or chest or spinal canal, then impulse on coughing
- Reducibility &
- Compressibility

[These tests do not apply to solid, firm or hard swellings. So, in solid swelling you can directly proceed to test for fixity to skin & deeper structures.]

7. Fluctuation: It may be defined as transmission of an impulse an impulse in two directions at right angles to each other (& it implies the presence of fluid in the swelling).

- If the swelling is freely mobile, first fix with one hand or ask the assistant to hold it fixed. Then keep the two index fingers across the swelling at opposite poles. When one index finger is pressed, the finger at the other end feels the impulse & passively lifted up. Repeat the maneuver in a plane at right angles to the first. If the fluctuation is felt at both planes, it is called a positive fluctuation test.
  (The principle of fluctuation test is the Pascal's Law: it states that pressure exerted to a fluid is transmitted equally in all directions)
  - ✓ To avoid fallacy, fluctuation should always be tested in two planes at right angles to each other.
- If the swelling is less than 2cm, the fingers are too near to perceive an impulse & whole swelling may be displaced giving a false sense of fluctuation.
  Procedure:
  - So for small swelling, fix the swelling between the index & thumb of left hand just touching the edge of the swelling which will act as the perceiving fingers & press the swelling in the center with the right index finger.
  - In a very small swelling, use a closed ball point pen or a match stick. The swelling expands circumferentially which is felt by the fingers of left hand.

  There are 2 more terms about fluctuation:
  - ✓ Pseudo-fluctuation: A false sense of fluctuation felt in large soft swelling(not containing fluid) e.g. large lipoma.
  - ✓ Cross- fluctuation: fluctuation demonstrable between two separate cystic swelling communicating with each other.

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Example: 1. Compound palmar ganglion above & below the wrist.
2. Psoas abscess, pointing in the thigh above & below the inguinal ligament.
3. Deep plunging ranula in the floor of the mouth & sub- mentally.

8. Trans-illumination: Demonstration of transmission of light through a swelling e.g. meningocele, hydrocele.

- If a swelling can transmit the light through it, it is termed as trans-illuminant. This implies the presence of clear fluid, so also wall of the cystic swelling should be transparent.
- Thick & opaque walls or turbid fluid like blood, pus or lymph will not allow the light to pass through them.
- The test is preferably performed in a dark room where on applying a pencil-torch to the swelling, the entire swelling is illuminated with a red glow. However, if the room isn't sufficiently dark, use a long roll of paper or X-ray film to create a dark zone.
- Apply the torch to one side of the swelling & hold the roll paper diagonally to the opposite side. Hold the roll applied firmly to the skin so that the outside light doesn't leak into it. Now turn the torch on & off & observe through to the paper roll for the glow.

Brilliant trans-illumination is a feature of:

I. Cystic hygroma
II. Epididymal cyst
III. Meningocele with the skin cover
IV. Ranula
V. Congenital hydrocele

9. Impulse on coughing:

If the swelling is likely to be communicating with the peritoneal cavity or pleural cavity or spinal cord & cranial cavity, then grasp the swelling between your fingers & ask the patient to cough. If the swelling become tense or increases in size during coughing, it is positive cough impulse.

In case of children, they can't be asked to cough. So, palpate the swelling while they are crying.

10. Reducibility:

Like the cough impulse, reducibility should be tested in swelling which are likely to be communicating with the abdomen, chest or spinal canal & cranial cavity.

Procedure: Ask the patient to relax & compress the swelling uniformly from all sides. A reducible swelling will reduce in size & even may disappear completely as seen in Hernia.

It will reappear only on:

I. Straining or
II. Coughing or
III. By gravity force: because it involves displacement of viscera to the adjoining cavity.

Reducible swelling:

A. Hernias
B. Meningocele
C. Varicocele
D. Saphena varix

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11. Compressibility: Which is a characteristic sign of vascular haemangioma.
    - When the swelling is compressed it reduces in size, and as soon as the pressure is taken off, the swelling regains its original size by itself without any external factor like straining or coughing e.g. cavernous haemangioma

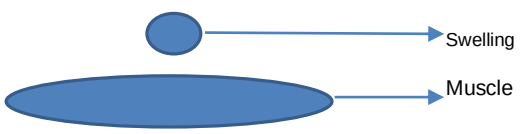
12. Pulsatility:
    - If the swelling is pulsatile, confirm it by placing a finger firmly over the swelling over a few seconds. The finger rises with each pulse beat.
    - Now place two fingers over the swelling as far apart as possible & note the finger movements.
        - ✓ If the fingers are lifted up & move apart with each pulsation; this is an expansile pulsation seen in aneurysm.
        - ✓ If the fingers are lifted only vertically(raised but not separated); then it is a transmitted pulsation. A swelling just over an artery will show a transmitted pulsation i.e. pulsation transmitted from an underlying artery.
    - In knee-elbow position, the swelling falls away from the aorta & the pulsation isn't felt, which means that the swelling itself is not pulsatile, and it is transmitted pulsation.
    - If the swelling is pulsatile, feel gently for a thrill.
      Whenever pulsation is felt over the swelling, keep the hand over the swelling gently for a few seconds & try to feel for a thrill.

13. Fixity to surrounding structures:
    Test the fixity to:
    - Skin
    - Subcutaneous tissues
    - Muscles & tendons
    - Bone

    Fixity to the skin:
    - If the swelling is arising from the skin itself (as a keloid over the sternum), then the swelling is obviously fixed to the skin & skin can't be pinched over it.
    - If the swelling is deeper to the skin, try to pinch the skin over the swelling at various points or try to move the skin over the swelling by a sliding movement. If the skin can be pinched (as over a lipoma), it implies that the swelling is not adherent to the skin.
    - If the skin can be pinched over the swelling, but on moving the skin or the swelling, the skin is puckered, as seen in early carcinoma of breast; then it is said to be tethered to the skin.

    ***[Tethering is indirect fixity to the skin due to fixity to the fibrous septa (in case of breast abscess/ carcinoma> Cooper's ligament) attached to the skin]
    (In case of a malignant breast lump, the skin can't be pinched or slided)

    Fixity to the subcutaneous tissue/ muscle:
    - Now ask the patient to contract the underlying muscle against resistance.
        - If the swelling is in the subcutaneous plane above the muscle, it will become more prominent & will remain mobile in all directions.



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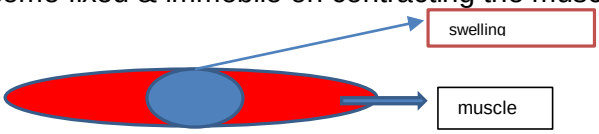
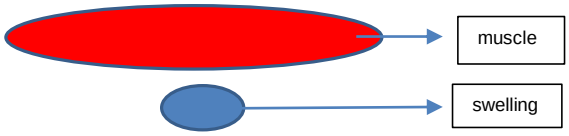
- If the swelling is in the muscle itself within the muscle sheath, it will become fixed & immobile on contracting the muscle.



- If the swelling is deep to the muscle, it will become less prominent & difficult to palpate.



Example:
*** In a case of intramuscular swelling which is a fibrosarcoma (within the pectoralis major muscle):

- First ask the patient to relax the muscle & test the mobility. An intramuscular swelling is mobile at right angles to the muscle fibers but not in the direction of the muscle fibers.
- Now ask the patient to contract the muscle & note that swelling becomes fixed on muscle contraction.

*** If the swelling is related to a tendon:

- Ask the patient to contract & relax the concerned muscle. If the swelling is fixed to the tendon, the swelling moves with tendon as seen in ganglion.
- And if the muscle is contracted against resistance, it will become fixed.

Fixity to the bone:
If a swelling is fixed to the bone, the swelling will be totally immobile irrespective of muscle contraction & will move the bone as seen the bone (as seen in jaw tumor).

Revision of palpation of a swelling:

1) Temperature & tenderness
2) Confirm the size & shape
3) Palpate surface & edge
4) Note the consistency
5) If cystic, specific test:
   a. Test for fluctuation
   b. If fluctuation '+'ve, test for trans-illumination
      **If it is likely to be connected to abdomen, chest, spinal canal or cranial cavity-
   c. Test for cough impulse
      &
   d. Reducibility

      ** For vascular haemangioma

   e. Test for compressibility
   f. Pulsatility

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6) Test for fixity to other structures layer by layer (from skin to bone)

Percussion

(Percussion is of limited value in the examination of swelling)

- In small swelling, percussion is not done.
- If you expect the swelling to contain gas e.g. enterocele (a hernia containing intestine) or pharyngocele; then a tympanic note on percussion will be confirmatory.
- You can also use it to elicit hydatid thrill in a hydatid cyst.

Auscultation

If the swelling is pulsatile i.e. arising from an artery or very vascular as in thyrotoxic goiter, auscultate over the swelling for a bruit.
Bruit: Bruit is a short, medium pitched murmur heard over the swelling with each pulse wave.

- An aneurysm will produce a systolic or a continuous murmur.

Focal examination

1. Examination of regional lymph nodes
2. Pressure effect
3. Joint above & below

Examination of regional lymph nodes:

- Palpate the regional lymph nodes for enlargement. If the regional lymph node are enlarged, then examine higher lymph node groups also.
- If the swelling itself a lymph node swelling, then examine its drainage area for an infected or malignant lesion & then all other lymph node groups, liver & spleen for the systemic cause of lymphadenopathy.

Pressure effect:

- ✓ Swelling causing pressure over bone: Erosion
- ✓ Swelling causing pressure over artery: Week distal pulse
- ✓ Swelling causing pressure over vein: Edema & dilated veins
- ✓ Swelling causing pressure over nerve: Muscle wasting, weakness, paresis, paralysis.

Joint above & below:

Note whether there is an impairment of joint movements.

Conclude the examination by a quick general examination of all the systems.

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Examination of scrotal swelling

Inspection

Let the patient stand with the scrotum & abdomen fully exposed.

****** (N.B: Inspection of a scrotal or inguinoscrotal swelling should always be done in standing posit ion)

- Why standing position??
  Answer:
  - ✓ Because direct hernias & varicoceles may be totally missed in lying down position.
  - ✓ And if the hernia is present, its full extent can be seen only in standing position.

1. On inspection, observe the swelling to identify the following things:
   - Unilateral or bilateral?
   - Scrotal or inguino-scrotal?
   - Relation to testis, epididymis, cord
     - ✓ whether the testis is seen separate from the swelling as seen in the encysted hydrocele of the cord.

       Or,
     - ✓ Is the testis incorporated within the swelling as seen in the testicular tumor or hydrocele?
   - Observe the penis
     - ✓ Whether it is pushed to the opposite side (unilateral hydrocele)
     - ✓ Whether it is partly buried within the swelling (seen in large bilateral hydrocele)

2. Inspect: - Shape
   - Surface
   - Size (in centimeter)

Shape: Is it globular, retort shape or irregular?

- ✓ Scrotal swelling that is testicular & epididymal swelling & hydrocele are always globular.
- ✓ And hydrocele often shows a characteristic constriction around its central portion; which is diagnostic of a Tunica Vaginalis Hydrocele.
- ✓ Next, measure the size of the swelling in centimeters in all 3 dimensions using a measuring tape.

3. Now inspect the overlying skin:
   i) Rugoities
   ii) Redness, edema
   iii) Excoriation, vesicles
   iv) Blackening
   v) Ulcers, sinuses, scars

- Normal scrotal skin has rugosities, which may be diminished in a hydrocele.

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- Thick, edematous skin, which on palpation will be firm, non-tender -- is a feature of filarial elephantiasis (filarial lymphedema)
  ** You can also see a 'Ram's Horn Penis' in this case due to filarial lymphedema of the penis.
- Redness & edema is a feature of scrotal wall cellulitis or in Acute epididymo-orchitis.
- Skin excoriation & vesicles are seen in urinary extravasation.
- Blackening & sloughing of the scrotal skin is a feature of Fournier's Gangrene – which is a idiopathic gangrene of the scrotal skin secondary to infection & cellulitis.
- Very large hydrocele may show friction ulcers on the lateral & posterior aspect due to friction with thighs.
- Also look for ulcers, sinuses & scars as seen in tubercular epididymitis.
  (It is extremely important to lift the scrotum and inspect its posterior surface. Otherwise a posterior sinus or ulcer arising from the epididymis may be missed.)

4. Visible cough impulse:

- In the swelling
- Over the inguinal canal

Palpation

1. a) Temperature
   b) Tenderness

- Look for any local rise of temperature over the swelling. Palpate the swelling with the back of the fingers; first on the normal side & then over the swelling for compression.
- Then palpate over the swelling, first very gently & then with slight firmness to look for tenderness.

2. Get above the swelling!!!

- In a scrotal swelling, the 1st point to be noted is whether the top of the swelling can be reached.
- Hold the root of the scrotum between the thumb infront & other fingers behind & palpate the cord structure above the swelling; by moving the thumb from medial to lateral side & feeling the cord as it slips medially.

Normal cord structures:
i) whipcord like vas
ii) Multiple string-like fibers of cremaster muscle

- In a unilateral scrotal swelling, always palpate the opposite normal cord & compare the thickness & feel.
- If only the cord structures are felt above the swelling, it means that the top of the swelling can be reached i.e. the swelling is entirely scrotal, not inguino-scrotal.
- In a inguino-scrotal swelling, top of the swelling cannot be reached (Can't get above the swelling).

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3. - Surface
   - Consistency
   - Weight
   - Relation to testis, epididymis & cord

- Now palpate the surface of the swelling & note whether it is smooth or nodular. (Nodular, uneven surface is seen in testicular tumor)
- Then, note the consistency of the swelling whether solid or cystic.
- Lift the swelling to note its weight; note the weight of normal testis for comparison. (Malignant testicular tumor feels very heavy; as compared to the cystic swelling like hydrocele)

*** If the swelling is cystic, then test for-

- Fluctuation
- Trans-illumination
- Reducibility
- Cough impulse

4. Fluctuation:

Fluctuation is the presence of transmitted impulse in two planes at right angles to each other.

Procedure: If the scrotum is very mobile, fix the swelling between the ring & little fingers of both hands; stretching the skin slightly. Then keep the thumb & index fingers of the left & right hands at the upper & lower poles respectively. Apply intermittent pressure at the lower pole & note that the thumb & index fingers at the upper pole move apart from each other showing positive fluctuation test. It is the indication of presence of fluid in the swelling.

5. Trans-illumination:

Trans-illumination is the demonstration of transmission of light through the swelling.

- If a dark room is available, trans-illumination should be tested in darkness.
- Place a pencil torch over the medial & lateral aspect of the swelling & the whole swelling will be illuminated & show a red glow indicating positive trans-illumination & presence of clear fluid in the swelling.
- The wall of the swelling should also be thin & translucent. Opaque & thick walls may interfere with trans-illumination.
- If a dark room is not available, observe through a roll of black paper, placed on the antero-medial or lateral side of the swelling holding the torch diagonally opposite. The roll of the paper will create a dark zone where the trans-illumination will be appreciated.

Precautions: 1. Don't place the torch posteriorly.
2. If the skin is thin, test normal skin illumination.

- If the skin is thin or the swelling is small, first place the pencil torch on the normal side of the scrotum to note the normal skin illumination in the patient. Then test over the swelling so that normal skin illumination is not mistaken for trans-illumination.
- Congenital hydroceles in children are brightly trans-illuminant due to thin skin & thin transparent covering membranes.
- Epididymal cyst is also brilliantly trans-illuminant. The epididymal cyst is separated from the testis & is related to the head of epididymis at the upper pole of testis.

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- A multi-loculated cyst of epididymis has a characteristic Chinese-lantern type of illumination.The septae between the cyst cast shadows akin to the shadows cast by the wooden frame of the lantern.
- Sometimes a scrotal swelling contains fluid, it is fluctuant but shows negative trans-illumination.

Negative trans-illumination is seen in-

1) Opaque fluid : - Hematocele
   - Pyocele
   - Chylocele

2) Opaque wall (in long standing hydrocele)

6. Reducibility:

- Now raise the scrotum & compress the swelling gently towards the external inguinal ring. Does it reduce in size?
  - A Hydrocele can't be reduced.
  - Reducible scrotal swelling:
    I) Varicocele
    II) Congenital Hydrocele
    (Purely scrotal swellings are irreducible)

7. Cough impulse:

- Now hold the swelling gently in the hand & ask the patient to cough. Look & feel for an expansile impulse in the swelling.
- Then keep the hand over the inguinal canal & again ask the patient to cough; looking for an expansile cough impulse of an associated hernia.

Having completed the palpation of the swelling, palpate the testis, epididymis & spermatic cord – if they are separately palpable.

- In large hydrocele, testis may not be palpable, but
- In a small hydrocele, testis may be felt within the swelling in the posterior portion.
- If the swelling is separate from the testis, palpate the head & tail of epididymis to ascertain whether the swelling is arising from the epididymis or from the cord.
- If the swelling appears to be in the cord, above the testis, apply downward traction to the testis & see whether the swelling gets pull-down & becomes fixed. This is the positive "Traction test".
  If the swelling is the encysted hydrocele of the cord within the cord, note that it becomes fixed when you pull the testis down. This is a positive traction test.
- Now palpate the cord.
  - Normally you feel the firm, whip-cord like vas & fibers of cremaster muscle felt as a number of strings.
  - Abnormal cord structures:
    I) Nodular vas ~ Tuberculosis

    II)Thickened cord with a bag of worm feel ~ Varicocele

The thickened, tortuous veins which becomes turgid on standing have the characteristic round worm-like feel – diagnostic of a varicocele.

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- Next, palpate the opposite testis, epididymis & cord to confirm that they are normal.

Focal & General Examination

- In supine, lying down position, palpate the inguin/al & external iliac lymph nodes on both sides.
- Examine the abdomen carefully for presence of any lump & organomegaly.
  *** In particular, in case of a varicocele, look for a left renal mass.
  And in case of malignant testis, look for para-aortic lymph nodes & also left supra-clavicular lymph nodes.
  - If the patient has epididymo-orchitis, do a per-rectal examination for prostatitis and enlarged seminal vesicles.

Examination of Inguino-Scrotal Swelling

Inguino-scrotal swelling extends from the scrotum to the inguinal region & include –

A. Inguinal hernia
B. Congenital & encysted hydrocele
C. Varicocele
D. Cord swellings

Inspection

To inspect an inguino-scrotal swelling, patient should be in a standing position, stripped below the waist.

- Why standing position?
  Answer: 1) To note the full extent of a hernia (only seen in standing position)
  2) To inspect direct & varicoceles (they may not be seen at all in lying down position)

1.

- Shape of the swelling
- Location of the swelling

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- ❖ Unilateral or bilateral
  - ➢ Indirect inguinal hernia has a pyriform shape: Broad over the scrotum & narrow over the medial half of the inguinal ligament.
  - ➢ Direct inguinal hernia is globular shaped: over the medial half of the inguinal ligament.

2. Size of the swelling:
   - ➢ Now measure its exact size in centimeter. In case of a hernia, the size should be measured when the hernia is fully distended by asking the patient to cough.
     (Size of the swelling is exactly measured by measuring tape during palpation)

3. Overlying skin:
   - ❖ Redness
   - ❖ Edema
   - ❖ Scar of surgery
   - ❖ Discoloration

   - ➢ Inspect the skin overlying the swelling, which should be normal in an uncomplicated hernia.
   - ➢ Redness & edema of the skin suggests acute inflammation & in case of a hernia it suggests acute strangulation (red, edematous & shiny skin)
   - ➢ Patient having a scar of previous hernia surgery indicates recurrent hernia.
     (If the scar is irregular & ragged, think of post-operative wound infection as the probable cause of recurrence)
   - ➢ An irregular pigmentation & discoloration may be seen in a patient wearing hernia truss for a long time.
     (Truss= an elastic, canvas or metallic device for retaining a hernia reduced within the abdominal cavity.)

4. Visible peristalsis:
   Now, observe the swelling closely for a visible peristalsis. An enterocele i.e. hernia containing bowel loops may show peristalsis specially when the covering layers are thin.

5. Visible cough impulse:
   Ask the patient to cough & look for visible expansile impulse in the swelling.
   - ➢ Positive cough impulse diagnostic of an inguinal hernia.
   - ➢ Hernia with no expansile cough impulse:
     A. Omentocele with adhesions
     B. Obstructed hernia
     C. Strangulated hernia

6. Observe the position of the penis:
   - ➢ A hernia will push the penis to the opposite side
   - ➢ A very large hernia will bury the penis in the scrotal skin

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Revision of Inspection

1. Shape, size (in centimeters)
2. Location
3. Unilateral/bilateral
4. Skin over swelling:
   - ~ Redness, edema
   - ~ Scar
   - ~ Dislocation
5. Visible peristalsis
6. Impulse on coughing
7. Position of penis

Palpation

Temperature & tenderness:

- With the patient in standing position, feel with the back of the fingers for temperature, 1st on the normal side to note the normal skin temperature & then the swelling.
- Then press over the swelling gently for tenderness before proceeding further with palpation.

Get above the swelling:

- Palpate the cord structures between thumb in front & other fingers behind the root of the scrotum. If it is not possible to reach the top of the swelling in the scrotum, it indicates that it is an inguino-scrotal swelling.
- Palpate the pubic tubercle and confirm that the swelling is medial to it & above the inguinal ligament.
  ****** A femoral hernia as seen in the female patient is lateral to the pubic tubercle & below the inguinal ligament.

Incorporation of testis:

- Palpate the testis & check whether the swelling stops above the testis or incorporates the testis in it.
  - An acquired hernia will always stop above the testis.
  - A congenital type of hernia will include the testis within its sac; and the testis within its sac; and the testis may also get reduced into the abdomen along with the intestines when the hernia is reduced.
  - If the testis is absent and the scrotum is empty, then it is a case of undescended testis with hernia.

Consistency:

Now feel the consistency of the swelling.

Types of consistency:

1)Soft & elastic = Enterocele

2) Firm & Doughy = Omentocele

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3) Tense & tender = Strangulated hernia

4) Bag of worms = Varicocele

(Bag of worms: The dilated, tortuous veins seen in the cord above the testis; look & feel like elongated round worms)

Cough impulse:

- Ask the patient to turn his head to the opposite side & cough forcefully. Keep your hands over the swelling & feel for an expansile impulse on coughing i.e. the swelling increases in size & feels more tense during the act of coughing.
- If the swelling is not visible, keep your hand over the medial half of the inguinal canal, from superficial to deep inguinal ring & ask the patient to cough.

  *** In a small hernia, only a cough impulse is felt over the medial half of the inguinal ligament.
- To differentiate the impulse of direct, indirect or femoral hernias **Zieman's Technique** of palpation is applied.
  Procedure: Stand on the side of the hernia, reduce the hernia and place 3 fingers:
  - Index finger over the deep ring
  - Middle finger over the superficial ring
  - & Ring finger over the femoral ring

  (Femoral ring is situated 4cm below & lateral to the pubic tubercle)
  Now ask the patient to close the nose & mouth and blow. An impulse is felt –
  - By the index finger in Indirect hernia
  - By the middle finger in Direct hernia &
  - By the ring finger in Femoral hernia

Reducibility:

Ask the patient to lie down.

- A direct hernia will usually reduce by itself on lying down.
- An indirect hernia needs to be manually reduced.
- Congenital hydrocele may not get reduced manually but it reduces gradually over several hours during sleep.

- To reduce the swelling, lift the scrotum in the left hand & apply even pressure with the right hand starting at the apex of the swelling & squeezing it to the superficial inguinal ring.
- If the contents are difficult to reduce, ask the patient to flex the thigh, adduct it & rotate it internally to relax the pillars of superficial inguinal ring & the obliques.
- Now, observe how the hernia reduces.
  - ✓ Enterocele: reduces with difficulty in the initial part and the last portion slips in with a gargling sound.
  - ✓ Omentocele: first part reduces with ease; but the last part reduces with difficulty due to omental adhesion in the sac.
    (If the hernia can be reduced only partly, then probably it is an omentocele with adhesions in the sac preventing the contents from returning to the abdomen)
- If the hernia can't be reduced at all, then look for signs of obstruction & strangulation.
  - ✓ Skin over the strangulated hernia is tense & shiny & it is tender. It contains gangrenous loops of bowel.
  - ✓ In an obstructed hernia, note the distended coils of intestines in the abdomen featuring a step-ladder pattern.

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#Deep ring occlusion test:

After the swelling get reduced, perform the deep ring occlusion test.

Procedure:

- Reduce the hernia. Place the thumb 1.25 cm above the mid-inguinal point to occlude the deep inguinal ring completely.
  (Mid- inguinal point: is the mid-point between the anterior superior iliac spine & the symphysis pubis.)
- After occluding deep inguinal ring, ask the patient to cough. If the hernia is indirect, hernia will not bulge out on occluding the deep inguinal ring. This is the positive occlusion test.
- But in case of direct hernia, it will bulge out medial to the deep inguinal ring / occluding finger after coughing. This is negative deep ring occlusion test.
  This is because the direct hernia does not come out through the deep ring but medial to it.

Invagination test:

- After reducing the hernia, with the patient in recumbent position, invaginate the scrotal skin over the index finger starting near the bottom of the scrotum.
- Identify the pubic tubercle. Assess the size of the superficial inguinal ring. Normally it just admits only one finger. It is dilated if the hernia is coming out of it.
- Now, advance the finger through the superficial inguinal ring into the inguinal canal.
  - ✓ In an indirect inguinal hernia, it goes along the inguinal canal i.e. upwards, backwards & outwards.
  - ✓ In a direct inguinal hernia, the finger will go directly backwards through the defects in the posterior wall of the inguinal canal.
- Then try to palpate the superior ramus of os pubis which is felt there in direct hernia; while it is difficult to feel in indirect hernia where the transversalis fascia is intact.
- Now keep the finger along the length of the inguinal canal & ask the patient to cough. In an indirect hernia, the tip of the finger facing the inguinal canal feels the expansile impulse while in a direct hernia, the expansile impulse is felt by the pulp of the fingers which is facing the posterior wall.
- As the patient coughs, inguinal canal is felt to close around the finger. Judge the sphincteric strength of the conjoint tendon from the force of the contracting muscles around the fingers.

  **** Thus "Invagination Test" gives us a lot of information:
  i) Size of the superficial inguinal ring.
  ii) Direction of the hernia tract
  iii) Direction of the expansile impulse
  iv) Sphincteric strength of the conjoint tendon

  **** Contraindication of invagination test:
  i) If the superficial inguinal ring is small (in this case, use the little finger or just abandon the test)
  ii) In a child

  .

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Revision of palpation

1) Temperature & tenderness
2) Reach the top of the swelling to identify whether it is inguino-scrotal or scrotal swelling
3) Relation to the pubic tubercle
4) Relation to testis
5) Note the consistency
6) Test reducibility
7) Test for cough impulse
8) Perform deep ring occlusion test
9) Perform invagination test

Percussion

- Ask the patient to cough to distend the swelling, then percuss gently. A resonant note indicates presence of intestine i.e. Enterocele.
- All other swellings give a dull note.

Auscultation

- Peristalsis is heard over the enterocele.
- Otherwise, auscultation is of no diagnostic value in the examination of inguino-scrotal swellings.

Examination of the opposite side

- Having completed the examination of a hernia, palpate the testis, epididymis & spermatic cord of the opposite side to confirm that they are normal.
- Ask the patient to cough and inspect & palpate very carefully over an expansile impulse over the opposite inguinal canal & superficial inguinal ring.

Look for a possible cause of the hernia

1) Tone of the abdominal wall muscles
2) Examine the abdomen for scars & ascites
3) Examine the urethra for stricture
4) Do a per-rectal examination for enlarged prostate
5) Examine the respiratory system for evidence of chronic bronchitis or TB with chronic cough as the straining factor.

- In standing position, observe the lower abdomen. If the muscle tone is poor, there is undue protrusion of the lower abdomen.
- Then in lying down position, ask the patient to raise his neck & shoulders. If the muscle tone is poor, you will see longitudinal bulging over the lateral parts of both inguinal

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ligaments & iliac crests. They are termed as Malgaigne's Bulging - they indicate poor tone of the oblique muscles.

- In a person with good abdominal muscle tone, the abdominal wall is flat & retracted over the flanks.
- Next, examine the abdomen.
  - ✓ A scar of appendicectomy or ureterolithotomy may suggest injury to the ilio-hypogastric nerve as the cause for weakness in the conjoint tendon.
  - ✓ Also look for evidence of free fluid in the abdomen.
- Now, wear gloves & inspect urethral meatus for narrowing & palpate along the length of the urethra for a stricture – as a straining factor.
- In an elderly patient, do a per-rectal examination for enlarged prostate which is the commonest cause for direct inguinal hernias in the elderly.
- Lastly, examine the respiratory system in details for chronic bronchitis or TB.

Examination of an Abdominal lump

Inspection

For inspection, let the patient lie down supine, relaxed with the legs semi-flexed. Expose the abdomen from the level of the nipples to the groins

- 1st note the contour of the abdomen.
  ~ Scaphoid
  ~ Normal
  ~ Distended
  - To inspect the contour, imagine a line from the tip of the xiphoid process to the pubic symphysis.
    - ✓ If the abdomen is concave & lies below this line, it is termed as scaphoid.
    - ✓ If it is more or less along this plane, it is flat or normal.
    - ✓ And if it is above this plane & convex, it is termed as distended/protuberant.
- If the abdomen is distended, note whether the distension is uniform or is it more in one area or one side.
  For this, compare the symmetrical areas on both sides of the midline for fullness.
- Inspect the lateral borders of the flank, to inspect whether it is distended or concave.

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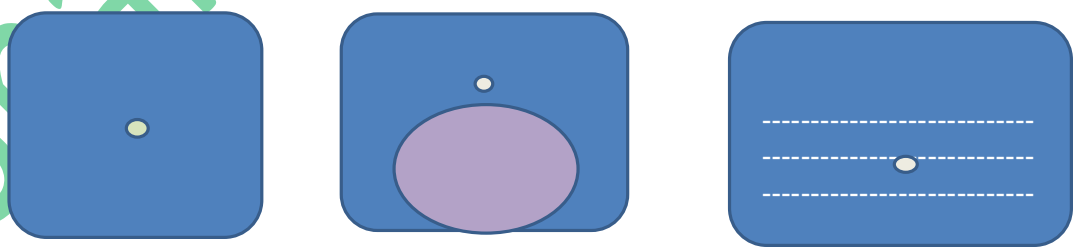
- Later, in sitting position, we will inspect the renal angles for fullness. (Renal angle fullness is found in renal lump)
- Note the skin over the abdomen for:
  - Redness
  - Scars
  - Striae
  - Branding marks
  - Nodules
  - Distended/ dilated veins

✓ Redness over a lump suggests inflammation.
Redness of the skin over umbilicus in an acute abdomen suggests acute haemorrhagic pancreatitis termed as the Cullen's sign.
✓ Branding marks usually suggests chronic or long standing pain.
✓ Hard subcutaneous nodules as seen in carcinoma of stomach indicates secondary spread of malignancy to the skin.
✓ Dilated veins around the umbilicus with centrifugal flow suggests portal hypertension with Caput medusa while vertical, femoro-axillary veins are seen in venacaval obstruction.
✓ If there is scar of previous operation, ask the details about the nature of previous operation. The scar itself will tell us many things. (Various types of operations indicated for various diseases)
✓ Now note the widening of the scar in the central part. A ragged, wide scar suggests wound infection after the previous operation.

- Note the umbilicus:
  ~ Is it in the center?
  ~ Is it stretched/everted?
  ~ Is there a hernia?
  - Normally it is in the midline, midway between the tip of the xiphoid process & top of the symphysis pubis.
  - It is displaced upwards by the lumps arising from the pelvis.
  - In ascites, reverse is the case. The distance between the xiphoid process & umbilicus is more than the distance between the umbilicus & symphysis pubis. This is Tanyol's Sign.



Normal Lump in the lower abdomen Ascitis

- Then note the shape of the umbilicus.
  - In ascites, it is transversely stretched, or a laughing umbilicus
  - Or, everted as an umbilical hernia.

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- Then ask the patient to cough & look for an expansile impulse indicating an umbilical or paraumbilical hernia.

➢ Look for movements:
~ Movements during respiration
~ Visible peristalsis
~ Visible pulsation

Movements during respiration:
- Now inspect the abdomen tangentially from the side & from the leg end for the movements of the abdomen.
- Note the abdominal wall movement during respiration & compare it with the chest expansion.
- If thoracic movements are more prominent, it is thoraco-abdominal breathing, more common in males.
- If abdominal movements are more prominent, it is termed as abdomino- thoracic type of breathing, more common in females.
- In peritonitis, the abdomen doesn't move during respiration, only the chest expands. In localized peritonitis, only the localized portion of the abdomen may be immobile.
- If there is a visible lump, particularly if it in the upper abdomen, observe carefully whether it moves up & down with each respiration.
  - ✓ The lumps connected to the diaphragm i.e. from the liver, gall bladder & stomach – move very well with respiration.
  - ✓ Renal lumps move slightly.
  - ✓ Retroperitoneal lump & intra-abdominal lumps not connected to the diaphragm do not move with respiration.

Visible peristalsis:
Now look for visible peristalsis.
- In pyloric stenosis, peristaltic wave in the epigastrium moving from left to right.
- Visible peristalsis in the distended coils of small intestine is found in intestinal obstruction.
- Step-ladder pattern of peristalsis, showing multiple distended loops arising towards the center – typical in low ileal obstruction.

Visible pulsation:
Lastly look for visible pulsations.
- Aneurysm of abdominal aorta is pulsatile.
- If a lump is in the epigastrium or umbilical region that is overlying the abdominal aorta , it may show transmitted pulsation from the abdominal aorta. The lump itself is not pulsatile. This pulsation is disappeared in "knee- elbow" position when the lump falls away from the aorta.
  (You should also keep in mind that in a very thin patient, even the pulsations of the abdominal aorta may be visible)

➢ Having completed the inspection of the abdomen proper, ask the patient to stand & inspect the scrotum for a testicular swelling.
➢ Then inspect the hernia orifice. Ask the patient to cough & look for a cough impulse.
➢ If the lump is arising from the pelvis or is very large; inspect the legs for edema.
➢ Then ask the patient to sit & standing behind the patient, inspect the spine for any deformity, gibbus, kyphosis or scoliosis.

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- Inspect the paraspinal area for any paraspinal swelling or sinus, paraspinal sinus or scar very suggestive of TB or spine.
- Then inspect the renal angles for fullness. It is found full in renal lump.
- Lastly, inspect the left supra-clavicular region for swelling due to enlarged lymph nodes.
  **** Left supra-clavicular lymph nodes can be enlarged due to secondary deposits from the malignancy of stomach, colon or testis, termed as Troisier's sign.
  And the enlarged supra-clavicular lymph nodes are termed as the Virchow's nodes.
  **** Remember, to inspect the 4 sites out of the abdomen:
    1) Scrotum
    2) Hernial orifices
    3) Spine
    4) Left supra-clavicular lymph nodes

Revision of Inspection

I. Note the contour: scaphoid /normal / distended
II. If there is a localized bulge: Note the effect of raising the neck- does it become more prominent or less?
III. Inspection of skin over the abdomen: for
~ Redness
~ Scars
~ Striae
~ Branding marks
~ Nodules
~ Distended veins
IV. Note the umbilicus:
~ Position
~ Stretched/ everted?
~ Is there a hernia?
V. Look for movements:
~ Movements during respiration
~ Visible peristalsis
~ Visible pulsation
VI. Inspect the sites:
~ Scrotum
~ Hernial orifices
~ Spine
~ Left supra-clavicular lymph nodes

Palpation

1. Superficial palpation
2. Deep palpation

Superficial Palpation

For palpation, patient should lie comfortably & relaxed on examination couch, with a pillow under the head & legs semi-flexed, preferably with a pillow under the knees to relax the abdominal wall muscles.

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- Ask the patient to take deep breath through open mouth. If your hands are cold specially in cold weather or after washing hands with cold water, warm them by rubbing against each other before commencing palpation.
- 1st note the temperature over the sight of abdominal lump, compare it with normal & note whether there is local rise of temperature suggestive of acute inflammation in the lump.
- Then palpate gently with a flat hand all over the abdomen to feel the tone of abdominal wall muscles & tenderness.(Normally, the abdomen feels soft & elastic & is non-tender)
- If there is tenderness i.e. pain on palpation, demarcate the exact area or point of tenderness. Example: pain over the McBurney's point is suggestive of acute appendicitis.
- Then note the presence of guarding & rigidity.
    - As you press over the abdomen, all muscles contract, the wall becomes firm & non-elastic; the reflex phenomenon is termed as Guarding.
    - If the muscles are in the state of sustained contraction, even when you are not palpating, it is termed as Rigidity.
      (Note board-like rigidity all over the abdomen in the patient of acute peritonitis)

**** Rigidity – Autonomous action
**** Guarding – Reflex phenomenon

- If guarding is detected, keep the hand over the site with gentle pressure & divert the patient's attention to some conversation. Observe whether the guarding disappears.
  ***** Voluntary guarding, which is due to patient's oversensitivity or fear will disappear if you successfully divert the patient's attention away from the act of palpation.
- If there is mild localized tenderness, look for Rebound tenderness.
  Procedure: Palpate the tender area with a flat hand & slowly press down the hand pressing deeper with each expiration. Now withdraw the hands suddenly. If the patient gets acute pain on sudden withdrawal of the hand, it is termed as rebound tenderness. It indicates inflammation of parietal peritoneum to underlying inflamed organ.
  (In presence of intestinal obstruction, rebound tenderness indicates strangulation)

Revision panel of Superficial palpation:

1) Temperature
2) Tenderness (Area of tenderness)
3) Tone of muscle
4) Guarding & rigidity
5) Rebound tenderness

Deep palpation

This includes: 1) detail examination of the lump first.
2) palpation of the rest of the abdomen.

Palpation of the lump

Before proceeding to the detail palpation of the lump first you must determine whether the lump is intra or extra-abdominal.

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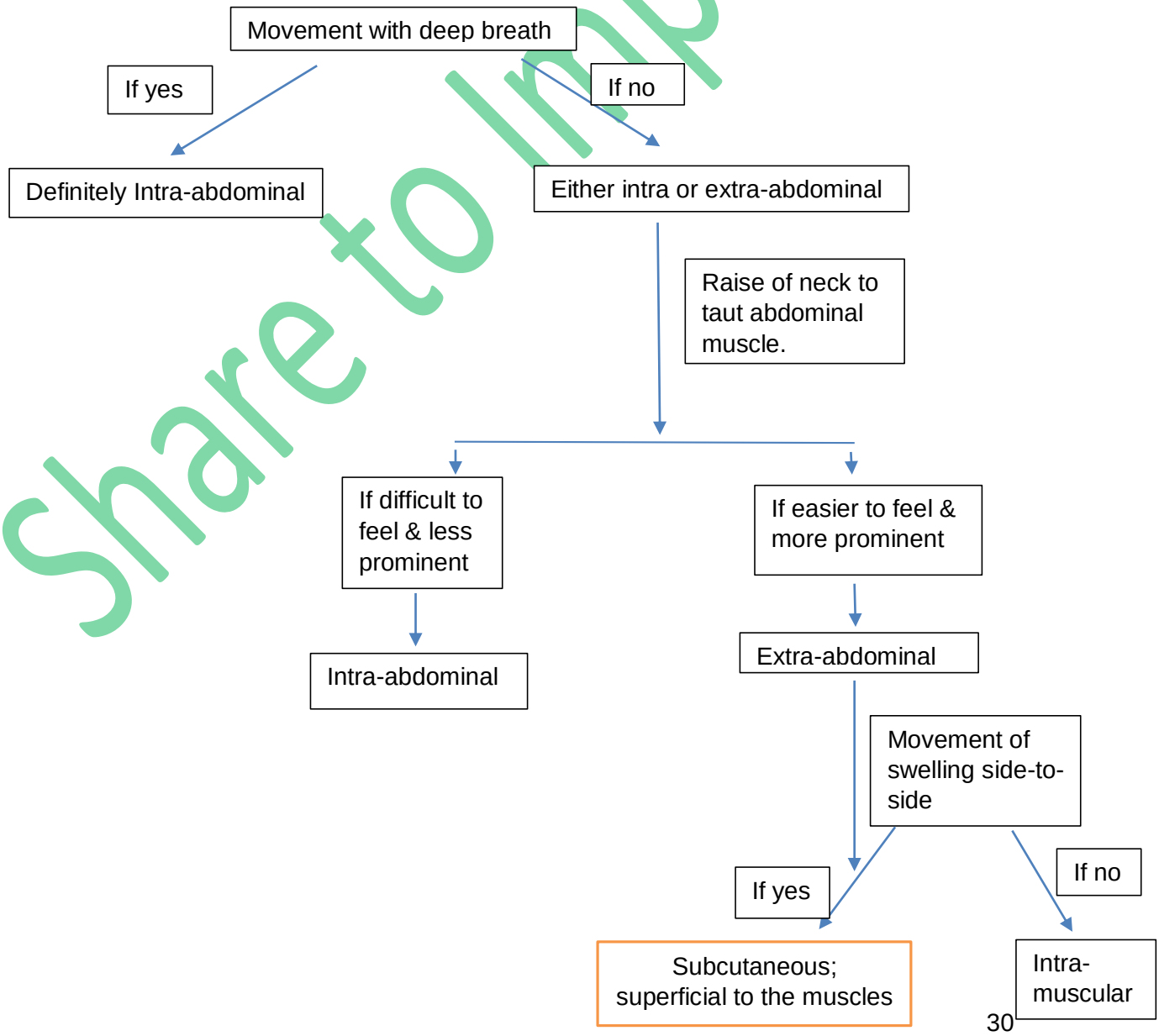
- For this, 1st feel the swelling. Keep your hand on the lower border of the swelling ask the patient to take deep breath.
  - If the swelling moves with respiration, it is definitely intra-abdominal.
  - If it does not move, it may be either parietal or intra-abdominal.
- If on raising the neck, the swelling becomes difficult to feel & less prominent, then it is intra-abdominal.
- If it becomes more prominent & easier to palpate, check whether it can move side-to-side.
  - If it is mobile, then it is sub-cutaneous, superficial to the muscle.
  - But if it becomes fixed on contracting the wall muscles, then it is within the muscles or intra-muscular.
- If the lump is situated laterally, the muscles are made taut either by asking the patient to raise the legs to 30 degrees without bending the knees or Valsalva maneuver. (Valsalva maneuver = Effortful expiration with nose kept closed)

Checklist for either Intra or extra-abdominal lump:



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Detailed palpation of the lump:

- 1st identify the borders of the lump.
- Measure its size in centimeters with a measuring tape.
- Now note its location in relation to the quadrant involved & in relation to the-
  - Costal margin
  - Umbilicus
  - Anterior superior iliac spine
  - Symphysis pubis
- Then note its shape, surface & margin.
  - A well-defined margin suggests neoplasm
  - An ill-defined margin suggests inflammatory swelling
- Then note the consistency of the swelling.
  - ✓ Whether it is-
  - Soft
  - Cystic
  - Firm
  - Hard
  - ✓ It is either uniform or variable
    (The consistency may be uniform throughout the swelling or it may be variable i.e. different in different parts of the swelling.)
- If the swelling is cystic, test for fluctuation & fluid thrill.
- If the swelling is in the lumbar region, palpate bimanually to feel the exact size & consistency by feeling it in between two hands.
- If the swelling is in the right or left hypochondrium, check whether it extends under the costal margin & whether the fingers can be insinuated between it & costal margin.
- If the swelling is in the upper half of the abdomen, check the movement with respiration. (already mentioned)
  Then hold the swelling between the fingers of both hands & try to move it vertically & horizontally. If it is mobile, look for restriction of movement in any direction.
  1) For example, a mesenteric cyst is freely mobile at right angles to the attachment of mesentery but less mobile in the line of attachment of mesentery.
  2) While an ovarian cyst is mobile in all directions – vertical as well as horizontal.
- If the swelling is in the flanks, palpate it bimanually & test for antero-posterior mobility & ballotability.
  Keep the right hand over the anterior abdominal wall in the lumbar region & place the left hand in the loin with the tips of fingers reaching the renal angle. Now, palpate with both hands simultaneously & try to move the swelling antero-posteriorly. If it is mobile & not touching the anterior abdominal wall, test for **ballotability**.
  Procedure: Keep the anterior hand very gently over the lumbar region & give a sudden, forward push to the swelling with the posterior hand. If the mass touches the anterior hand and falls back, it is termed as ballotable.(Only renal lumps are ballotable)
- Lastly, test whether the lump is pulsatile.
  - If the lump is pulsatile, place two fingers over 2 sites of the swelling as far apart as possible & note the pulsation.
  - If fingers move up & away from each other i.e. this is an expansile pulsation, diagnostic of aneurysm of abdominal aorta.

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- While if the fingers move only upwards, it is the transmitted pulsation due to the swelling, lying over the aorta.
- If any doubt, place the patient in knee-elbow position & then feel for the pulsation.

✓ Transmitted pulsation will disappear as the swelling fall away from the aorta.
✓ But an aneurysm will continue to pulsate.

Palpation of rest of the abdomen

1) Palpate for liver, spleen & kidneys

2) Note their relation to the lump.

- To palpate for the liver, start palpating in the right iliac fossa, along the midclavicular line with the fingers parallel to the liver's inferior border exerting moderate pressure during expiration.
  Wait to feel lower border as it descends during deep inspiration. If it is not felt, move the hand by 1cm & palpate again till you reach & feel liver border or you reach right costal margin & liver is not palpable. If liver is palpable, note its size, border, surface, consistency & tenderness.
- Then palpate for the spleen from the right iliac fossa towards the left costal margin with fingers parallel to the left costal margin. If spleen is palpable, note its size in centimeter from the left costal margin, then palpate the anterior border for splenic notch & note that the finger can't be insinuated under the costal margin.
- If spleen is not palpable, then turn the patient to his right side, place your left hand firmly over the left lower chest, dip the right hand under the left costal margin & ask the patient to take a deep breath. A just palpable spleen hiding under the costal margin will be felt by this method.
- Then palpate bi-manually in both lumbar regions for renal lump. If the abdomen is very thin, lower pole of the right kidney may be normally palpable.
- Palpate the rest of the abdomen for any abnormality
  **** Palpate for tenderness over –
  - Colon (In the flanks)
  - Lower intercostal spaces (lower chest on both sides)
  - Renal angles
- Then, palpate the scrotum, looking for testicular tumor. Test for presence of testicular sensation.
- Make the patient stand & palpate over hernial orifices & ask the patient to cough , feeling for a cough impulse & hernial swelling.
- If the lump is arising from the pelvis or from retroperitoneal space or is so large as to compress inferior vena cava, then examine the legs for edema, due to compression of the veins or obstruction to lymphatics.
- Then examine the back. Palpate the spine for deformity & tenderness. Look for renal angle tenderness.
- Lastly, palpate supra-clavicular fossa from behind particularly on the left side for Virchow's lymph nodes.

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Revision of deep palpation

1) Palpation of the lump:
   a) Intra/Extra-abdominal
   b) Size, shape, consistency & exact location of the lump.
   c) If it is in lumbar region, bimanual palpation & ballotment
   d) Mobility
   e) Pulsatility
2) Palpation of the rest of the abdomen:
   a) Palpate for liver, spleen & kidneys
   b) Note their relation to the lump
   c) Palpate for tenderness over:
      ~ Colon
      ~ Lower intercostal space
      ~ Renal angles
   d) Palpate:
      ~ Scrotum
      ~ Hernial orifices
      ~ Back spine, paraspinal area
      ~ Left supra-clavicular nodes

Percussion

- 1st percuss over the lumps.
  - ✓ Solid swelling will give a **dull** note on percussion.
  - ✓ But if the swelling is retro-peritoneal or deeply located, coils of intestine may be overlie the swelling and a **resonant** note is obtained as in case of a renal lump.
- If the swelling is in the upper abdomen, note whether the dullness over the lump is continuous with the liver dullness & splenic dullness.
  - ✓ Percuss over the upper border of the liver, then the lower border & note the liver span. Confirm the mobility of the diaphragm by tidal percussion.
  - ✓ Then percuss for spleen in the left 9th intercostal space from the posterior axillary line forwards. If the spleen is enlarged, the dullness will extend beyond the mid-axillary line.
- If the renal lump is suspected, percuss posteriorly in the loin, just lateral to the erector spinae. Normally, this area is resonant due to the presence of the colon. If the kidney is enlarged, the note will become dull. But in other lumps like spleen, it remains resonant.
- Then, percuss from the umbilicus to the flanks for detecting ascetic fluid. If there is dullness in the flanks, try to demonstrate shifting dullness. Keep the finger just lateral to the border of dullness & roll the patient over to the opposite side. Wait for 20 seconds and percuss again. If the note becomes resonant , then presence of free fluid in the abdomen is confirmed. Then turn the patient supine again & demonstrate that the note is dull once again.
- If the dullness extends to both flanks & supra-pubic region , it is termed as **Horse-shoe shaped dullness**.
- If there is large ascites or a large cystic lump, percuss for **Fluid thrill**.

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Procedure: Ask an assistant to press the ulnar border of his hand vertically over the center of the swelling. Keep your left hand gently over one side of the swelling & tap the opposite side with the right hand. If the swelling contains fluid under tension, the palpating hand will feel a thrust after a small delay or time gap following the tap.

- If the swelling is suspected to be a hydatid cyst, try to elicit "Hydatid Thrill" or "After Thrill".

  Procedure: Place 3 fingers of left hand spread out over the swelling & percuss gently over the middle one. A peculiar sensation or after thrill will be felt by the lateral fingers due to displaced daughter cyst hitting the wall of the swelling.

Auscultation

Auscultate carefully over the abdomen for abdominal sounds & peristalsis.

- If the lump is pulsatile, auscultate over it first for a bruit.
- Auscultate over the abdominal aorta & then over renal arteries for a bruit.
- If the liver or spleen is enlarged, auscultate over them for a hepatic rub or splenic rub during deep inspiration.
- Auscultate over the periumbilical area & right iliac fossa for peristalsis. (Tingling sound will indicate intestinal obstruction)
- Lastly, always try to perform the per-rectal examination & in female patient, a per-vaginal examination.

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Examination of Breast Lump

Inspection

Strip the chest upto waist to expose the both breasts completely.

A. Comparative inspection of both breasts

B. Inspection of affected breast

With the patient sitting on a tool, make a comparative inspection both of the breasts.

I. Sitting erect, with both arms by the side.
II. Sitting erect, with both arms above the head.
III. With the patient bending forward.

A. With the patient erect, comparative inspection:
1) visible lump or bulge
2) Compare the level of both the nipples

- If a lump or diffuse bulge is visible, note the quadrant in which it is situated.
- Now compare the level of both the nipples
  **** The nipple is at a higher level, if it is fixed by a malignant lump. (It will be more pronounced when the arms are raised above the head.)
- If the breasts are symmetrical, measure the vertical distance of the nipple from the clavicle and the horizontal distance from the midline – to note the exact displacement of the nipple (of course due consideration should be given to the normal asymmetry & pendulousness of the breasts)
- Now ask the patient to raise her hands above the head. This is Auchincloss's Method of examination of breast.
  (The visible signs of carcinoma of breast become more prominent on raising the arms)
- Note skin puckering of the malignant breast lump. On raising the arms the puckering has become more pronounced.
- Now observe the nipples. On raising the arms, the nipple of the affected side raises more as the malignant lump is fixed to the pectoral fascia & gets pulled up with it.
- Also in Arm-raised position, inspect the undersurface of the breast & inspect both axillae for axillary swelling due to enlarged lymph node & axillary breasts.
  (Axillary breasts become enlarged & painful during lactation)
- Then ask the patient to bend forward so that the breasts fall away from the body.
  If the affected breasts lag behind, it indicates fixity to the pectoral fascia and chest wall.

B. Inspection of the affected breasts in detail:

- 1st inspect the nipple & areola.

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Nipple displacement:
I) Towards the lump: Malignant breast lump
II) Away from the lump: Benign lump (fibroadenoma)

- A mere change in the direction of the nipple in early carcinoma is deviation of the nipple.
- If the nipple of the affected breast is retracted, ask whether it has retracted recently or is it retracted since childhood i.e. congenital retraction

**** Recent retraction is extremely significant & strongly suggest malignancy, though it may also be seen in chronic breast abscess with fibrosis. It is usually associated with retraction & diminished size of the areola.*

**** A patient with congenital retraction of nipple during her lactation period may present with a breast abscess because the retracted nipple interferes with breast feeding & causes milk retension*.

- If there is nipple discharge, note its colour. Always inspect the patient's under garments for the colour & amount of discharge.

Nipple discharge:
1) Bright red discharge (fresh blood):
    a) Carcinoma
    b) Duct papilloma
2) Blackish red discharge:
    Duct papilloma with obstructed duct.
3) Clear watery or greenish discharge:
    Fibroadenosis
4) Milky white discharge:
    a) Lactation
    b) Galactocele
    c) Mammary duct ectasia
    d) Galactorrhoea
5) Purulent discharge:
    a) Acute mastitis
    b) Chronis abscess with duct ectasia

Inspection of the nipple & areola:
~ Cracks
~ Fissures
~ Eczema

- If the areola of one side is bright red eczematous or is destroyed with a ulcer, it may be a case of Paget's disease.

Inspection of nipple & areola:
I) Unilateral eczema & destruction= Paget's disease
II) Bilateral eczema & itching= Allergic Eczema

Inspection of overlying skin of breast:
1) Redness, shininess, edema - signs of inflammation
2) Dilated veins
3) Dimpling, retraction & puckering
4) Peau d'orange appearance
5) Ulcers & nodules

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- Red, shiny & edematous skin is found over acute mastitis/breast abscess.
- Dilated veins over the breast lump is suggestive of sarcoma rather than carcinoma.
- Peau D' orange/ Orange peel appearance: This is due to cutaneous lymphedema with pitting at sites of hair follicles where the skin is firmly attached. It is seen best by squeezing the skin gently. The malignant cells block superficial lymphatics of the skin producing edema of the skin. The skin swells up except at the hair follicles which look like deep pits as seen on orange skin.
- Puckering of skin is seen in carcinoma. The skin is pulled to the malignant ulcer & shows Folds & puckering.
- Fungating carcinoma – raised & everted edge typical of malignancy.
- In advanced carcinoma of breast, multiple skin nodules surrounding the malignant breast ulcer is found.
- Lastly, inspect the arm for edema. This edema is due to lymphatic obstruction in the axilla due to malignant infiltration of axillary lymph nodes.

Revision of inspection

1) Comparative simultaneous inspection of both breasts:
   - ~ For asymmetry & lump
   - ~ For levels of both nipples
2) Inspection of nipple:
   - ~ For deviation, displacement
   - ~ Retraction, Cracks
   - ~ Nipple discharge
3) Inspection of areola:
   - ~ For cracks
   - ~ For fissures
   - ~ For eczema
4) Inspection of skin over the breast:
   - ~ Redness
   - ~ Shininess
   - ~ Edema
   - ~ Peau D' orange appearance
   - ~ Skin nodules
   - ~ Ulcers
   - ~ Dilated veins
   - ~ Retraction
   - ~ Puckering
5) Inspection of the arm for lymphedema

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Palpation

Let the patient lie supine on examination table for palpation of the breast.

- First note the skin temperature over the lump comparing it with the normal breast.
- Then note the consistency of the normal breast tissue on the normal side before palpating the affected breast i.e. palpate the normal breast first & then the affected breast.
    - First palpate with flat hand, rolling & feeling the breast tissue between the palmer surface of the finger & underlying chest wall to identify any breast lump.
    - And then palpate between the fingers & the thumb to note the consistency of the breast tissue.
- Palpate in turns the 4 quadrants of the breast & then tissue beneath the areola (5th quadrant : peri-areolar quadrant) & then the axillary tail.
- Once the lump is identified with flat hand, palpate it between the fingers & thumb to note its characteristics.

  Palpation of the lump:
  1) Size of the lump (in centimeter)
  2) Shape of the lump
  3) surface: Smooth/Irregular
  4) Edge: Well-defined/ill-defined
  5) Consistency: Soft/ Firm/ Hard/ Cystic/ Variable
- Now, press from the periphery towards the nipple in a squeezing action in each of the quadrants & look for nipple discharge.
- If this fails to bring a nipple discharge, compress the breast tissue under the nipple & areola between the thumb & other fingers.
    - Black nipple discharge due to altered blood in a case of duct papilloma.
    - Milky discharge is observed during lactation.
    - In a newborn child, milky discharge may be expressed for the first few days due to the effect of maternal hormones on the child. It is termed as Witch's milk.
- If the swelling is soft & cystic as in galactocele, chronic abscess or cystic hygroma, then test for fluctuation & trans-illumination.
- On aspiration,
    - ✓ chronic breast abscess reveals pus.
    - ✓ Galactocele reveals milk-like fluid
- Trans-illumination should be carried out in a dark room with a powerful torch. Place the torch on the under surface of the breast.
    - Normal breast tissue is translucent.
    - Cystic Hygroma may be trans-illuminant.
    - But most other breast swellings are opaque & cast a negative shadow.

- ***Test the fixity of the lump***:
    ~ To the overlying skin
    ~ To the breast tissue
    ~ To the pectoral fascia & muscle
    ~ To the chest wall

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Fixity to the skin:

- If the skin is puckered or is ulcerated or infiltrated, then the lump is obviously fixed to the skin.
- If not, then slide the skin over the lump & test its mobility. Also try to pinch the skin over the swelling. If the skin is infiltrated, it can't be pinched.
- If the skin is not fixed to the lump, move the lump from side to side & see whether the skin gets dimpled/ the lump is tethered to the skin.
  (As in this case, skin is not directly infiltrated, the overlying skin can be pinched; but on moving the lump, the skin gets dimpled or pulled-in as the Cooper's ligaments are infiltrated and the skin mobility is restricted.)
  The method of demonstration of tethering by squeezing the skin where the normal skin moves in towards the fixed skin & wrinkles is termed as Plato sign.

Fixity to the breast tissue:

- Stretch & fix the breast tissue over the lump with stretched thumb & middle finger of the left hand. Now try to move the lump in all directions with the right hand.
  - In case of fibroadenoma, it is freely mobile even when the breast tissue is fixed by the left hand. So, this lump is not fixed to the breast tissue.
    (A fibroadenoma is often is so freely mobile within the breast tissue that it is termed as a Breast lump)
  - While a malignant breast lump, which is fixed to the breast tissue becomes immobile when the breast tissue is fixed by stretching.

Fixity to the pectoralis major & serratus anterior muscle:

- >>>>Ask the patient to fix her hand on her waist.
  - ✓ First test the mobility of the lump in the direction of the fibers of pectoralis major & at right angles to it while the muscle is relaxed.
- Now ask the patient to press firmly her hand over the hip. Palpate the anterior fold of axilla to confirm that pectoralis major is contracted & taut.
  - ✓ Move the lump again in same two directions. Note the reduction in mobility when the muscle is contracted.
    ****Any restriction in mobility on contraction of pectoralis major muscle suggests fixity of the lump to the pectoralis muscle & fascia.

>>>> If the lump is in outer & lower quadrant, it lies on the serratus anterior. So, fixity to the serratus anterior should be tested.

- Let the patient stand at an arm's length distance from a wall with the palms resting on the wall. Test the mobility of the lump in horizontal & vertical direction.
- Now ask the patient to push against the wall with outstretched hand. This contracts the serratus anterior muscle. Now test the mobility again. Any restriction of mobility indicates fixity of the lump to serratus anterior.
- Now inspect the scapula as the patient pushes against the wall. If there is winging of scapula on the affected side, it indicates paralysis of the serratus anterior due to involvement of the long thoracic nerve.

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Fixity to the chest wall:
If the tumor is fixed & immobile, even when the pectoralis major is relaxed, then it is fixed to the chest wall (it is fixed to the bone).
On moving the lump, the whole chest moves.

Revision of palpation

1) Temperature & tenderness
2) Size, shape, surface & edge of the swelling
3) Consistency
4) If cystic: Fluctuation & trans-illumination
5) Nipple discharge (on compressing the lump)
6) Fixity to the surrounding structures: to skin/ breast tissue/ pectoral fascia & muscle/ chest wall.

Examination of lymph nodes

- With the patient in sitting position, ask her to keep her arm hanging loosely by the side. First, palpate along the medial wall of the axilla i.e. along the chest wall for the Central group of lymph node.
- Then, move the hand higher-up for Apical group of lymph node. Keep the other hand on same/ opposite shoulder to steady the patient.
- Then, palpate the anterior axillary fold for the Pectoral group of lymph node.
- And palpate under the posterior axillary fold for the Sub-scapular group of lymph node.
- Now, with the other hand, palpate lateral wall of the axilla against upper end of humerus for Brachial group of lymph nodes.
- Then palpate below the clavicle in the delto-pectoral groove for Infra-clavicular group of lymph node.
- Now, stand behind the patient and palpate the base of the anterior triangle of the neck behind the middle of the clavicle. Lift up the patient's arm with other hand to relax the muscle & cervical fascia. This is Supra-clavicular group of lymph node.
- Next palpate the opposite axilla in the same manner.
  (If any one or more group of lymph nodes are palpable, note their site, number, consistency i.e. soft, firm or hard & whether they are freely mobile or fixed to the surrounding structures.)
- If the lymph nodes are enlarged, examine the arm, forearm & dorsum of the hand on the affected side for edema; compare it with the opposite arm.
  (Edema of the arm indicates lymphatic obstruction in the axilla or axillary vein thrombosis)

Systemic Examination

1) On systemic examination,
   - ✓ Palpate the abdomen for hepatomegaly. Hard nodular liver indicates secondary deposits in the liver.
   - ✓ Percuss for free fluid in the flanks.

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2) Per-rectal & per-vaginal examination (in female) for pelvic lumps in the Pouch of Douglus and the ovaries.
3) Examine the chest for pleural effusion & consolidation.
4) Lastly, examine the spine, ribs & long bones carefully for tenderness & bony swellings; specially when the patient complains of pain.

Examination of a Thyroid Swelling

The thyroid gland is located infront of the neck with its two lobes on either sides of the trachea connected by an isthmus.
We begin our examination of the thyroid swelling with inspection.

Inspection

For inspection, make the patient to seat on his/her tool with neck slightly hyperextended and inspect the thyroid from the front. Ask the patient to swallow to make the thyroid more prominent for inspection.

- If the patient has short & fat neck, ask the patient to clasp the hands over occiput & push the head backwards against the resistance of clasped hands. This is the Pizillo's Method to make the thyroid more prominent for inspection.

1. Size, shape, location, border:
    - 1st note the size & shape of swelling & its situation whether it is on one side of the midline, in the midline or whether it extends on both the sides.
    - Measure the exact size in centimeters using the measuring tape. Now note the extent of the swelling; particularly the lateral border in relation to the sternomastoid & lower border in relation to the supra-sternal notch of the sternum.
      A thyroid swelling always lies deep to the sternomastoid muscles(as demonstrated by contracting the sternomastoid muscle)
    - Then note whether the lower border ends above the suprasternal notch or it extends behind the supra-sternal notch.
      (Both the borders will be better appreciated if the patient is asked to make swallowing movements during the inspection)

2. Surface: smooth/ nodular/ Bosselated

    - A simple goiter and single nodule have a smooth surface.
    - While a multinodular goiter has a nodular or bosselated surface.

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3. Skin over the thyroid:
    I. Redness & edema: signs of inflammation
    II. Scars of previous surgery
    III. Sinuses
    IV. Dilated veins

- Scar mark of previous thyroid surgery is suggestive of recurrent thyroid swelling.
- Sinuses in the midline of the neck discharging mucus like fluid > Thyro-glossal fistula.
- Then watch the swelling for few seconds quietly for pulsatility (sign of thyrotoxicosis)
- Now ask the patient to swallow & look for an upward movement of the swelling.
  A thyroid swelling characteristically moves upward during deglutition as it is enclosed in the pre-tracheal fascia which is fixed to the thyroid cartilage. So, when the superior constrictor of larynx pull the thyroid cartilage up during deglutition, the thyroid also moves up & down.
  Of course, we should not forget the other swellings that also move on deglutition.
  Swelling that move up during deglutition:
    1) Thyroid
    2) Thyroglossal cyst
    3) Pre-tracheal lymph nodes
    4) Sub-hyoid bursa
    5) Extrinsic carcinoma of larynx
- A swelling which is not attached to the pre-tracheal fascia(e.g. lipoma) will not move upwards during deglutition.
- If the swelling is a nodule close to the midline you must also test for its upward movement on protrusion of the tongue.
  Procedure: Ask the patient to extend the neck & open the mouth wide. Now keeping the mouth open, let the patient move the tongue out & in. If upward movement of the swelling occurs during protrusion of the tongue, then this is diagnostic of a thyroglossal cyst; which is connected to the foramen caecum of the tongue.
- A thyroglossal fistula also moves upwards on protrusion of the tongue; as the fistula is connected to the foramen caecum & also it moves up with deglutition.

Revision of Inspection

1) Size & shape
2) Location
3) Borders (in relation to the sternomastoid & supra-sternal notch)
4) Surface: Smooth/ Nodular/ Bosselated
5) Skin: a) Redness & edema
   b) Scars & sinuses
   c) Dilated veins
6) Pulsation
7) Upward movement on-
   ~ Deglutition
   ~ Protrusion of the tongue

Share to Improve

Palpation

- Let the patient sit with neck extended & test the temperature of the swelling with the back of the fingers & look for tenderness.
- Then stand behind the patient, place the hand around neck with the thumbs over the occiputs & tips of other fingers over the front of the neck. This is the standard method for palpation of the thyroid gland. The flexion of the neck can be adjusted by the grip between the thumbs over the occiput & the index fingers under the chin.
- Now, keep the neck slightly flexed to relax the deep cervical fascia & ask the patient to make a swallowing movement as you are palpating. As the thyroid moves up & down, the lower border can be appreciated better & nodules if present can be felt more easily.
- Then palpate the anterior surface of the lobes; one at a time; inclining the head to the side being examined; to relax the overlying Sternomastoid muscle. For example, to examine the right lobe, flex the neck slightly to the right, support the thyroid firmly with the left hand & then palpate with the right hand.
- Note the consistency, surface & borders carefully. Palpate the tracheal rings in the supra-sternal notch i.e. below the lower border of isthmus. If they are not felt, a retrosternal extension should be suspected.
- Now, stand in front of the patient, extend the neck slightly & palpate by Lahey's Method for deep or postero-medial surface of the gland.
  Procedure: To palpate the left lobe, push the thyroid gland to the left by your left hand; so that the left lobe is pushed out of the trachea-esophageal groove & then with right hand, palpate the posterior surface for nodule. Then repeat the procedure on the right side.
- Next with the patient in the same position, keep a thumb over the lobe to be examined and ask the patient to swallow. Feel for small nodules on the surface as the gland moves up & down. This is Crile's Method of palpation for small nodules.

> # Lahey's Method: for palpation of deep surface of thyroid.
>
> # Crile's Method: for palpation of small nodules in the thyroid.

- During palpation, first you should determine whether the entire thyroid gland is enlarged or is it an affection of only one lobe/isthmus or is it a single nodule.
- If the entire gland or entire lobe is palpable, note its surface whether it is:

1) Surface: Smooth or bosselated
2) Consistency: Uniform (Soft/ Firm/ Hard) or variable
   - ✓ Colloid goiters are soft.
   - ✓ Multinodular goiters are firm.
   - ✓ Carcinoma thyroid & Riedel thyroiditis are hard.
3) Retrosternal extension
   - Palpate the lower border very carefully during deglutition to determine the presence of retrosternal extension. Palpation of tracheal rings above the supra-sternal notch rules out retro-sternal extension.

Shall to Improve

- If it is a single nodule, note its:
  1) Location: In lobe/ Isthmus
  2) Shape
  3) Size
  4) Consistency: Soft or firm

  **** Paradox about consistency of Thyroid should be noted & remembered here:
  A cyst in Thyroid feels firm, while a solid swelling (adenoma) feels soft. Because adenomas being highly cellular are soft, while cysts with fluid under tension feel firm as compared to the normally soft thyroid.

  5) Is the rest of the thyroid gland palpable?

  ****After palpating the nodule, try to palpate the rest of the thyroid gland. Normally it is not palpable.

  ****A normal Thyroid gland is not felt on palpation; only its isthmus can be felt over the 2^{nd}, 3^{rd} & 4^{th} tracheal rings.

  So, if along with a single nodule (like a nodule on the isthmus), the rest of the thyroid gland is palpable, clinically it is considered as multinodular goiter with a single large nodule.

  But if the rest of the gland is not palpable, then it is considered as a solitary nodule.
- Now keep your hand very gently over the upper pole of each side & try to feel for a palpable thrill. Thrill over the upper pole is diagnostic of a primary toxic goiter.
- Next, pinch the skin over the swelling to look for fixity to skin & test the mobility of the swelling in vertical & horizontal directions. Fixity in any direction suggests malignant infiltration or thyroiditis.
- Now palpate the trachea & carotid pulsations.
  - Trachea: ~ Deviation
    ~ Kocher's Test
  - Corotids: ~ Berry's sign

  To palpate the trachea, first note the position of the larynx & palpate the trachea downwards. Example:

  - In the unilateral left sided goitre, trachea can be felt along its length and its displacement to the opposite side can be easily appreciated.
  - In a bilateral goitre, the trachea may be difficult to feel. So note the position of the larynx & the position of the trachea over the supra-sternal notch to get an approximate idea of position of trachea.

  # Kocher's Test (For Scabbard Trachea):

  It is done to rule out tracheal narrowing.

  Procedure: Ask the patient to extend the neck & take heavy deep breaths with open mouth. Now compress the swelling from both sides. Appearance of stridor on slight compression of the lateral lobes indicates narrowing of the trachea. This is a positive Kocher's test. This is typically seen in the scabbard trachea of large & long standing multi-nodular goiters where trachea is compresses from both the sides & becomes an antero-posterior slit like the scabbard of a sword.

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So, lateral compression immediately produces obstruction & stridor. It may also be seen in a malignant thyroid, infiltrating the trachea.

- Now palpate the carotid artery pulsations against the transverse process of 6th cervical vertebrae between the posterior border of thyroid & sternomastoid.
  - In a unilateral goiter, 1st palpate the normal side for normal feel of carotid pulsation & then compare it with the affected side.
  - If the goiter is large, the carotid sheath will be pushed backwards but the pulsation will always be felt in spite of the backward displacement in a benign goiter.
  - But in a malignant goiter, the carotid pulsation may be felt weak or obliterated due to malignant infiltration of the carotid sheath. This is a positive Berry's sign i.e. obliteration of carotid pulsation in malignant thyroid.

Revision of palpation

Palpate by: 1) Standard method
2) Lahey's method
3) Crile's method

On palpation, note:

1) Size & shape
2) Borders
3) Retrosternal extension (If any)
4) Surface: Smooth/ nodular/ bosselated
5) Consistency
6) Palpate carefully by Lahey's method & Crile's method for small nodules within the gland.
7) In case of a single nodule, note whether the rest of the gland is palpable.
8) Palpable thrill (in the upper pole)
9) Fixity: to skin or deeper structure
10) Trachea: a) Deviation (from the mid line)
    b) Kocher's Test (If goiter is large or bilateral)
11) Carotids: Berry's sign

Percussion

Percuss directly over manubrium sternii or use a heavy percussion stroke.
Percussion on manubrium sternii:

- Normal= Resonant (due to air in the trachea behind manubrium sternii)
- Retrosternal goiter= Dull (Retrosternal extension of thyroid which descends between the trachea & the sternum and comes to lie between the manubrium sternii & the air column)

Share to Improve

Auscultation

Auscultate over the swelling, paying more attention to the upper poles for a systolic bruit.

***Bruit is diagnostic of primary toxic goiter and is due to markedly increased vascularity of the gland.

After examination of Thyroid, look for:

1) Signs of Thyrotoxicosis
2) Signs of Myxoedema
3) Signs of Retrosternal extension
4) Signs of Metastasis

Signs of Thyrotoxicosis

I. Eye signs
II. Tremors
III. Tachycardia
IV. Warm moist skin, Pretibial myxedema
V. Bruit, Thrill

I. Eye signs:

Ask the patient upright on a tool to look horizontally forward towards a distant object at eye level.

Normally, the lower lid just touches the limbus at 6 O'clock while the upper lid covers the upper margin of the cornea from 11 to 1 O'clock.

Looking for exophthalmos:

1) Lid retraction, lid lag & infrequent blinking- early signs of Thyrotoxicosis.
2) Actual bulge (examined by Naffziger's method) & sclera seen inferiorly.
3) Absence of wrinkling (Joffroy's sign) & inability to converge (Mobius's sign).

Lid retraction: The earliest eye sign to appear is the lid retraction with resultant widening of palpebral fissure also known as Dalrymple's sign.

The upper lid is retracted due to tonic contraction of the involuntary part of the Levator Palpabrae Superioris, thereby exposing a strip of white sclera above the superior limbus. This results in a typical starring & frightened look of a thyrotoxic patient.
This is associated with infrequent & incomplete/partial blinking of the eyes, termed as Stellwag's Sign.

Lid lag/ Von Graefe's sign: With the left hand, fix the patient's to prevent neck flexion or extension. Hold your right index finger in front of the patient's eye at a distance of 40 cms and asking the patient to follow the finger move it upwards & downwards.

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When the patient looks downwards, the upper behind & a larger portion of white sclera is exposed on looking down.

This is a positive Von Graefe's sign.

Actual bulging of eyeball: Exopthalmos

With further progress of thyrotoxicosis, there is actual bulging of the eyeballs due to retro-orbital edema & fat deposition. This is termed as Exopthalmos.

Ask the patient to look straight forward & a strip of white sclera is visible in the inferior limbus & lower eyelid.

This has nothing to do with the upper lid retraction & it is due to actual forward bulging of the eyeball i.e. exophthalmos.

- Now to note the amount or degree of exophthalmos, examine the eyes by Naffziger's Method.
  Procedure: Stand behind the patient, tilt the head of the patient backward to observe the eyes in supra-orbital plane. The actual protrusion of the eyeballs beyond the supra-orbital ridges can be appreciated in this position.
  Normally the eyes don't project beyond supra-orbital ridges.

Absence of wrinkling in the forehead:

Ask the patient to look upwards with head tilted slightly downwards. Look for the transverse wrinkles over the forehead which are seen in a normal individual in this position. Absence of wrinkling of forehead in thyrotoxicosis is called Joffroy's sign.

- If exophthalmos is limited to one eye, it has to be differentiated from proptosis due to an infraorbital mass. Ask the patient to look downwards & evert the upper eyelid. The eversion is difficult or impossible in exophthalmos due to thyrotoxicosis; while in a case of infraorbital mass, eversion is possible even with a very marked proptosis. This is the Gifford's sign.
- Now test convergence, by holding your finger at a distance of 1 meter from the eyes & asking the patient to stare at it. Now bring it slowly towards the midpoint between the eyebrows.
  The patient can't converge eyes in exophthalmos. This is a positive Mobius's sign. Convergence is slow, jerky & incomplete. With progressive exophthalmos, there is further bulging of the eyeballs with conjunctival congestion & edema.

Progressive Exophthalmos

1. Further bulging of eyeballs
2. Conjunctival congestion & edema
3. Corneal ulcers, diminished vision
4. opthalmoplegia/ restriction of eyeball movements

II. Tremors:

i) Fine tremor of outstretched hand
ii) Fine tremor of protruded tongue

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- Ask the patient to stretch out arms with slight fanning of fingers. Thyrotoxic patient will always show a fine tremor of fingers.
- Another method to demonstrate tremors is to keep a piece of paper over the outstretched fingers. The vibration of papers are more easily appreciated.
- Now ask the patient to open mouth fully and put out the tongue straight for 15-30 seconds. The tongue should not touch the teeth.
  Look for frank tremors or in mild cases, fine fibrillary twichings: Features of thyrotoxicosis.

III. Tachycardia:

Feel the radial pulse; tachycardia & bounding pulse are characteristic of thyrotoxicosis. However, pulse rate may increase further due to anxiety which is associated with thyrotoxicosis.

- So, to judge the degree of thyrotoxicosis, you must count the sleeping pulse rate.
  ****** Sleeping tachycardia is very much suggestive of thyrotoxicosis.
  Sleeping pulse rate: It is counted in early morning around 4 am i.e. before the patient wakes up, without disturbing the sleep.
- A fast & irregular pulse may suggest atrial fibrillation.

IV. Warm, moist skin & pretibial myxedema:

- Now feel the palms & feet of the patient. In thyrotoxicosis, they are warm & moist.
- And the legs may show pretibial myxedema with thickened, hyper pigmented skin & coarse hair.

V. Bruit, Thrill:

They are already examined during examination of thyroid gland i.e. the palpable thyroid thrill & thyroid bruit on auscultation.

**** **Comparative study of primary & secondary Thyrotoxicosis**

Primary Thyrotoxicosis	Secondary Thyrotoxicosis
1. Eye signs: Exophthalmos	1. ~~Eye signs: Exophthalmos~~ (i.e. not seen)
2. Tremors: CNS signs	2. Tremors: CNS signs
3. Cardiac signs: ➢ Tachycardia ➢ Cardiomegaly, CCF	3. Cardiac signs: > Tachycardia > Atrial fibrillation < Cardiomegaly, CCF

Coloured signs are more prominent
Coloured signs are less prominent

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Signs of Myxoedema

If there are no signs of thyrotoxicosis, look for signs of myxoedema. They are-

- Edema of face & legs (with dry, coarse skin)
- Hoarseness of voice (slow, hoarse voice)
- Lethargy
- Delayed relaxation of deep reflexes (e.g. ankle jerk & knee jerk)

→ Diagnostic clinical sign

Note the slow relaxation phase of the ankle jerk. The muscle contracts briskly as usual & then relaxes slowly.

In early case, Note the slightly delayed relaxation phase of the ankle jerk.

Signs of Retrosternal Extension

- Inspect the upper chest, neck & face for dilated veins, congestion & puffiness which results from pressure on the internal jugular veins at the thoracic inlet.
- Palpate the tracheal rings in the supra-sternal notch. Inability to palpate the rings suggests retrosternal goiter.
- Then percuss over manubrium sternii. A dull note instead of normal resonant note suggests the pressure of retrosternal goiter.
- Now elevate both arms above the head until they touch the sides of the face. Hold them there for 1 minute. If this maneuver produces congestion of the face & respiratory distress; it suggests thoracic outlet obstruction which in case of a goiter is most likely to be due to retrosternal extension of the goiter. This is a positive Pemberton's sign.

**** Lastly look for Horner's Syndrome

Signs of Horner's Syndrome:

1) Ptosis
2) Constricted pupil
3) Enophthalmos (in the eye of the affected side)
4) Absent Cilio-spinal reflex
5) Anhydrosis/ Loss of sweating on the affected side of the face.

Horner's Syndrome can occur in:
1) Retrosternal goiter
2) Malignant Goiter: affecting the cervical sympathetic nerve.

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Signs of Metastasis

Lastly, look for the evidence of metastasis meticulously if carcinoma is suspected.

- Palpate the neck on both sides for enlarged, hard lymph nodes.
- Palpate the entire skull surface for hard nodules.
- Look for bony deformity or tenderness in long bones.
- Examine the abdomen for nodular liver & ascites.
- Examine the chest for signs of effusion & consolidation.

Revision of signs of metastasis

1. Hard cervical lymph nodes
2. Hard nodules on skull.
3. Long bone metastasis
4. Nodular liver & ascites
5. pleural effusion/ consolidation

Peripheral Vascular Disease (PVD)

- PVD may present with a "Gangrene", Where cell death has already occurred or before that with and ischemic limb.
- If gangrene is present then examine the gangrenous arm first then proceed to examine the ischemic limb.

Inspection

Inspection of the gangrenous area.

- It shows a dark discoloration and a shriveller-up mummified appearance: It's a dry gangrene.
- In a wet gangrene it shows a dark discoloration but the tissue are edematous and swollen and there is no clear-cut demarcation between the gangrenous and normal limb; whereas a dry gangrene shows a line of demarcation between the dead gangrenous part and the normal living tissue.

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- Just proximal to the line of demarcation is a small zone of Hyperemia and Hyperesthetia followed by a normal skin.
- In due course of time the dry gangrene will separate itself by the process of aseptic ulceration and the ulcer will be covered up by skin.

Now inspection of the proximal limb: Check for-

- Evidence of proximal spread of gangrene and infection.
  - Presence of redness and edema in the proximal skin suggests active infection (spreading infection as in wet gangrene).
  - Spreading infection to the proximal limb: Edema, Redness.
  - Spreading gangrene to the proximal limb: Blebs, Ulcerations, Skip areas (Black colored)
  - Redness edema and slough around site of amputation of a gangrenous toe indicate infection and wet spreading gangrene.
  - Skip areas: it is an area of "Blackening" in the proximal limb independent from the gangrene.
- Signs/Evidence of chronic ischemia:
  - Observe the skin color of the ischemic limb and compare it with the opposite normal side.
  - A marked pallor will indicate sudden arterial obstruction as in (1) Embolism or (In Raunaud's Phenomenon).
  - A chronically ischemic limb looks pale and thin and shiny with scanty hair with wasting (Shrivelled up apperance) nails look brittle with transverse ridges.

    Cause:

    - Thin: Due to loss of subcutaneous fat and muscle wasting.
    - Dark discolouration: blood supply become critically less. And tips of fingers may show ischemic or trophic ulcers.

    Cardinal sign of chronic ischemia in limb:

    - Dark discolouration
    - Skin looks pale , thin and shiny
    - Scanty hair
    - Muscle wasting (Shrivelled up appearance)
    - Brittle nails with transverse ridge
- Now measure the limb gurth with a measuring tape and compare it with the opposite limb at the same level to demonstrate and record limb wasting.
  - In lower limb: 3 inches above and below of the knee joint.
  - In upper limb: 2 inches above and below the elbow joints.
- Now, inspect the veins over the dorsum of the foot
  - If they are well filled in their lying down position it indicates a fairly good circulation
  - But if they are collapsed and gutter like then it is an indication of severe ischemia.
  - If toes are affecter, took for constriction at the base of toe. Groove 'Ainhum' (It is situated at the base of toes/finger which gradually deepens over several years till the toe/finger separates)

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- If autoamputation has already occurs look for transverse acar in the abdomen > lumber sympathectomy

SUMMERY OF INSPECTION:

- Inspection of gangrenous area:
  - Extent of the gangrene
  - Line of demarcation
  - Type of gangrene (Dry or Wet)
- Inspection of the proximal limb:
  - NoSpread of infection : Edema, Redness
  - Spread of gangrene: Blebs, Ulcers, skip areas
  - Signs of chronic ischemia: Thin, shiny skin, wasting, brittle nail.

PALPATION

First palpate the gangrenous area:

- In a dry gangrene the skin is cold non tender hard and greesy; it has no sensations.
- In a wet gangrene the skin is turgid edematous with loss of sensation (but it may be tender if gangrene is not fully established)
- If the skin is edematous palpate carefully all over the gangrenous and proximal areas for crepetations to rule out the anaenobic infection like gas gangrene by *clostridium dificille*.

Then, palpate the proximal ischaemic limb:

- 1st test the temperature with the back of your fingers proceeding proximally & comparing it with the temperature of the opposite limb.
  Note the level upto which the limb is cold.
- In a severe PVD, it may be cold upto mid thigh.
- Skin temperature is a good indicator of the state of skin circulation & is important in deciding the level of amputation if required.
- Now palpate the proximal limb for tenderness.
- Then palpate along the line of major vessels for tenderness i.e. along popliteal & femoral arteries in the lower limbs & radial, brachial & axillary arteries in the upper limbs.
  Tenderness indicates recent thrombosis or embolism.

Focal examination: Examination of

1) Arteries
2) Lymph nodes
3) Joint tenderness

Arteries: (circulation status)

1st test the capillary circulation in nail (by blanching – by pressing the tip of nail) & note time taken to refill the nail bed (to turn pink again).
It gives a rough idea of the rate of blood flow through the capillaries.

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Peripheral artery examination:

1) Then palpate the **Dorsalis pedis artery** at the proximal end of the 1st metatarsal space, just lateral tendon of extensor hallucis longus against the navicular & middle cuneiform bone.

2) Palpate the **posterior tibial artery** midway between the medial malleolus & tendo-achillis against the calcanium keeping foot dorsiflexed & inverted.

***** If dorsalis pedis & posterior tibial arteries are well felt, it implies that proximal pulses are bound to be normal.

3) Then, palpate the **popliteal artery** in the popliteal fossa against the upper end of tibia or lower end of femur.

- The patient in supine position, keep the knee flexed in 135°, keep your thumbs over the tibial tuberosity & insinuate your fingertips in the lower part of the popliteal fossa palpating from the lateral to the medial side till the neurovascular bundle is felt. Now palpate the artery against the upper end of tibia.
- If not felt in this position, turn the patient prone, flex the knee to 90° & palpate the artery in the midline in the upper part of the popliteal fossa against the lower end of femur.
- If the popliteal pulse is still not felt, as it is a very difficult pulse to locate in an obese patient, then perform the Fuchsig's test/ Crossed leg test.
  Procedure: Ask the patient to sit on the edge of the table & cross the affected leg so that the opposite knee. Ask him to keep the legs fully relaxed. Divert his attention by talking something else. Look for Oscillatory movement of the hanging leg synchronous with the patient's pulse.
  Example: i) Gangrene due to electric burns – oscillatory movement present.
  ii) Burger's disease – Absent.
  [The test is of great significance when femoral pulsation is normal but the dorsalis pedis & posterior tibial are not palpable; because the oscillatory movement is a definite indication of good popliteal pulse.]

4) For the **femoral artery**, with the patient lying supine, keep the leg abducted & slightly externally rotated to relax the deep fascia & palpate in the line of mid-inguinal point just below inguinal ligament. Femoral artery is felt against the head of femur.

5)Then palpate the **abdominal aorta** to the left of the midline in the epigastric & umbilical area against the spine.

Then, palpate the opposite limb & then the upper limbs from the periphery to the neck.

- In upper limb peripheral pulse examination:

  1st perform nail capillary blood flow.

6) Palpate the **radial artery** on the flexor aspect of the wrist, just lateral to the tendon of flexor carpi radialis against the lower end of radius.

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7) Then palpate the **brachial artery** in the lower half of the arm just medial to the biceps tendon against the shaft of the humerus & in front of the elbow medial to the biceps tendon.

8) Then palpate the **axillary aretery** in the axilla against the head of the humerus.

9) Palpate the **subclavian artery** in the supra-clavicular fossa in mid-clavicular line against the 1st rib.

10) Then palpate the **common carotid artery** against the tubercle of the transverse process of the 6th cervical vertebra between upper portion of trachea & sternocleidomastoid.

Other arteries (Superficial temporal arteries, facial artery) aren't significant for PVD.

[Superficial temporal artery is palpated in front of tragus against the temporal bone & facial artery is palpated against the lower border of mandible at the anterior border of massietor muscle (Ask the patient to clench & palpate the anterior border of massietor muscle).]

Auscultation

After palpation of the arteries, you will identify the approximate level of block. Now auscultate along entire course of the artery for systolic bruit of stenosis, partial obstruction or aneurysm. Also, routinely auscultate the major arteries that is abdominal aorta, popliteal, femoral, axillary & carotid arteries.

Special tests for PVD

Tests for lower limbs:

1. Buerger's test
2. Capillary filling time

Buerger's Test: Ask the patient to lie supine & raise the leg with knee extended to about 90°. If the limbs showes marked pallor, then the test is 'positive'.

- The pallor appears within a few seconds in a severe disease & may take 2-3 minutes in a mild disease.
- If test is positive, lower the limb, let it resume the normal colour, then raise it gradually to note the angle at which the pallor appear. This angle is called Buerger's Angle of Circulatory Insufficiency.
  [Buerger's angle of < 30° = indicates very severe ischemia]

Capillary filling time:

With the patient lying supine, raise the legs till the affected leg becomes pale. Now ask the patient to seat on the edge of the table & hang the legs down. Note the time taken by the affected leg to resume its normal pink color. This is the capillary filling time & in PVD, it may be prolonged to 15-30 seconds.

Now let the patient seat with the legs hanging for 2-3 minutes. The leg will assume a purple red cyanotic color termed as "Dependent Rubor" indicating impaired circulation.

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Special tests for chronic ischemia in upper limbs

1) Reynaud's Phenomenon: test for upper limbs
2) Adson's test
3) Elevated arms stress test } Tests for Thoracic Outlet Obstruction
4) Allen's test

Raynaud's Phenomenon

If you are suspecting it, dip the fingers of both hands in ice-cold water & water for blanching or pallor of the fingers.

Fingers in Raynaud's:

1) Dip in cold water: Blanching (pallor) → White (due to loss of circulation)

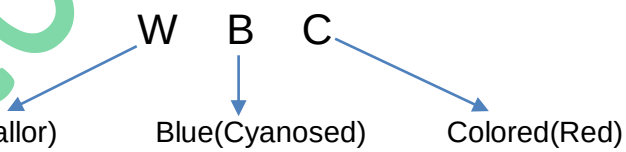
↓ then

2)Take fingers out of water : Swollen & cyanosed → Blue (due to decreased oxygen supply)

↓ Then

3) After some time: Red & engorged (due to relaxation of spasm of blood vessels & blood flow to the capillary)

N.B : color change of fingers in Raynaud's :



Adson's Test

With the patient sitting on a tool, feel the radial pulse of the affected hand. Ask the patient to turn the face as much as possible towards the affected side. Ask him to take deep breath. If the pulse becomes feeble or is obliterated, then the Adson's Test is positive.

(The forced inspiration contracts the Scalenus Anterior which is an accessory muscle of respiration which elevates the 1st rib & compress the subclavian artery at the thoracic outlet)

The test is also performed by asking the patient to turn the neck to the opposite side & to take a deep breath & secondly by keeping the arm extended & pulling it downwards noting whether the pulse diminishes.

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Elevated Arms Stress Test

Ask the patient to abduct the shoulders to 90° with maximum possible external rotation keeping elbow flexed at 90°; thus raising the arms above the head. Now ask the patient to brace the shoulders back & open and close fists slowly for a period of 3 minutes. If the patient's symptom of radiating pain, cramps, paresthesia or Raynaud's Phenomenon appears, forcing him to stop, then the test is considered as positive for thoracic outlet obstruction.
(A normal individual will only feel some fatigue in the forearm muscles.)

Allen's Test

(for the degree of patency of radial & ulnar artery)

Ask the patient to clench his fists tightly. Now compress both radial & ulnar arteries at the wrist separately using both your hands. Ask the patient to clench & release his fist till blanching occurs. Now ask him to open the fist & release the radial artery. Note the time taken by the hand to regain the normal pink color. Then repeat the test after blanching the hands; release the ulnar artery & note the time taken by the hand to regain normal color.
If any of the arteries is blocked, the palm will remain blanched for a longer time when pressure over the blocked artery is released.

Examination of Varicose vein

Definition: varicose vein is an elongated, dilated & tortuous vein, in the subcutaneous layer.

****3 types of examinations are done in a varicose vein.
1. Examination of the varicose vein
2. Tests for incompetent perforators
3. Examination of the deep veins

Inspection

A. Inspection of the vein
B. Inspection of ankle & foot

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Inspection of the vein

In standing position:

- 1st note the site & extent of the varicosity
- & relation to long or short saphenous veins

*** Long saphenous varicosities run from the front of the medial malleolus upwards along the antero-medial aspect of the leg, knee & thigh to end at the saphenous opening just below the inguinal ligament.
*** Short saphenous varicosities run over the posterior aspect of the calf to converge & end at the center of the popliteal fossa.
*** Some varicosities may not confirm to these anatomical pathways & are termed as Stray varicosities.
[You must examine the legs from front & back]
Now inspect the length of the varicosity for a **Blow out**.
Blow out: A localized bulge in the vein indicating incompetent perforator.

- Next, inspect the saphenous opening below the inguinal ligament for a Saphena varix.

Saphena Varix: It is a 'blow-out' over the sapheno-femoral junction.
It indicates sapheno-femoral wall incompetence.

- Ask the patient to cough & look for a visible cough impulse.
- Now look for dilated veins over the lower abdomen above the inguinal ligament converging onto the saphenous opening.
- Now, raise the legs upto 60° & check whether the varicosity collapses or not.
  - An uncomplicated varicose vein will always collapse on raising the legs (collapsibility).
  - But if it is secondary to pelvic vein thrombosis or arterio-venous fistula in the leg, then it will not collapse when it is raised.

Morrissey's Test:

- Holding the leg elevated for 30° or more, ask the patient to cough & look for a cough impulse at the saphenous opening. If a saphena varix is present; it seems to bulge out & a retrograde venous pressure wave will be seen to raise in the empty vein & fall slowly.
- +ve Morrissey's test indicates incompetency at the sapheno-femoral valve.

Inspection of the ankle & foot

- Inspect the medial aspect of the ankle for ankle flare or venous flare. It is a diffuse soft fullness, with small subcutaneous dilated venules around the ankle, usually feeling the hollow between the medial malleolus & the heel.
  *** Ankle flare is seen in incompetency at the ankle perforators.

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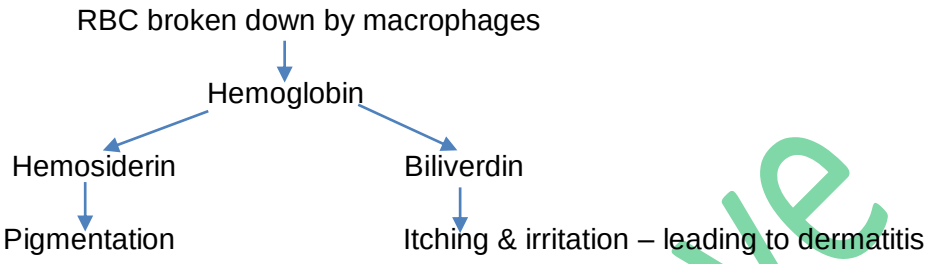
- Now inspect the skin over the medial aspect of the lower third of the leg for pigmentation, edema, woozing or ulceration. These are changes in the skin due to the back pressure in the veins & capillaries which forces the RBCs out of the vessel wall.



Varicose ulcer:

- It's typical location is over the medial aspect of the lower third of the leg, also termed as gatter area; it is surrounded by dark pigmentation & the dilated veins.
- Varicose ulcer is more commonly seen after deep vein thrombosis & sometimes with primary varicose veins.
- DVT damages the wall of deep veins, so blood is pumped into the superficial veins particularly on the medial side where perforating veins are situated.

Characteristics of varicose ulcer:

- Superficial
- Painless
- Ragged irregular edges
- Unhealthy granulations
- They never penetrate the deep fascia

Sometimes varicose ulcer leads to

- Telipus Equinus deformity of the ankle
- Limping during walking

Summary of Inspection

Inspection of the vein

1) Site, extent & anatomical relation
2) Blow-out, Saphena varix & dilated veins over abdomen
3) Collapsibility
4) Morrissey's test

Inspection of the ankle & foot

1) Ankle flare
2) Hyperpigmentation of the skin, Edema, dermatitis
3) Varicose ulcer
4) Talipus Equinus deformity

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Palpation

- With the patient in standing position, palpate the length of the vein for warmth & tenderness.
  [Superficial thrombophlebitis in acute stage will be warm & tender]
- Note the cord-like thickening & redness along the vein – suggesting superficial thrombophlebitis in varicose vein.
- Now mark the course of vein with skin pencil. Make the patient lie down, raise the leg to 30° & empty the vein. Now palpate the deep fascia along the course of the vein, more carefully at the sight of blow-out(if any), look for **pits** in the deep fascia.

Pit: A pit is felt as a circular defect in deep fascia with sharp edges.
It indicates the sight of a dilated perforator.

- If a pit is felt, mark it with a 'X' sign with skin pencil over the skin.
  This is **Fegan's method** of palpation - for the detection of incompetent perforators.
- Now, keep your finger gently over the saphenous opening which is situated 3.8 cm below & lateral to the pubic tubercle and ask the patient to cough. 0
  A cough impulse indicates sapheno-femoral valve incompetence.
- If a saphena varix is present, a thrill will be palpable when the patient cough, as if a jet of water is entering & filling the varix.
  This is the Cruveilhier's sign of saphena varix.
- Now, with the patient standing, palce the finger of your left hand over the saphenous opening & tap over the most prominent part of the varicosity in the leg with the right hand. If the impulse is felt by the palpating fingers, it indicates that there is a continuous blood column between the two points & the vein walls are incompetent.
  This is positive tap test or Schwartz's test.
- ***** Brodie- Trendelenberg test:
  It will tell us whether the sapheno-femoral valve is competent or not & whether there is any other perforator incompetence.

  Procedure:
  - With the patient lying down supine, elevate the leg to 30° & empty the vein completely. Now press the thumb to occlude the saphenous opening. If there is a large saphena varix, use the other 4 fingers.
    Keeping the sapheno-femoral junction pressed & occluded, ask the patient to stand. Compressing the vein by the thumb is not always accurate, particularly if the vein is not visible or the patient is obese.
    So, the test is better performed with a rubber tourniquet tied around the upper thigh just below the saphenous opening.
  - Observe the vein for 15-30 seconds with maintained pressure. The vein will remain empty if it is a pure sapheno-femoral incompetence. But if there is a perforator incompetence in the leg, the vein will fill slowly from **below-upwards**.
  - Now release the hand pressing on saphenous opening & watch how the varicosity fills from above.

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- ✓ If sapheno-femoral valve is **incompetent**, the varicosity will fill very rapidly from **above downwards**.

- ✓ If sapheno-femoral valve is **competent**, there will be **no retrograde filling**.

This test report is mentioned as:

(1) Negative-Positive

That means 'Negative' with maintained pressure & 'Positive' with release of pressure – it indicates a pure sapheno-femoral valve incompetence.

(2) Positive-Negative

That means 'Positive' with maintained pressure & 'Negative' with release of pressure – It indicates only perforator incompetence.

(3) Positive-Positive

That means 'Positive' with maintained pressure & also 'Positive' with release of pressure – it indicates incompetency of both sapheno-femoral valve & perforators.

➢ ****Multiple Tourniquet Test:

With the patient lying supine, elevate the leg & empty the veins completely by milking them down. Now apply 3 rubber tourniquets.

1) 1st, below the saphenous opening
2) 2nd, just above the knee
3) & 3rd, just below the knee

These divide the long saphenous vein into 4 segments; each with 1 constant perforator.

- ✓ The sapheno-femoral valve – above the 1st tourniquet.
- ✓ The mid-thigh perforator in adductor canal – between the 1st & 2nd tourniquet.
- ✓ The below knee perforator – between the 2nd & 3rd tourniquet.
- ✓ And the ankle perforators – below the 3rd tourniquet.

The tourniquet should be tight enough to occlude only the superficial veins.

Now ask the patient to stand up & observe for 15-30 seconds for the appearance of varicosities in each segment.

Rapid appearance of varicosity or blow-out in any of the segments indicates the incompetency of the related perforator.

In the segments with competent perforators, the vein remains collapsed.

Pratt's Test

This test is performed to locate incompetent perforators more accurately.

Procedure: With the patient supine, raise the leg to 30°, empty the veins & apply the elasto-crape bandage from the toes to mid-thigh with a gentle pressure to occlude the superficial veins only.

Now, apply a tourniquet below the sapheno-femoral valve to occlude the retrograde flow from the sapheno-femoral valve.

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Now, ask the patient to stand & release the bandage from above downwards. After releasing each turn, observe the vein for filling. The moment when the turn of the bandage over an incompetent perforator is unbound, the vein will fill rapidly.

Summary of palpation

1) Warmth & tenderness
2) Pits by Fegan's method
3) Cough impulse & Cruveilhier's sign
4) Schwartz's test

Special test for Incompetent perforators:

1) Brodie-Trendelenburg test

2) Multiple tourniquet test

3) Pratt's test

Examination of the Deep veins

You should look for:

I) Patency of deep veins

II) Active Deep Vein Thrombosis

The patency of deep vein is tested by Modified Perthe's Test.

Procedure: with the pt. supine, elevate the limb & empty the vein. Apply a rubber tourniquet over the upper thigh to occlude the superficial veins. Then ask the patient to walk around briskly for 5 minutes.

- If the deep veins are blocked, the varicosities will become turgid & the patient will experience throbbing pain in the calf. This is a positive Perthe's Test.
- If deep veins are patent, the varicosities will remain collapsed & there is no calf pain.

**** A positive Perthe's test is an absolute contraindication for ligation & stripping of the veins and it must be routinely performed before surgery.

- The same test, if performed by applying an elasto-crape bandage from the toes to the thigh is the original Perthe's Test.
- Now, we look for Active Deep Vein Thrombosis.
  For this, look for-
  1) Tender swelling of the calf
  2) Tenderness along the course of the veins(Femoral, popliteal, posterior tibilal veins)
  3) Homan's sign
  4) Mose's sign

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- To test for tenderness over the deep veins of the calf, flex the knees for 30°, rest the foot on a table & press the calf muscles against the tibia to compress the Posterior Tibial Veins.
- If this is not tender, sqeeze the calf muscles from side to side. If painful, this is a positive Mose's sign.
  [If the calf muscles are tender, don't perform the test, as squeezing the calf muscle can potentially dislodge a thrombus in the deep veins & results in pulmonary embolism.]
- Now let the leg fully extended for the Homan's sign.
  Dorsiflex the foot passively. The stretching of calf muscles & posterior tibial vein elicits pain if the deep veins are thrombosed & painful.
  This is a positive Homan's sign.
  [In active DVT, all these tests should be done very gently, as potentially they dislodge a thrombus & cause pulmonary embolism.]

Focal & General Examination

- Palpate the inguinal lymph nodes which may be enlarged with varicose ulcers & DVT.
- Examine the opposite leg for varicose veins.
- Palpate the abdomen for any lump pressing on the pelvic veins.
- Examine the scrotum, in standing position for varicocele & testicular tumor.
- Perform proctoscopy to rule out co-existing haemorrhoids.

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