

Plastic surgery

# Electrical burn

- The severity of burn depends on the voltage.
- The damaging effect is inversely related to the tissue resistance.
- Nerves, muscles and blood vessels have low resistance, so they are affected most.
- Skin, bone and tendons have high resistance, hence, they are less burned.

## Management:

- ✓ Pt should be monitored for cardiac arrhythmias.
- ✓ Good hydration & alkalization of urine to prevent renal impairment.
- ✓ Fluid management couldn't be based on calculated formula.
- ✓ Observation of limb vascularity & fasciotomy.



Fasciotomy was done to relieve the pressure resulting from compartment syndrome.

## Escharotomy VS fasciotomy

- fasciotomy is done in management of compartment syndrome after electrical burn. Escharotomy is done to decompress tissues in 3rd degree burns.
- Beneath escharotomy you will see granulation tissue, beneath fasciotomy you will see muscles.
- If ischemia is suspected, escharotomy is indicated.



**Escharotomy**

## Thermal burn

- Temperature  $> 45$  degrees.
- Duration of exposure is more important than degree of temperature.
- Classification:
  - 1 direct flame burn (dry heat)
  - 2 scald burn (Moist heat due to hot liquids).
  - 3 contact burn with hot metals.
  - 4 friction burn.



**Scald burn**



**Contact burn**



**Friction burn**

What category of burn does this patient have? What is the main risk of this burn? What should you do?

-It's a **facial flame burn ( facial edema )**.

-the patient will have upper airway obstruction ( edema in the oropharynx and vocal cords due to inhalation of hot gases ) and risk of CO poisoning.

-The patient should be intubated before reaching to complete obstruction and give 100% oxygen if CO poisoning is suspected.



## Chemical burns

- Caused by acids or alkali.
- Acids produce less damage and less penetration.
- Acids produce coagulative necrosis.
- Alkali produce liquifactive necrosis.
- Management : dilution by water for 2-4 hrs in alkaline burn, and 30 minutes for burns caused by acids.





## 1<sup>st</sup> degree burn

- Pain and erythema.
- Limited to the dermis.
- No contracture.
- (1-6) days , heals by regeneration.
- Applies only to thermal burns.



## 2<sup>nd</sup> degree burn

- Necrosis of the epidermis and varying depth of the dermis (superficial/ intermediate/ deep).
- Pain, erythema, blisters, blanching, burned area is wet with exudate.
- Applies only to thermal burns.



### 3<sup>rd</sup> degree burn

- Necrosis of whole skin.
- Eschar (dead tissue, insensitive, lethargy, inelastic, hard).
- Thrombosed dermal vessels
- Applies only to thermal burns.



- **Post burn contracture.**
- a complication of 3rd degree burns.
- they should have put skin graft for the patient to prevent this complication.



## Contusion

- Bruising injury caused by blunt trauma.
- Small hematoma is resorbed by itself (except on the face; need to be opened and evacuated)
- Large hematomas : if <24 hrs managed by aspiration, if > 24 hrs by incision and drainage.



## Abrasion

Managed by dressing to prevent 2ry bacterial infection.



What is the type of this wound ? How is it treated?

It's an **incised wound**.

Within the first 6 hours (or the first 24 hours in the face) it's treated by primary closure if the edges can be approximated without tension.



**Lacerated wound** usually caused by blunt objects. First, we clean the edges (wound excision) to transform it to incised wound, then if within first 6 hours without contamination we close it by closure if the edges can be approximated without tension.

## Puncture wound

- Caused by pointed objects.
- Management: tetanus vaccine/ excision/ removal of foreign bodies.



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## Avulsion flap

- Undermined laceration in the dermis and subcutaneous tissue.
- Management: debridement of edges/ excision of small avulsion flaps to prevent **trap-door effect**/ suturing.





## pyogenic granuloma

- during wound healing if the capillaries grow too vigorously they may form a mass covered with epithelium.
- look for a history of trauma
- very rapid growth
- removed using chemicals such as silver nitrate, phenol and TCA

## hypertrophic scar

is a cutaneous condition characterized by deposits of excessive amounts of collagen which gives rise to a raised scar, but not to the degree observed with keloids.

They do not extend beyond the boundary of the original wound, but may continue to thicken for up to six months.

They usually improve over the one or two years, but may cause distress due to their appearance or the intensity of the itching; they can also restrict movement if they are located close to a joint.



## Keloid scar

You are more likely to develop a keloid if:

You are black, Latino or Asian

You are younger than 30 years of age

You are pregnant

You are a teenager going through puberty

You have a history of keloids in your family

People who have darker skin are 15% to 20% more likely to develop keloids.

Certain areas of the body are more likely to scar than others. Keloids usually develop on the chest, shoulders, earlobes and cheeks.



Hypertrophic scar	Keloid scar
Improves with time (2 years)	No improvement with time
No genetic predisposition	Genetic predisposition
Less collagen	More collagen
Less cytokines	More cytokines
fibers parallel to the dermis	Fibers random in orientation
Remains within the borders of the original scar	Extends beyond the original scar margins
Regress spontaneously or by medication	

Treatment :

- Surgery (Z- plasty, W- plasty) / artificial skin/ steroids/ pressure therapy/ topical silicon/ low dose radiation/ laser (CO2 and argon)/ calcium channel blockers/ interferon.

## Venous ulcer

Most Common site is lower 1/3 of the leg just above the medial malleolus.

Incr. Venous pressure of the leg due to destruction of the valve of the veins.

The leg is swollen due to venous edema + hyperpigmentation + induration





## Exam question

- what's the type of this ulcer ?  
**Venous ulcer.**
- why ? mention two findings you see. **Because it's on the lower medial aspect of the leg where the perforators are located. and there is hyperpigmentation around.**
- what's the most important pathophysiology of this ?  
**It's valve insufficiency after DVT (post phleptic syndrome )**



## **Venous Ulcer Characteristics :**

### **where ?**

\*Lower 1/3 of leg \*gaiter area \*anterior to medial malleolus.

### **cause?**

Commonly a history of:

\*Deep Vein Thrombosis (DVT) \*Obesity \*Calf muscle pump function deficits \*Valve incompetence in superficial perforating veins.

### **description?**

\*Ulcer has uneven edges \*Ruddy granulation tissue \*No dead tissue.

\*Reddish brown pigmentation (Hemosiderin) \*Evidence of healed ulcers \*Edema that may leak, maceration, varicose eczema, itchy skin and scale

\*Dilated and tortuous superficial veins \*Leg may be warm \*Hair on leg

\*Normal leg and foot pulses.

### **pain?**

\*Moderate to no pain at all \*Pain if present is eased by raising the leg



## Arterial ulcer

Arterial insufficiency ulcers (also known as Ischemic ulcers) are mostly located on the lateral surface of the ankle or the distal digits.

The ulcer has **punched-out appearance**. It is intensely painful. It has gray or yellow fibrotic base and undermining skin margins. Pulses are not palpable. Associated skin changes may be observed, such as thin shiny skin and absence of hair.

They are most common on distal ends of limbs.



The lesion can be easily identified clinically. Arterial Doppler and pulse volume recordings are performed for baseline assessment of blood flow. Radiographs may be necessary to rule out osteomyelitis.

## Arterial Leg Ulcer Characteristics

### where?

\*At tips of toes or between toes \*Over phalangeal heads \*Above lateral malleolus, over the metatarsal heads, on the side or sole of feet.

### cause?

Commonly a history of:

\*Aging \*Diabetes \*Arteriosclerosis \* Smoking \*Hypertension.

### description?

\*Deep pale base \*Well defined edges \*Black or necrotic tissue  
\*Minimal / no hair \*Thin, dry and shiny skin \*Thickened toe nails \*Leg may be cool \*Leg becomes pale when elevated \*May have neuropathy \*Nil or diminished leg and foot pulses.

### Pain?

\*Very Painful \*Pain is reduced by lowering the leg to a dependent position.

## Neurotrophic ulcers

Neurotrophic ulcers are characterized by a **punched-out appearance** with a deep sinus. These are often seen underlying calluses or over pressure points (e.g. plantar aspect of the first or fifth metatarsophalangeal joint).

They are commonly surrounded by chronic inflammatory tissue. Probing or debriding may lead to brisk bleeding. Because these patients usually have a neuropathy leading to hypoesthesia and diminished positional sense or 2-point discrimination, these ulcers are frequently **painless**.

Muscle atrophy may be noted.



## Marjolin ulcer (malignant ulcer)

- squamous cell carcinoma arises in a long standing benign ulcer or scar ( long standing venous ulcer or scar of old burn ).

- Need 20-30 years to develop.

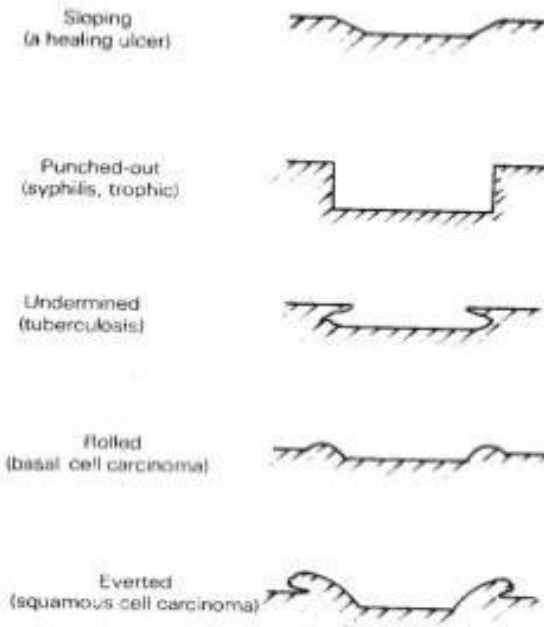




**Granulation tissue :**  
(sign of healing ulcer)

## Inspection.....

- Edge: five types:-
  - *Sloping edge* e.g. healing ulcer
  - *Punched out edge* e.g. Gummatous ulcer, deep trophic ulcer
  - *Undermined edge* e.g. tuberculous ulcer-destroy subcutaneous faster the skin
  - *Raised edge* e.g. Rodent ulcer
  - *Rolled out (everted)*- e.g. Squamous Cell Carcinoma



**Figure 1.15** The varieties of ulcer edge.



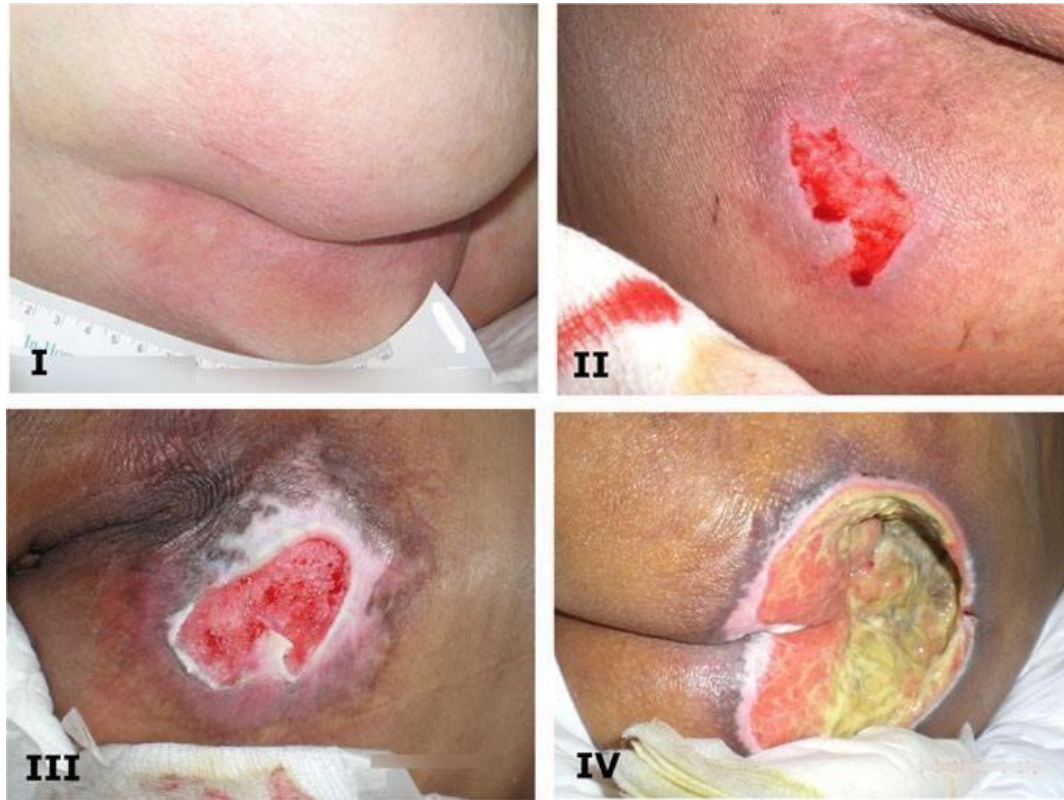
## Pressure sores grades

1) Intact skin (no ulceration) with non blanchable erythema.

2) Blisters with defect in epidermis and/or dermis.

3) Full thickness skin loss with damage or necrosis of SC tissue that may extend down to but not cross deep fascia . (SC tissue is exposed)

4) Full thickness skin loss with extensive tissue destruction + Damage to bone/ muscle/ bone or joint capsule.  
(muscles, bones or fascia are exposed)



### Risk Factors:

#### A- Local:

- 1- Unrelieved pressure
- 2- Shearing force
- 3- Increased temperature and moisture.

#### B- Systemic:

- 1- Aging
- 2- Decreased mobility
- 3- poor nutrition
- 4- Arterial disease and hypotension

## Surgical treatment of pressure sores

-Adequate analgesia

-Depending on the stage:

A- Superficial clean wound: Supportive care

B- Extensive and/or infected wound: debridement + Abx +/- surgical management .

Surgical management: Closure of the wound with healthy, durable tissue. Closure can be either :

1-Direct closure (In very small pressure sores)

2-Skin grafts

3-Flaps

### **Flaps :**

- Local tissue flaps.
- Myocutaneous flaps.
- Fasciocutaneous flaps.



### Ischial pressure sore

Flaps could be used :

Gluteal thigh rotation flap.

Hamstring muscle flap.

Biceps femoris flap.

Tensor Fascia Lata flap.

Gracilis flap

Medially based posterior thigh flap

Gluteus maximus flap



### Sacral pressure sore

- Rotation flap:  
bilateral gluteus Maximus V-Y flap.
- Gluteus Maximus muscle flap.
- Inferiorly based skin rotation flap.



### Trochanteric pressure sore

- Myocutaneous Tensor fascia Lata flap

## Chilblains

a type of **non-freezing tissue injury**.

caused by chronic high humidity and low Temp with normal core Temp.

seen commonly in mountain climbers.



## Trench foot

- The extremities are exposed to damp environment over long periods at temperatures ( 1-10 C).
- Numbness/ tingling/ pain/ itching.
- The skin initially red and edematous then gradually turns to gray-blue discoloration.
- **Non- tissue freezing injury.**





**Pernio** is an inflammatory skin condition presenting after exposure to cold as pruritic and/or painful erythematous-to-violaceous acral lesions. Pernio may be idiopathic or secondary to an underlying disease.

- **Non tissue freezing injury.**



## Cold urticaria

- Familial and acquired.
- History of cold stimulation.



## Frost bite

- **Tissue freezing injury.**
- Most common type of cold injury.
- **At temperature (-2c).**
- Intracellular ice crystals and microvascular occlusion.
- Vasoconstriction due to prostaglandins.
- Age( elderly and very young).
- Blacks more than white.
- Medications that increase the risk :  
caffeine/ argot alkaloids/ aminophylline.
- **Treatment:** rapid warming (40-42 C)/  
debridement of clear blisters whereas  
hemorrhagic are left intact and aspirated  
if infected / elevation/ topical  
thromboxane inhibitor/ NSAID.
- Massage is contraindicated.



## Fight bite

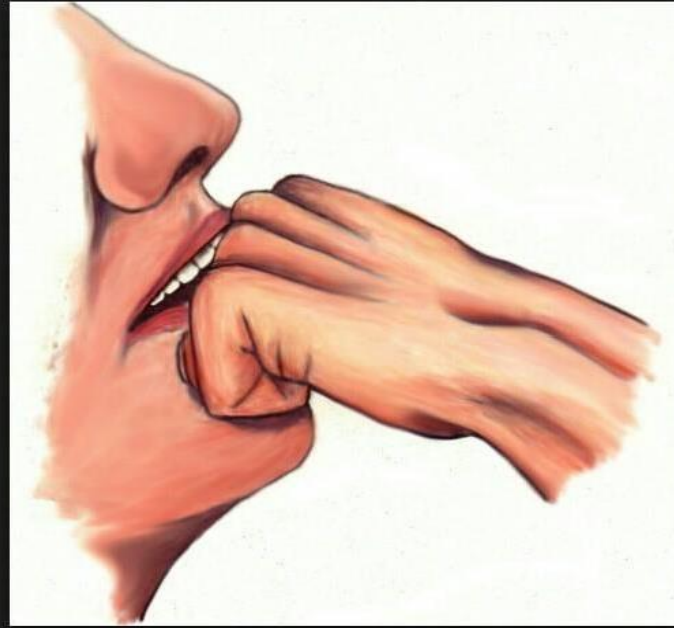
\*a small (3-5 mm) laceration over the dorsal metacarpophalangeal (MCP) joint generated by The teeth of the victim and appears innocuous to the patient and the unwary doctor but it has serious complications .

\* **organism** : *Eikenella corrodens* ( specific to human mouth).

\***Complications**: cellulitis; extensor tenosynovitis; septic arthritis .

### \***Management**:

- 1) exploration (foreign body +extent)
- 2) local anesthesia
- 3) debridement
- 4) admission : drainage + ( IV) antibiotics (amoxicillin +clavulanic acid )





## DOG BITE

\*Management :

- 1) exploration
- 2) analgesia
- 3) IV antibiotics ( clindamycin + penicillin )
- 4) elevation
- 5) tetanus toxoid
- 6) rabies vaccine



## Skin graft

What are the signs of graft take?

1. The graft is adherent to the recipient site.

2. Pink color.

3. The graft blanches with pressure ( denotes vascularity ).



## Skin grafts

### 1- split thickness skin grafts :

- Epidermis and thin part of dermis.
- The donor site heals by epithelialization within 2 weeks.
- Used for large areas.



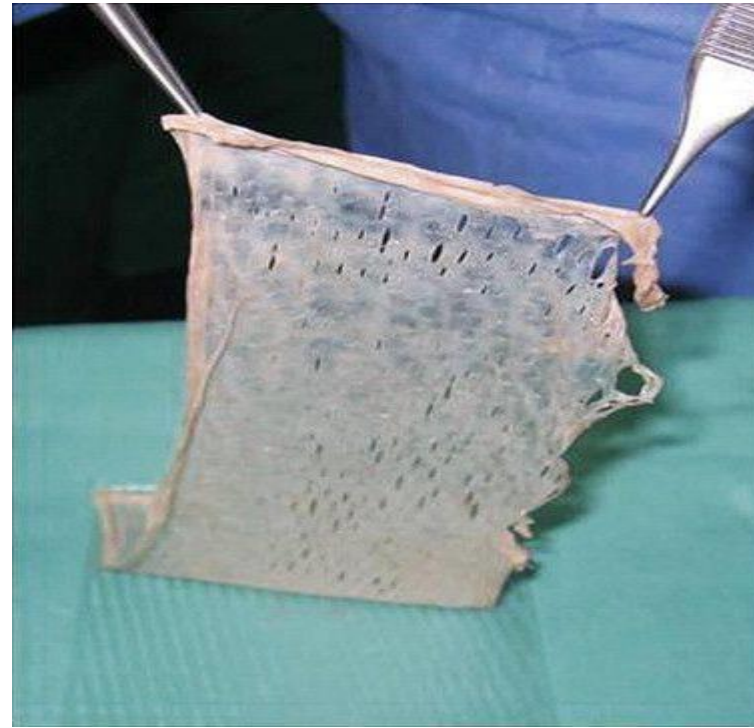
### 2- full thickness skin grafts:

- Taken from areas of loose skin as the donor area is closed by approximation of the edges (direct closure).
- Used for small areas.





- This is dermatome.
- It's used for taking a split thickness skin graft.



Split thickness skin graft after it has been meshed, showing the small perforations that allow the graft to be expanded and cover a greater area and also allows any blood/serum to drain away.

# Flaps

- A flap is a piece of tissue carries its own blood supplies that is moved from its original site, to cover a defect.
- Skin flaps/ muscle flaps/ myocutaneous flaps/ fasciocutaneous flaps/ osseofasciocutaneous flaps.
- Flaps are used when grafts are insufficient to cover the defect, or they wouldn't be taken.
- **To cover an avascular area.**
- When we need a more bulky tissue to deal with the defect and skin is not enough.
- **The donor area is managed by approximation if it was loose or by skin graft.**



## Fournier Gangrene

necrotizing fasciitis in the perineum.

most commonly caused by c.perfringes.

Treat with tissue debridement and antibiotics.



# Lipoma

-Benign tumor composed of fat cells (adipose tissue).

-**History:** Most individuals report a lump under the skin that may have been present for several years, increasing in size very gradually or growing larger if the individual gained weight. Pain may be reported, depending upon the size and location of the tumor, but the majority of lipomas do not cause pain. On occasion, a lipoma may be painful if it rubs against a nearby nerve.

-**Physical exam:** Most subcutaneous lipomas are dome-shaped and 2 to 10 centimeters in diameter. They can be felt under the skin as a smooth, mobile, rubbery growth. The skin covering the lipoma is normal in appearance and can be moved back and forth over the nodule.



**-Tests:** Usually no tests are required. If the individual's history or physical examination suggests the possibility of a malignant liposarcoma, microscopic examination of lipoma cells extracted via fine-needle aspiration (biopsy) is indicated. With irregularly-shaped or large lipomas (greater than 5 cm in diameter), CT scan or MRI may be performed to help differentiate a lipoma from a liposarcoma.

**-Treatment:** They may be removed by surgical excision or liposuction.

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**Lipomatosis** is believed to be an autosomal dominant condition in which multiple lipomas are present on the body.



## Sebaceous cyst

It is a small sac filled with oily substance known as sebum.

The cause (etiology) of sebaceous cysts is unknown.

**History:** Individuals may report a hard, usually painless lump under the skin. The lumps are usually found on the face, head, neck back or genitals.



**Physical exam:** The exam may reveal a small/large, smooth nodule under the skin. Skin is not pinchable with an overlying punctum. They can become inflamed and infected. Infected cysts become tender and red.

**Treatment :** Asymptomatic cysts do not need treatment.

Large or painful cysts: total surgical excision

Oral Abx for infected cysts.

Intralesional steroids for inflamed cysts

## sebaceous cyst

-Benign subcutaneous cyst filled with sebum.



Important note: if there is a scalp lesion like this it's impossible to be lipoma as a differential diagnosis since lipoma emerges from fat under the skin and scalp area is devoid from fat.

## Kaposi sarcoma

-malignant proliferation of endothelial cells, associated with HHV-8.

-presents as purple patches and plaques on skin, may extend into visceral organs.

-classically seen in three groups:

1) Transplant recipient, early spread, Rx decrease immunosuppression.

2) older eastern European males, remain localized, Rx surgical removal.

3) AIDS( Aids defining disease) - tumor spreads early, Rx increase antiretroviral therapy.



(cutaneous sarcoma appears as red hemispherical nodules or plaques)

- is it painful ? no it is painless  
- usually associated with what ? HIV infection & AIDS



**felon** : distal pulp space infection , if not treated results in osteomyelitis. Causes : Trauma (puncture, pricking), progression of untreated paronychia.



**Paronychia:** infection of the nail fold , happens due to bad manicure or bad maneuvering of hangnails. Most common hand infection.



## Tenosynovitis

- Infection of the synovial sheath surrounding tendon.

- The most causative organism of hand infection (tenosynovitis, felon, paronychia) is staph. Aureus.
- The 2<sup>nd</sup> is streptococcus.
- Initial treatment : oxacillin/ampicillin.
- Then we do culture and give antibiotics of choice.
- If abscess formed, incision and drainage.
- Elevation to decrease the edema.
- Resting the organ to decrease the pain.

## Antibioma

Hard, edematous swelling containing **sterile pus** following the treatment of an abscess with long term antibiotics rather than incision and drainage.

Treatment: exploration + incision and drainage if it is indistinguishable from a carcinoma, otherwise spontaneous resolution takes place over several weeks.



## Exam question

- 1 identify this picture
- 2 mention one risk factor or it is more common in?
- 3 treatment?

answers : 1-it is a **furuncle**.

2- they are most common on the face, neck, armpits, shoulders, back and buttocks. Hairy sweaty areas are typical sites as well as areas of friction such as inner thighs. Risk factors: decreased immunity, skin problems such as acne and eczema and poor hygiene.

3- Incision and drainage plus antibiotics.  
Applying warm compresses



## Carbuncle

is an abscess larger than furuncle, usually with one or more openings draining pus onto the skin.

The same etiology and sites of furuncle (infection in hair follicles mostly by staphylococcus aureus ).

The difference between furuncle and carbuncle is the surface openings that drain pus.

Tx: I&D + Abx

MC sites: on the back and the nape of the neck





## Erysipelas

1. It is an acute infection of the upper dermis and superficial lymphatics.

2. usually caused by streptococcus bacteria ( beta hemolytic group A ).

3. Erysipelas is more superficial than cellulitis.

4. It's typically more RAISED and DEMARCATED.

5. The infection may occur on any part of the skin including the face, arms, fingers, legs and toes, BUT IT TENDS TO FAVOR THE EXTREMITIES.

Fat tissue is most susceptible to infection, and facial areas typically around the eyes, ears, and cheeks.



# Neurofibromatosis

-Autosomal dominant.

-genetic disorder characterized by **cutaneous neurofibromas** / **Café au lait spots** / optic gliomas (vision problems)/ musculoskeletal deformities (scoliosis)/ learning disability and epilepsy.

-Might undergo malignant transformation.

-If removal caused a big defect in an area with redundant tissue we close it by **direct closure**.



Café au lait spots

## Bowen's disease:

A rare condition . It presents as a cluster of flat , pink , papular patches which are covered with crusts . The patches and the adjacent skin have a pale brown , thickened appearance.

Tx: excision



## seborrhoeic keratosis

-in the elderly " aka senile warts "

-special diagnostic feature : because they are patches of thick squamous epithelium they can be picked off if you try to pick the edges with a blunt forceps.

-when it peels off , it leaves a patch of pale-pink skin with slight bleeding.

-no other skin lesion behaves like this.

- doesn't need surgery. Completely benign.





## Erythroplakia

- Reddish patch that appears on the oral mucosa.
- It has 17 X more risk of malignancy than leukoplakia.



## Leukoplakia

- White patch that appears on the oral or genital mucosa.
- Risk factors : smoking/ (qat/القات)
- Premalignant (transform to SCC).

hemangioma	Vascular malformation
Start as small lesions at the age of 3-4 months	seen at birth but may appear late
Grow to reach their maximum size at the age of 1 year then involution	Grow parallel to the child's growth
Female to male (3:1)	Female to male (1:1)
Rarely to cause any complications	High flow can lead to destructive changes
Spontaneous resolution unless complicated you should treat	Treatment : surgery/laser/ embolization



Capillary **hemangioma** in the eyelid obstructing the eye , might lead to Amblyopia "lazy eye" .



The same patient at different ages  
(hemangioma)

## Vascular malformation



## Sturge weber syndrome

**port wine stain** vascular malformation involving the ophthalmic division.

- Usually not evident at birth.

mnemonic :

S : seizures / U: unilateral weakness

R: retardation ( mental ) / G: Glaucoma

E : other eye problems



- If a nevus undergoes changes in the pigmentation or in the shape or ulceration it indicates a melanoma.
- We differentiate the nevus from the vascular anomaly by its color.





## Hairy nevus

- It's premalignant and must be surgically removed.
- Congenital.
- Black or brown pigmented area with excess hair growth.

- In general, hair tuft or lipoma or hairy nevus located at the lower end of the back, it is associated with spina bifida.



## Non melanoma skin cancer

- The most common type of cancer.
- Its mortality is low.
- 75% basal cell carcinoma and 25% squamous cell carcinoma.
- BCC is slow growing, locally destructive and rarely metastasize.
- 80% are on head and neck.
- Melanin is a protective against tumor so blacks are less to have skin tumors.

## Squamous cell carcinoma

- Arising from epidermal cells.
- Risk factors: sun exposure/ pale skin/ arsenic/ xeroderma pigmentosum/ immunosuppression/being older/ male.
- **Actinic keratosis : the precursor skin lesion.**
- Raised, slightly pigmented skin lesion/ ulceration/ exudate/ itching.
- Dx: excisional biopsy for small lesion/ incisional biopsy for large lesions.
- Most common sites : head, neck and hand.
- **Involves the lower lip and BCC involves the upper lip or above this level.**



Basal cell carcinoma



Squamous cell carcinoma



## Basal cell carcinoma

- Arising in the germinating basal cell layer of epithelial cells.
- **Nodular** ( ulceration, **telangiectasia**, pearls).
- **Morphea** ( many sites at the same time/ more aggressive than the nodular type).
- Slow growing.
- Local ( rare risk of metastasis).





### Exam question

1- what is your diagnosis ?

BCC

2- do you expect to find enlarged lymph nodes ?

NO



**rodent ulcer**

complication of BCC

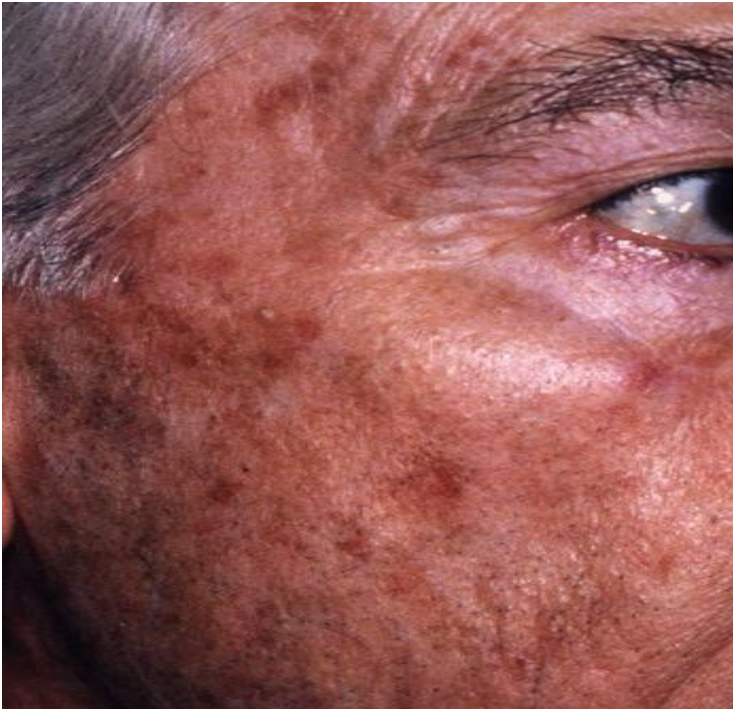
# Nevoid Basal Cell Syndrome

( AD )

Presentation :

- 1) multiple BCC mostly on the face
- 2) Cysts in the jaw.
- 3) Intracranial calcifications.
- 4) Rib abnormality ( mostly bifid ribs).





Erythematous scaly lesions on the temple area : typical of **actinic keratosis**



**Keratoacanthoma**  
self limiting growth and subsequent regression of hair follicle cells



## Xeroderma pigmentosa

- It might predispose to squamous cell carcinoma.
- an inherited premalignant condition associated with increase risk of all types of skin tumors.
- defect in the DNA repair genes
- AR



## Cleft lip:

failure of fusion of frontonasal process and maxillary process.

No functional deformity, only cosmetic deformity and **surgery is done at age of 3 months.**

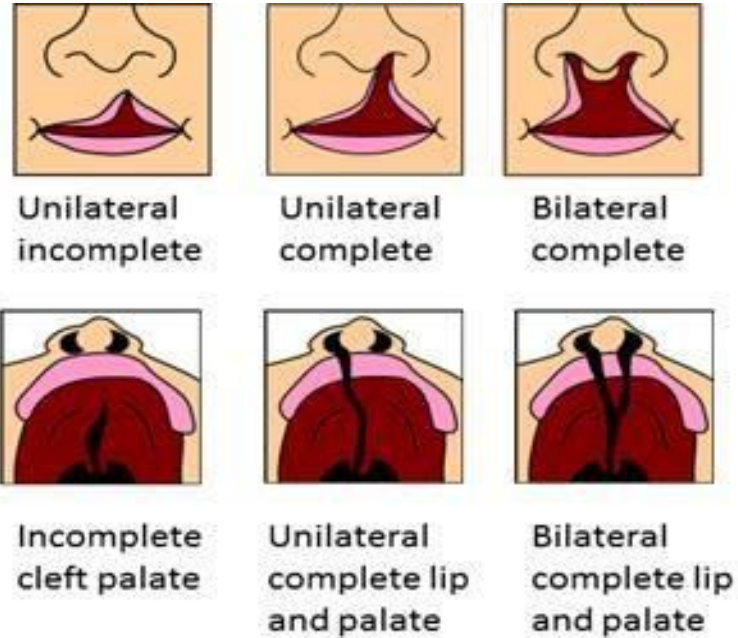
Breast feeding is not contraindicated.

## cleft palate:

failure of fusion of maxillary processes and lead to functional and cosmetic deformity .

baby can't feed, cant speak and may lose his hearing by time (acquired).

**surgery is done at age of 1 year** as a compromise between not losing his speaking abilities and the normal growth of face.



steps that can be done to feed the baby:

semi-sitting position (45 degrees)  
widening of the bottle milk nipple  
burping (as baby swallows a lot of gas)

## Bilateral cleft lip and palate

