MINISTRY OF HEALTH OF UKRAINE **POLTAVA STATE MEDICAL UNIVERSITY** DEPARTMENT OF THE GENERAL SURGERY WITH PATIENT'S CARE

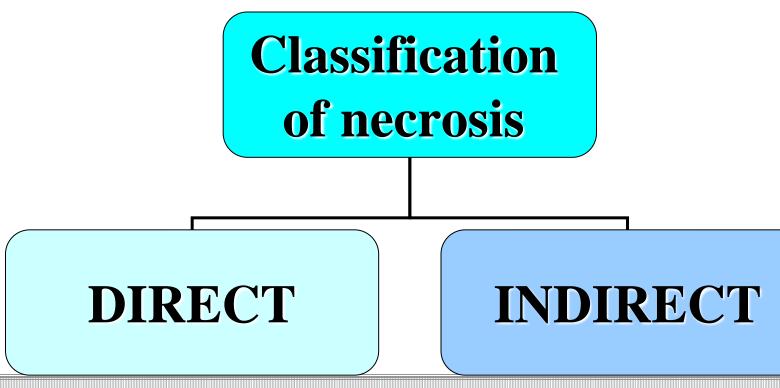
## NECROSIS, GANGRENES,BEDSORES, ULCERS AND FISTULAS

Lecture for general surgery

Chorna I.O.

Poltava

**Necroses** of tissues is a serious surgical pathology which can brings to lethal complications. Knowledge of their prophylaxis and treatment are obligatory for doctors of any profile.



**DIRECT** (exogenous) as a result of influence of an external damaging factor:

- the mechanical;
- the thermal;
- the electric;
- the chemical;
- the radiation;
- the infectious and toxic;
- innervations' disturbance.

#### Indirect (endogenic) as a result of <u>circulatory disturbances of a</u> <u>circulation</u>:

- disturbances of cardiac activity;
- acute and chronic disturbances of arterial permeability;
- acute and chronic disturbances of venous outflow;
- microcirculation disturbance;
- disturbance of a flow of lymph;
- disturbance of a systemic hemodynamic;
- spastic stricture and obliteration of arteries;
- disturbances of coagulability of a blood (clottages and embolisms).

#### Definition

## Necroses are a death of tissues, the whole organs or their parts in a live organism.



Factors which influence depth and rate of development of necroses

## Anatomical-physiological features of the organism of the patient:

general state of the patient, existence of chronic intoxications, attrition, avitaminoses, anemia, metabolism disturbance;

features of a local circulation (the main or loose type), condition of a vascular wall.

**Degree of a infections** of soft tissues in a necrosis zone (a myocardial infarction – the aseptic current), gangrene of lungs, a gall bladder, an appendix – have is purulent-destructive current.

**Ecological factors** (the cold provokes a vascular spastic stricture, heat – intensifying of a metabolism of tissues, X-radiation – pervert vascular and tissues reactions).

#### Definition of terminology

**Gangrene** is a necrosis which has such signs: lesion of an organ or its most part and characteristic appearance of tissues (black or gray-green), caused by hemoglobin decomposing at contact to air.

#### Classification of gangrenes

#### On an etiology (as a result):

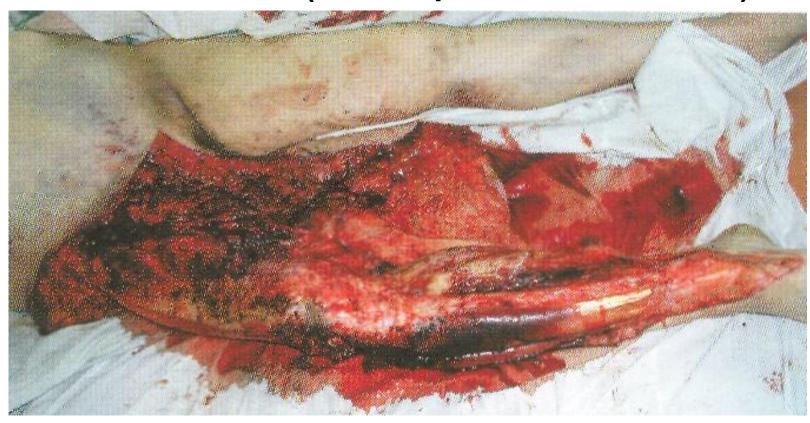
- wounds and ligation of vessels;
- prelums of vessels;
- thromboses and embolisms;
- thermal and chemical trauma;
  disturbances of a trophicity of tissues;
- development of a surgical infection;
- obliterating endarteritis;
- obliterating atherosclerosis;
  diabetic angiopaty;
- specific infection (lues).



Specifice

#### Cont. **On lesion depth:** the superficial; the deep; the total. **On a clinical current:** dry gangrenes; wet gangrenes. **On anatomic localization:** skin (dermatoses); extremities; internal.

# Traumatic necrosis of soft tissues of a femur (transport's trauma)



## Acute arterial ischemia-IIIB. Ischemic gangrene of extremities



## Acute arterial ischemia-IIIB. Ischemic moist gangrene of extremities



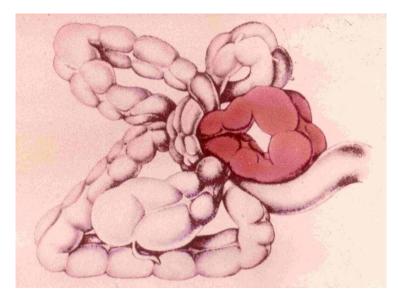
## Anaerobic nonclostridial infections of extremities

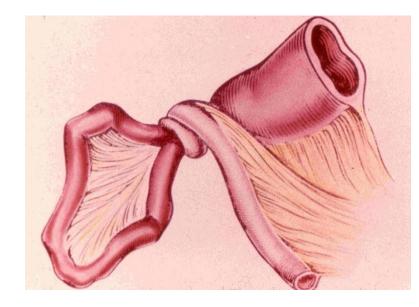


# Total gangrene of the lower extremity at a compartment syndrome



#### Gangrene of internal organs Necrosis of loops of an intestine as a result





#### nodulation thick

and

#### a torsion thin



**Causes of gangrenes** Dry gangrene can be at: chronic obliterating diseases of the lower extremities; the deep not infected thermal combustions. Wet (moist) gangrene can be at: deep thromboses (blue and "white" phlegmasias); deep combustions alkalis; the infected combustions and freezing injuries; necrotic forms of a surgical infection; pyoinflammatory processes in an internal organs.

#### **Causes of gangrenes**

Dry gangrene	Wet (moist) gangrene
gradual drying of tissues (mumification) happens to decrease of their volume on the background of chronic disturbance of a circulation.	On the background acute disturbance of a circulation tissues don't manage to dry, there is an edema.
Accurate demarcation from healthy tissues.	There is no demarcation from healthy tissues.
Absence of an infection.	Connection of Infections.
Symptoms of intoxication aren't present.	Expressed intoxication.
Histologically in tissues the coagulative necrosis	Histologically in tissues the colliquative necrosis
prevails.	prevails.

### **Demarcation line**



#### Treatment of dry gangrene Local treatment:

drying of tissues and infection prophylaxis (tanning of nekrotice tissues of 5% solution of a kalium potassium, brilliant greens, jodoskine);

necretomy or segment amputation (after accurate demarcation).

#### **General treatment:**

cupping of pains (analgetics); cpasmalitics (Nospanum); protectors of tissues and vascular (nicotinic acid,penthoxiphilliny, Trentalum, solcoseryly); vitamin therapy (group B vitamins); dezagregant (Aspirinum, Curantylum); anticoagulants (Phenilinum, heparin,clexan); prophylaxis of an infection (antibiotics); GBO.



#### Treatment of wet gangrene Local treatment:

at early stages it is necessary to try to transfer wet necrosis to a dry necrosis – drying of tissues and infection prophylaxis (a tanning of nekrotice tissues of 5% solution of a potassium permanganate or brilliant green);

high amputation of an extremity or organ resection within healthy tissues.

#### **General treatment:**

cupping of pains (analgetics); disintoxication therapy (Haemodesum, Polydesum, electrolytic solutions); cpasmalitics (Nospanum); protectors of tissues and vascular (nicotinic acid, penthoxiphilliny, Trentalum, solcoseryly); vitamin therapy (group B vitamins); dezagregant (Aspirinum, Curantylum); anticoagulants (Phenilinum, heparin, clexan); prophylaxis of an infection (antibiotics);GBO.

#### Complications of gangrenes At gangrenes of external localization:

intoxication;

secondary lesions of parenchymatous organs; death from septico-toxic shock;

paresis, paralyzes, contractures of extremities; epidermolysis and ichorization of soft tissues.

#### At gangrenes in an internal:

arosive bleedings;

perforations of hollow organs;

infection generalization on anatomic serous cavities which carries away life of patients.

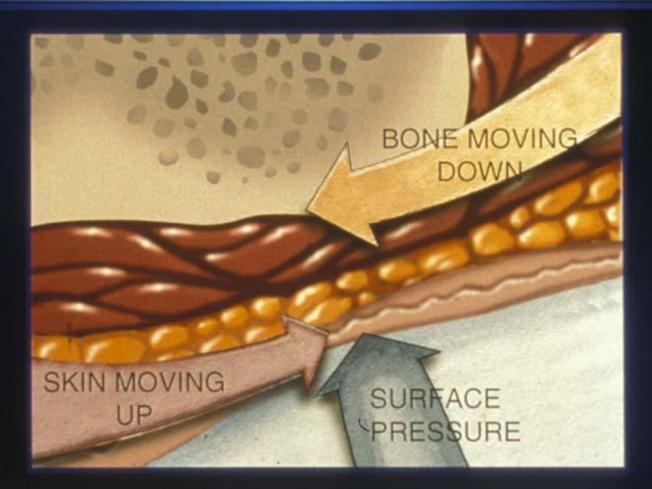
### Decubitus

### or Pressure ulcers, or Bedsores

Commonly used in medicine, the word decubitus is used to mean "lying down". It is derived from the Latin verb "decumbere" meaning "to lie down".

**Pressure ulcers**, also known as **decubitus ulcers** or **bedsores**, are localized injuries to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction. Most commonly this will be the sacrum, coccyx, heels or the hips, but other sites such as the elbows, knees, ankles or the back of the cranium can be affected.

## Shearing



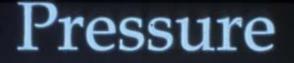
Shearing forces stretch or tear the blood vessels, reducing the amount of pressure needed to occlude them.

## **Result of Shearing**



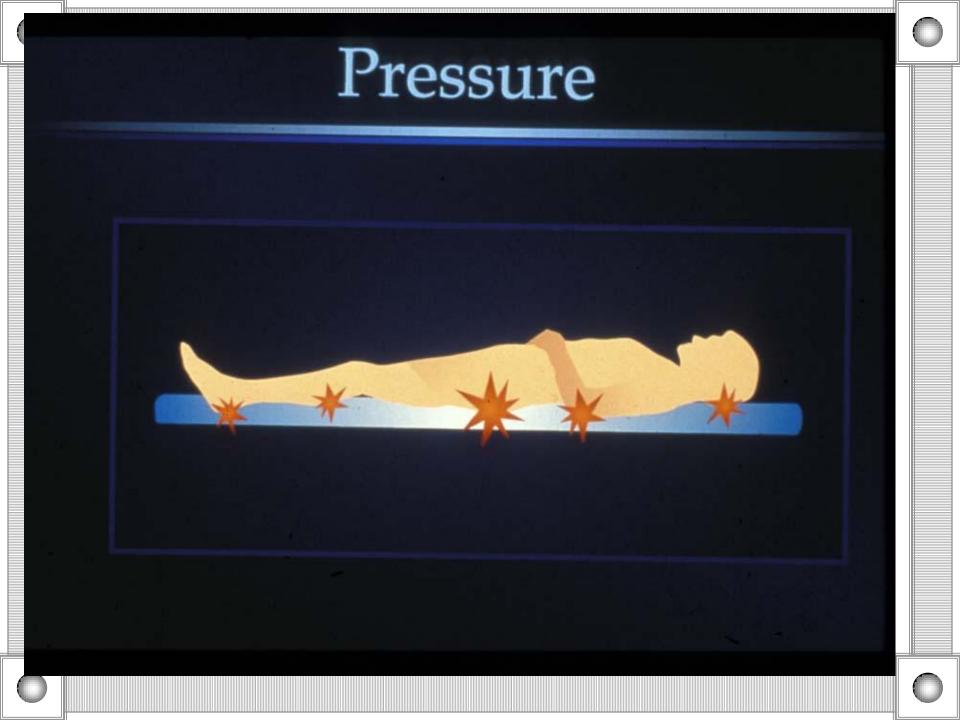
### **Pressure Ulcer Contributing Factors**

Friction/Shear Poor Nutrition Incontinence Moisture Co-existing Medical Conditions





Compression or squeezing together of soft tissue caused by weight or tension, resulting in ischemic response and, potentially, tissue necrosis.



## Hyperemia

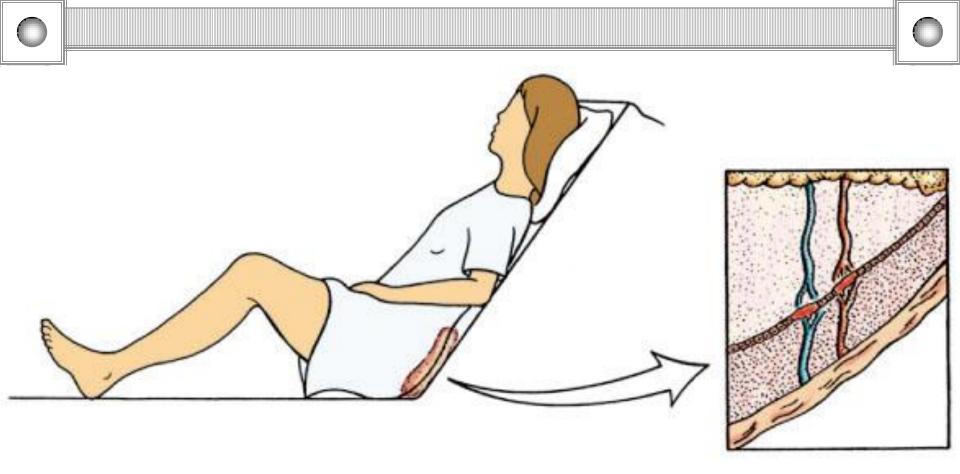
Normal Reactive Hyperemia-visible effect of localized vasodilatation (REDNESS) area will blanch with fingertip pressure and redness lasts less than 1 hour

Abnormal Reactive Hyperemia-excessive vasodilatation and induration (edema) in response to pressure. Skin appears bright pink-red. Lasts 1 hour to 2 weeks

### **Pathogenesis of Pressure Ulcers**

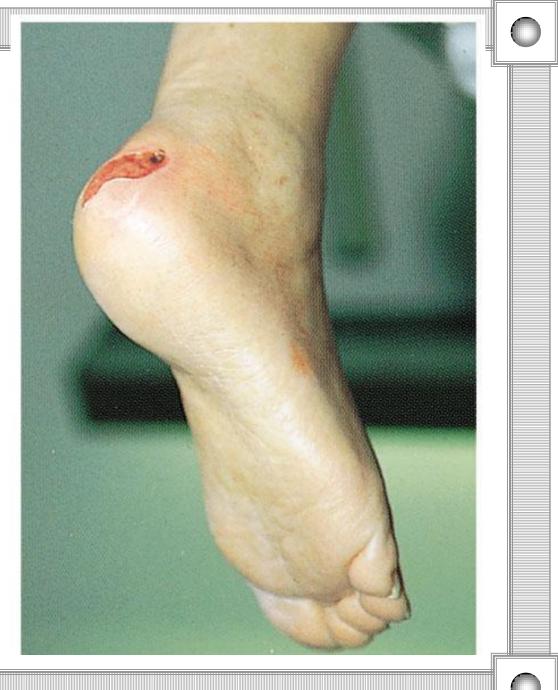
If circulation is restored before this critical point, circulation to tissue is restored (Reactive Hyperemia)

Skin has a greater ability to tolerate ischemia than does muscle, hence true pressure ulcers begin at bone with pressure related to muscle ischemia eventually coming through to epidermis (Shear injury) Sacrum and heels most susceptible



## Diagrammatic sketch of shearing force exerted againist sacral area

Formation of pressure ulcer on heel resultiong from external pressure fromm mattress of bed



## latrogenic decubituses (as complications of medical manipulations)

- trachea decubituses at long stay in it endotracheal tube;
- esophagus decubituses from long stay in it thick probe;
- rectum decubituses from long stay in it colonic tube;
- decubituses on subject sites of a body when the patient at exaltation it is long it is fixed to a bed (outsets);
- with a pressure from artificial devices, a plaster bandage, drainages, etc.

Skin in a prelum place

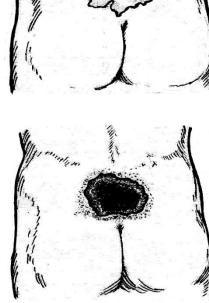
acyanotic, thinned, dry.

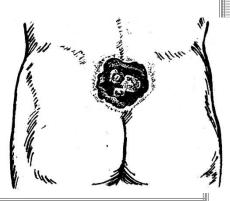
#### Stage of the superficial necrosis.

On the background of a hyperemia site necrosis (black or brown).

#### Stage of purulent fusion.

Accession of an infection and diffusion of process to depth.

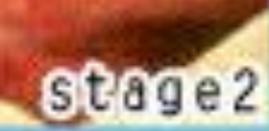


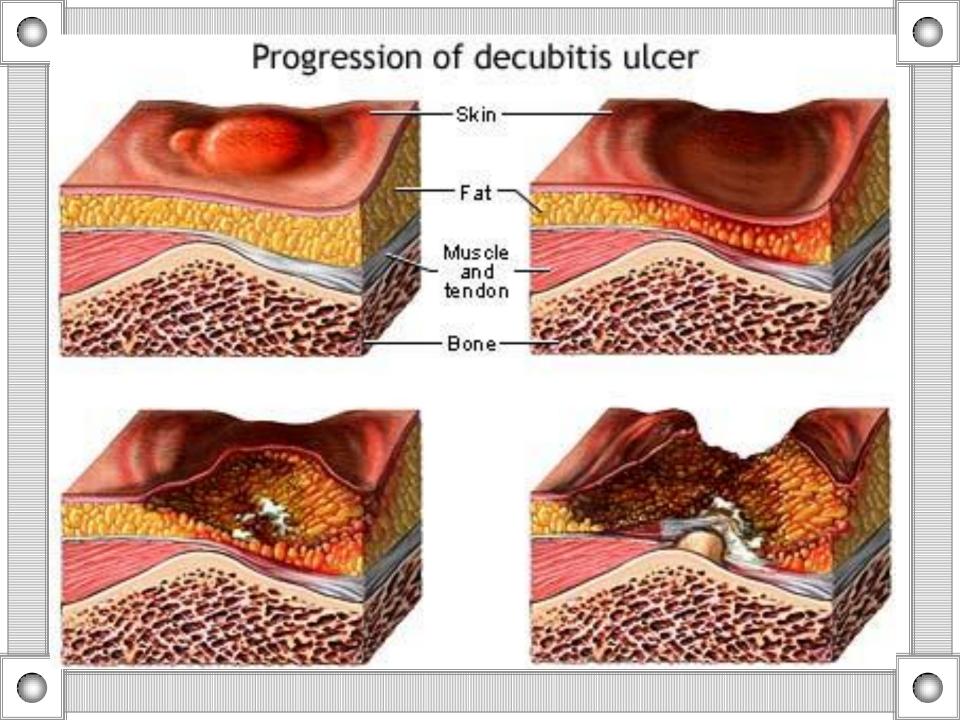


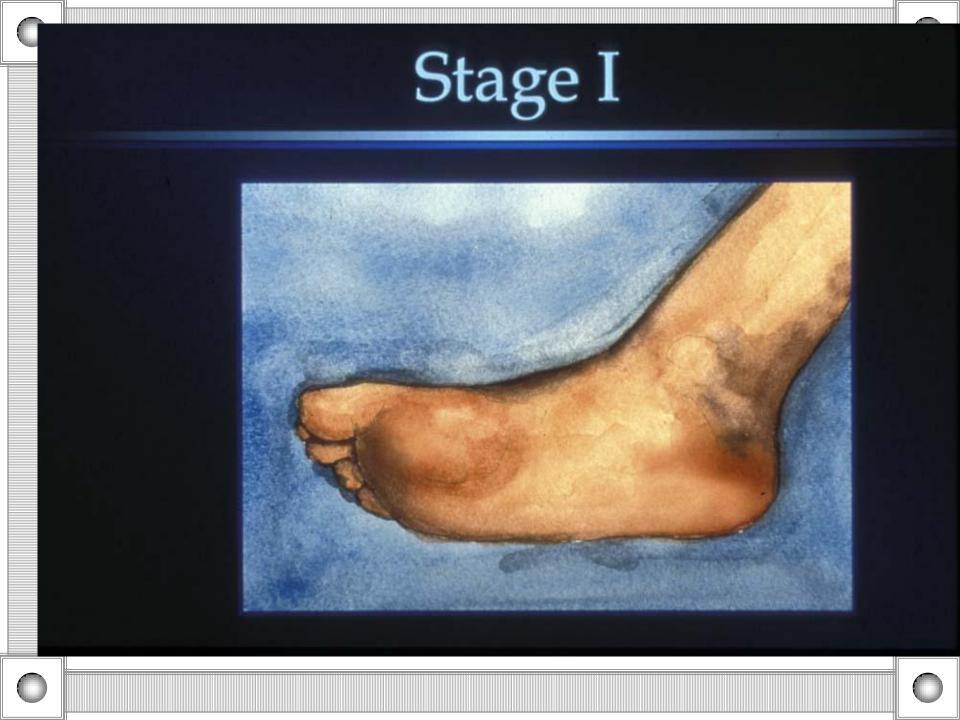












## Stage 1 Pressure Ulcer

Intact skin with non-blanchable redness of a localized area usually over a bony prominence.

Darkly pigmented skin may not have blanching: its color may differ from the surrounding area

The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue.

Stage I may be difficult to detect in individuals with darker skin tones

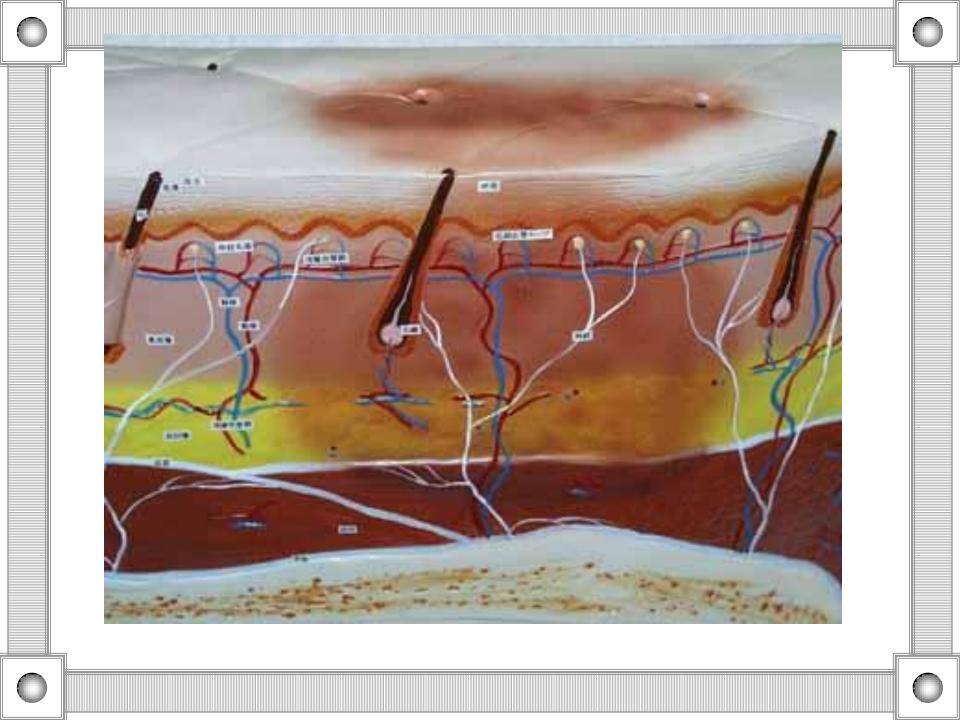


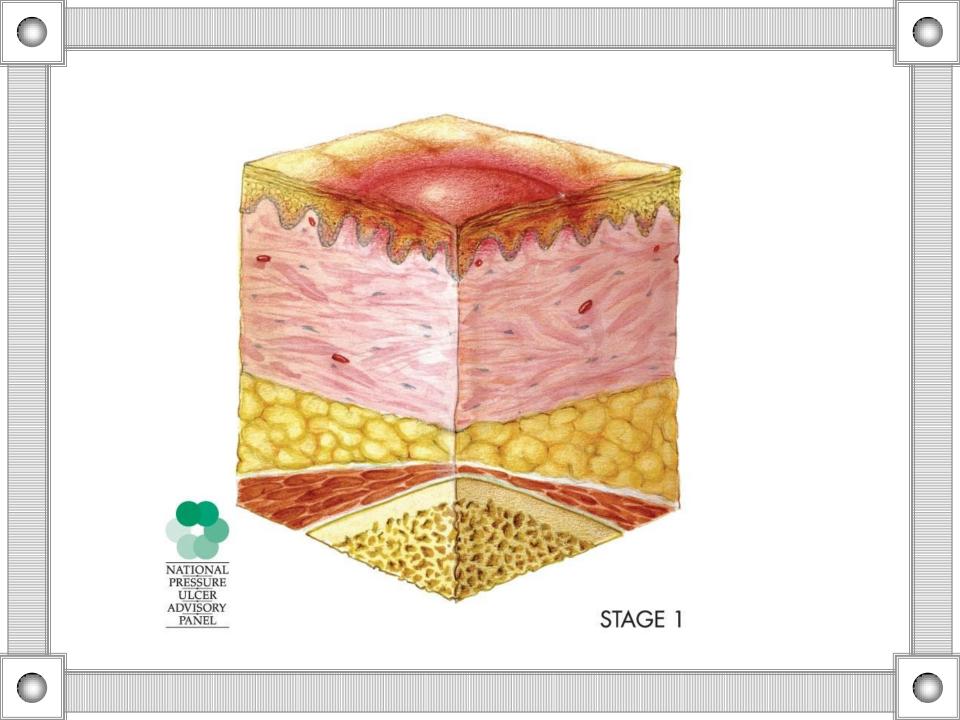
**Off-load pressure** 

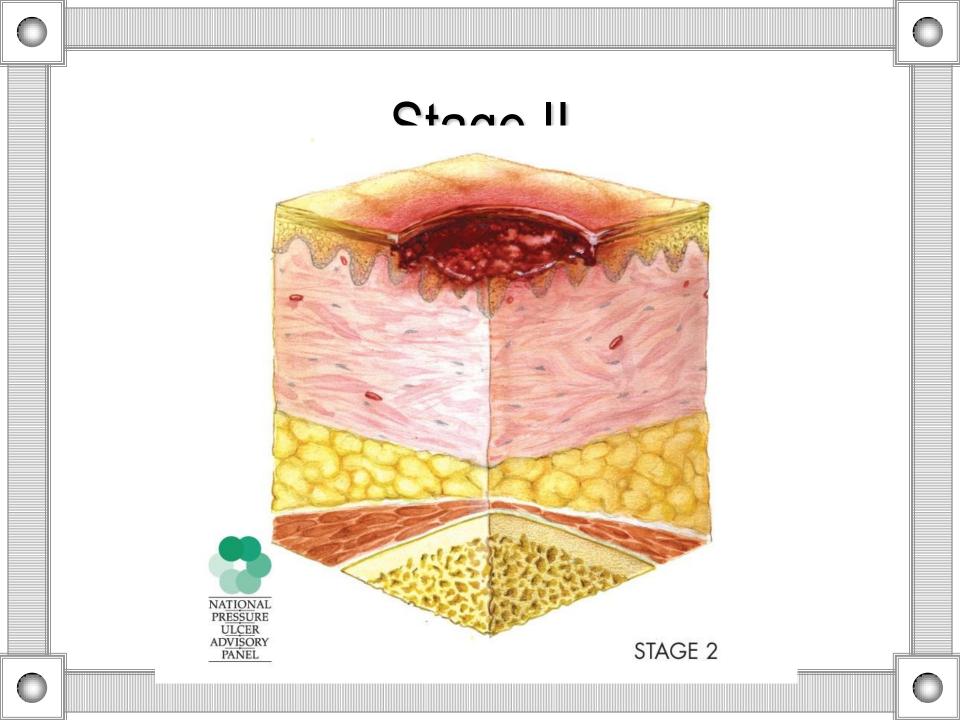
#### Transparent film dressing

Hydrocolloid dressing

Moisture barrier







### Stage 2 Pressure Ulcer

Partial thickness skin loss involving the epidermis and/or dermis.

The ulcer is superficial and presents clinically as an abrasion, blister, or shallow open ulcer Presents as shiny or shallow ulcer (red/pink wound bed) without slough or bruising. This stage should not be used to describe skin tears, tape burns, perineal dermatitis, maceration or excoriation

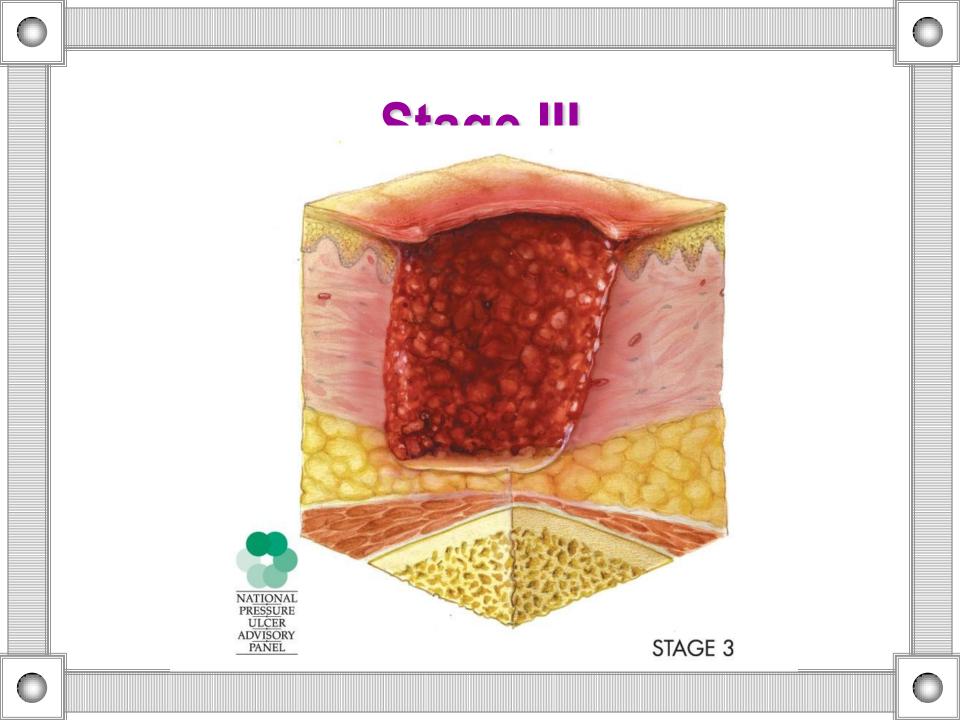
### Stage II Treatment

Hydrocolloid dressing: dressing of choice in minimally draining stage II ulcer Absorptive dressings (Foam) draining wounds Hydrogel: Healing wounds Off-load pressure









## Stage III

Full thickness skin loss involving damage or necrosis to subcutaneous tissue that may extend down to, but not through underlying fascia

Ulcer presents as a deep crater with or without undermining or tunneling of adjacent tissue

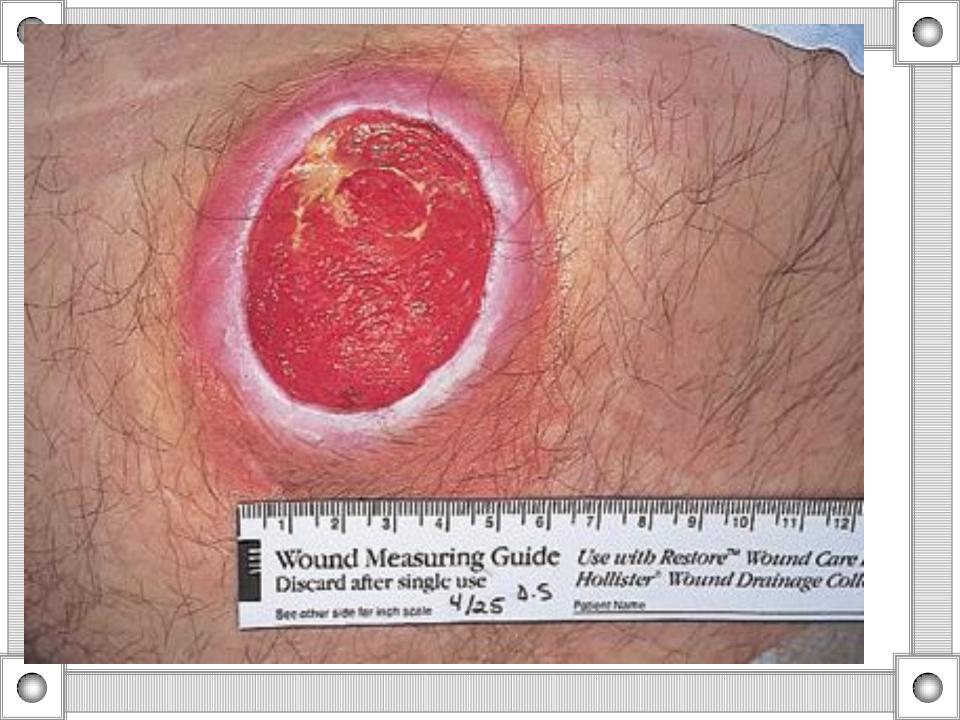
Slough tissue may be present but does not obscure the depth of tissue loss

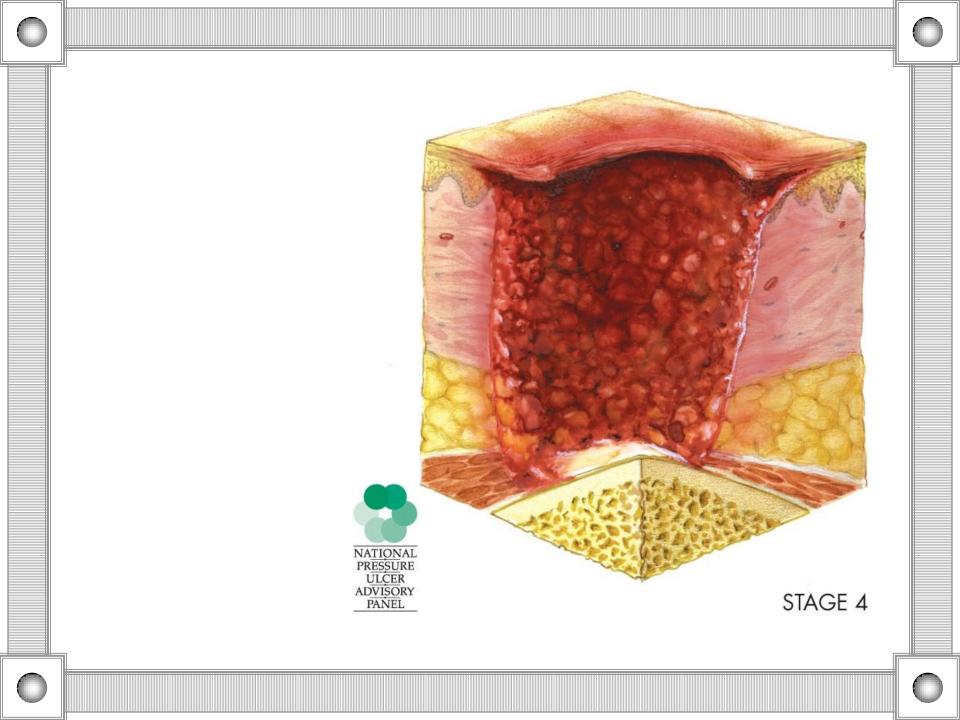


## Stage III Treatment

Requires physician order for Stage III or Draining vs. Non-draining Necrotic vs. Granulating **Draining wounds-Absorptive dressings** Granulating wounds-Hydrogel Necrotic wounds-Require debridement (Chemical, Mechanical, Autolytic, Sharp







## Stage IV

Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structures (tendons, joint) Undermining and tunneling are often associated with Stage IV ulcers

Slough or eschar may be present in some on some parts of the wound bed

Depth of wound varies by anatomical location

Exposed bone or tendon is visible or directly



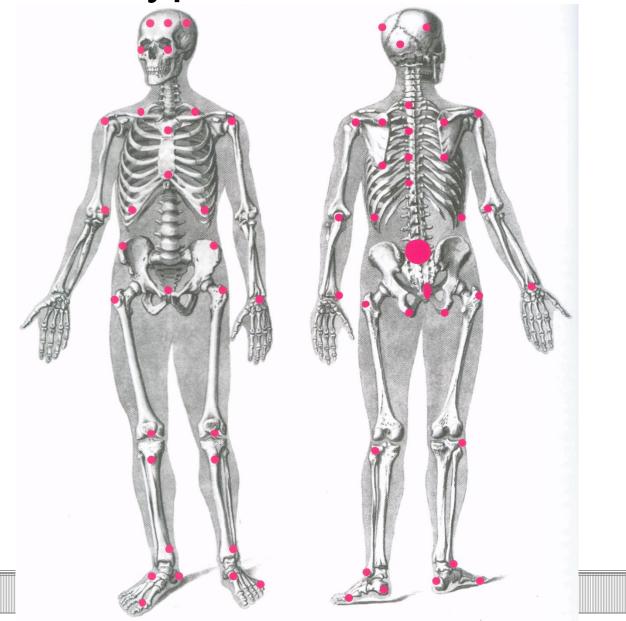
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#### Places typical for decubituses



# Decubituses in the field of a sacrum and buttocks





#### Decubitus of parietal area at a coma



# Decubituses of area of a heel and back surface of an anticnemion



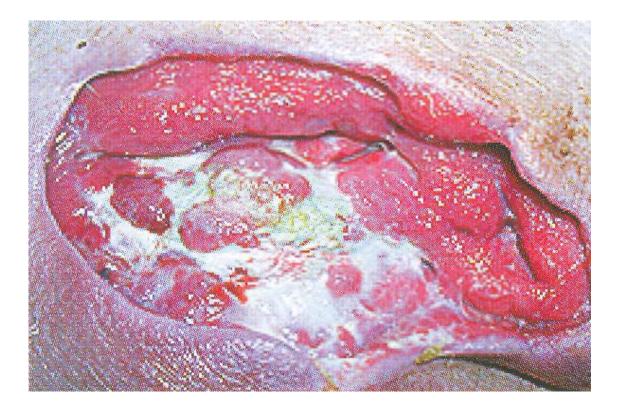
# Decubituses in the field of scapulas



## Decubitus in the field of a big trochanter of the IV stage.



## Contact osteomyelitis in a decubitus



# Wound myiasis in a head decubitus



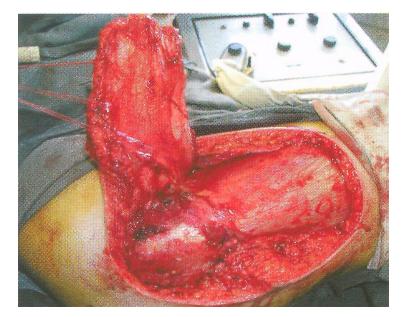
#### Local treatment of decubituses In an ischemia stage: prophylaxis intensifying, application of Ultra-violet radiation, skin processing by camphoric alcohol. In a stage of a superficial necrosis: apply tanning agents (strong solution of manganese, alcogole solution diamond green) to an escharosis. In a stage of purulent fusion: treatment under laws of a wound process.

#### General treatment of decubituses

- metabolism normalization an proteinum and sugar exchange;
- administration of reparant;
- vascular protectors;
- Antibioticotherape according to indications;
- GBO.

## Surgical treatment of a decubitus







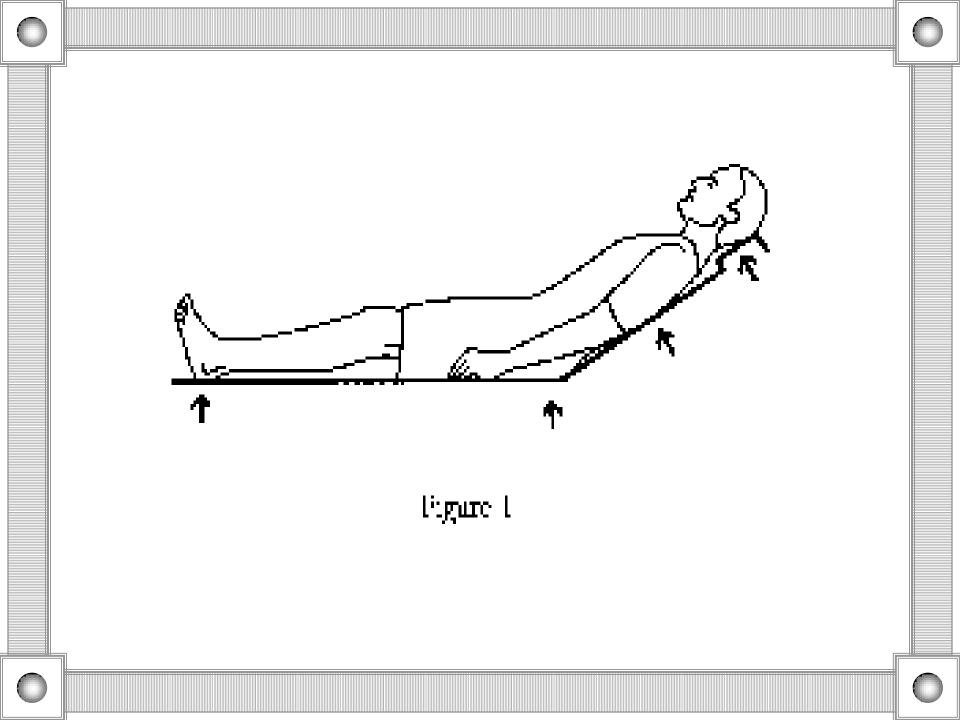


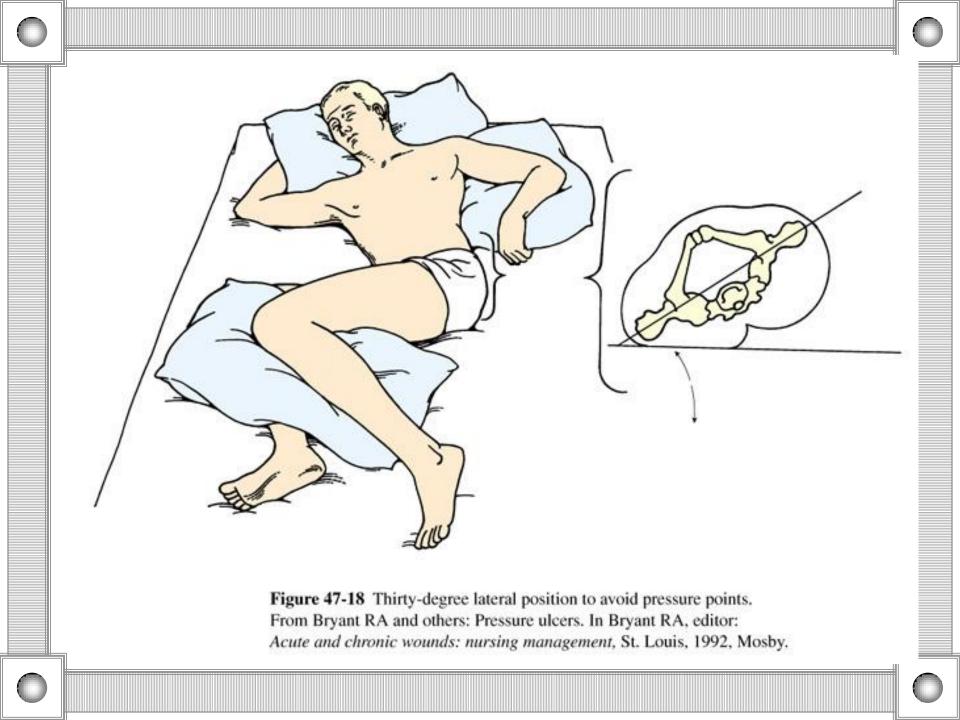
#### **Preventions of decubituses** Remember! Decubituses it is easier to warn, than to treat.

- Survey of parts of the body subject to formation of decubituses, not less, than once a day.
- Change of position of a body of the patient every 2 hour.
- The prevention of friction and shift of tissues during movement of the patient or at his wrong placement ("slipping" from pillows, situation "sitting" in a bed).

The contents in purity of a bed (fresh, dry linen). Wiping by water and massage of subject sites of a body.

- Processing of subject sites (a back, buttocks, arms, feet) an antiseptic for the purpose of infection preventions.
- Unloading of places of a prelum with use: the rubber circles covered with a diaper (under a sacrum), wadded and gauze circles or other soft laying under elbows, heels and a nape.
- Use of an antidecubital mattress.
- Organization of the healthy (rational) nutrition of the patient.
- Training of the patient in self-care receptions for movement.
- To carry out all medical manipulations according to instructions.





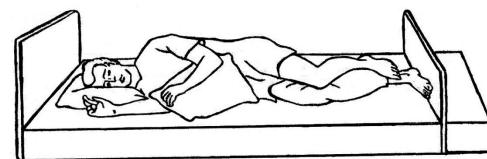




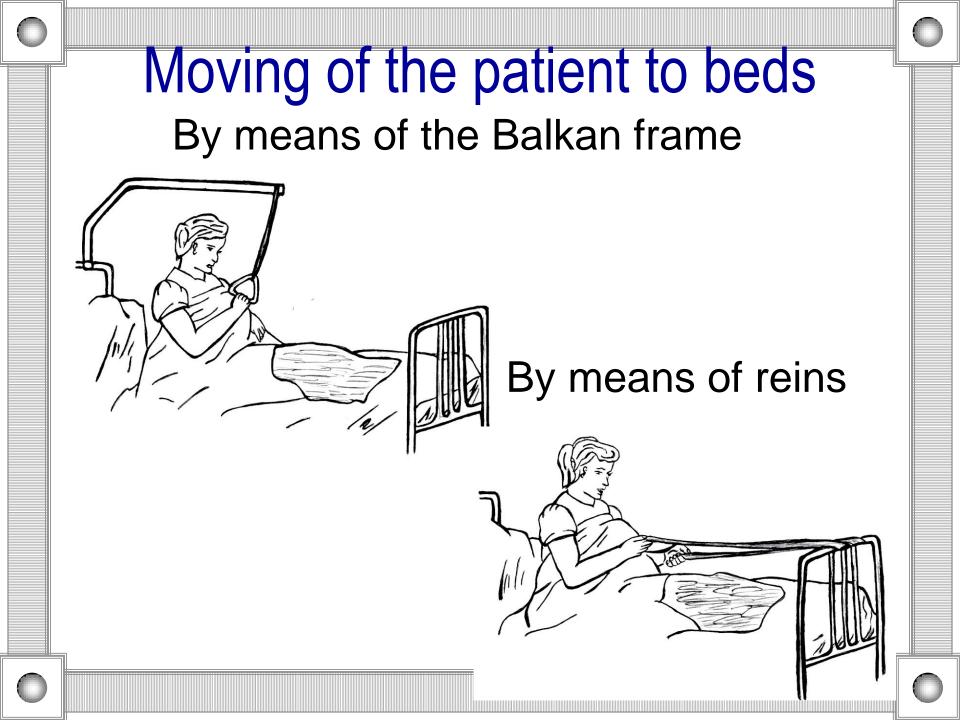
#### Simse' position

Position on abdomen

#### Position on the side



## position on the side and partiallyon a abdomen



#### Определение понятия Секвестры – это свободно лежащие в тқанях неқротизированные участқи, утратившие связь с организмом, но не подвергшиеся резорбции или отторжению во внешнюю среду.

#### Причины образования секвестров

#### нарушение микроциркуляции как результат тромбоза или инфекционного процесса.

#### Виды течения секвестров

- асептическое с образованием «секвестральной коробки» заканчивается обызыствлением;
- гнойно-неқротичесқое остаётся очагом инфекции с возможностью повторения процесса.



#### Диагностика секвестров

УЗИ паренхиматозных органов и клетчаточных пространств.

Сцинтиграфия паренхиматозных органов. Фистулография при свищевых формах тканевых некрозов. Компьютерная томография.

#### течение секвестров

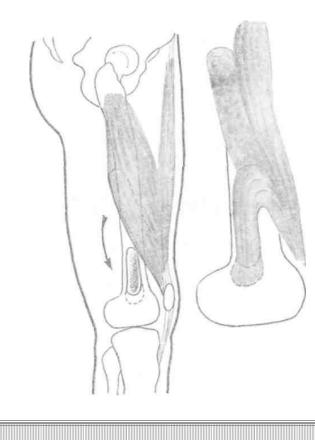
#### Местное лечение:

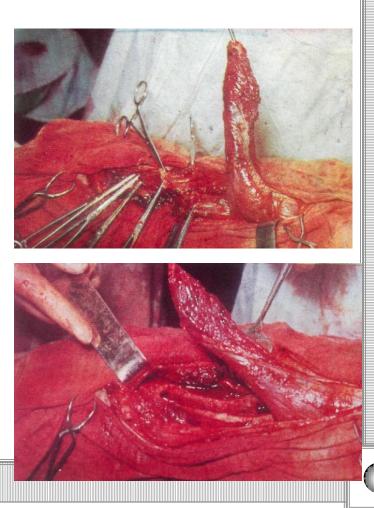
- удаление гнойно-некротического секвестра (секвестрэктомия);
- санация секвестральной коробки с последующим её заживлением. При неудалённом секвестре свищ не заживёт никогда или будет рецидивировать.

#### Общее лечение:

- антибақтериальное и противовоспалительное (по поқазаниям);
- протекторы тқаневые и сосудистые;
- витаминотерапия (витамины группы В);
- иммуностимуляторы.

Лечение хронического остеомиелита Мышечная пластика костной полости при хроническом остеомиелите бедра







**Trophic ulcer** 

The trophic ulcer is a defect of tissues with a small tendency to a healing, arising on the background impairment reactivity as result of the external and internal reasons

They are characterized by a various etiology and have secondary character.

## Etiological and pathogenetic classification of trophic ulcers

#### **Posttraumatic ulcers after:**

thermal and chemical burns; freezing injuries; skalped wounds; radial damages; decubituses; osteomyelitis.

### Ulcers on the backgraund bloodstrem disturbance:

heart failure;

arterial occlusion;

disturbances of venous outflow;

lymph drainage disturbances (lymphostasis).

**Neurotrophic ulcers as a result**: CNS damages (head and spinal cord); injuries of peripheric nerves.

#### Ulcers on the backgraund the general diseases:

collagenoses; illnesses of a metabolism; chronic intoxication; illnesses of a blood and hemopoietic organs; tumors; lues; tuberculosis, etc. **Ulcers caused by local infections:** mycotic and other parasitogenic diseases, epifastsial phlegmons; necrotic form of an erypsipelas.

#### Symptoms of trophic ulcers

- long existence (more than 2 months);
- bent to neogenesis weakening;
- low ability to an exudation;
- microbial expansion;
- predilection to diffusion of necrotic process;
- acidosis, hyperglycemia, dehydration, hyperpermeability of cellular membranes;
- giponeytrofiliya and lymphopenia.

#### Periods of a course of trophic ulcers

#### **Dystrophic changes:**

necrosis of a skin and surrounding tissues;

flaccid granulations;

plentiful fibrous scurfs and purulent discharge; extensive microbial dissemination.

#### The regenerative:

decrease of inflammatory process;

decrease of pains;

emergence of fine-grained granulation;

emergence of the centers of a regional cuticularization.

#### Stich – formation and epithelisation:

gradually there comes a wound repair with formation of the scars.

#### **Trophic ulcers of anticnemions**





Postthrombophlebitis syndrome, chronic venous failure

#### Throphice ulcers on the backgraund arterial insufficiency









# Trophic ulcer of the scar after a burn



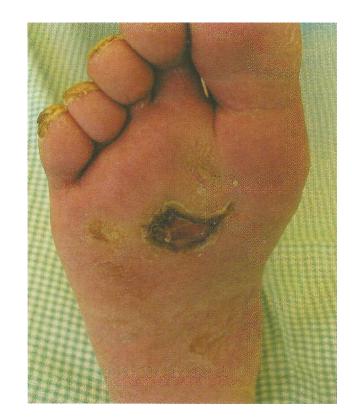
# Trophic ulcers after a freezing injury of the III-IV degres



#### Trophic ulcer of an amputating stump



# Neurotrophic ulcer after a spinal trauma



#### Deep steroid ulcer of an anticnemion



#### Herpes zoster (ulcerosus form)



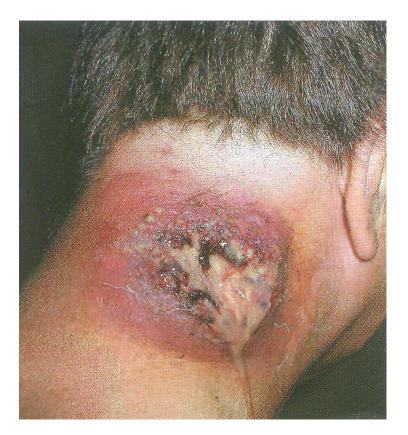
#### Mycotic ulcer of the left foot



## Bullosus-hemorrhagic erypsipelas of a forearm



## Neck carbuncul whith the outcome in an ulcer



#### Malignant ulcer



#### Ulcerated basalioma of face

# **Ulcer-cancer**

of face skin

#### **Ulcerated fibrosarcoma**



#### Deep mycosis with ulcer



#### Ulcer-cancer of glandule mamma (T-IV)





#### Microbial eczema of an anticnemion



#### Contact dermatitis on Troxevasinum – gel



# Trophic ulcer during posttrombophlebitic insufficiency



# Trophic ulcer during posttrombophlebitic insufficiency



### **Treatment of trophic ulcers**

#### The complex and conservative

#### **Local treatment:**

- functional regimen (movement, rest);
- elastic bandaging of an anticnemion at a venous failure;
- care of a skin round an ulcer (a dermatitis, an eczema);
- purification and ulcer sanation in a necrosis and inflammation phase;
- bandages with reparant in phases of healing and epitelisation;
- physiotherapy (laser, Ural federal district).

#### General treatment:

- antibacterial and antiinflammatory;
- protectors tissues and vascular;
- vitamin therapy (group B vitamins);
- immunostimulators;

dezagregant.

### **Treatment of trophic ulcers**

The complex and conservative

The surgical

- Correction of the broken blood flow:

operations on excising of superficial veins;

venous shunting;

arterial shunting;

over and subfascial dressing of insolvent veins of an anticnemion.

 In addition to it is closing of ulcerative defect autoskin: skin transplantation at the appreciable extent of defects on a place of ulcers after their preparation.



### Complications of trophic ulcers The acute:

arosive bleedings from ulcers;

penetration of ulcers in interfacing organs and tissues;

perforation of ulcers of walls of hollow organs in anatomic cavities.

#### The chronic:

perifocal microbial processes on skins and mucous;

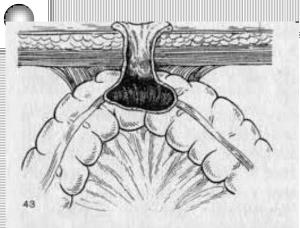
malignancy of ulcers;

rasping cicatrization of ulcers with cosmetic defects of a skin and cicatrical stenoses of hollow organs.

### **Prevention of trophic ulcers**

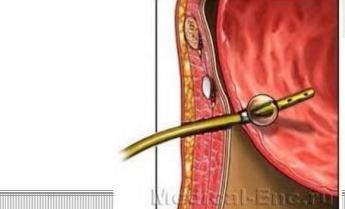
There are Well-timed diagnostics and treatment of diseases of vascular system which can complicated by trophic ulcers. There are planned reconstruction of the main blood flow in angiosurgery department according to indications .

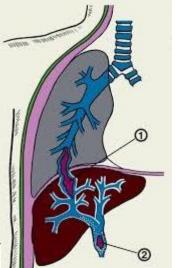
It is regular conservative tire-tread therapy by the patient with a chronic vascular failure.

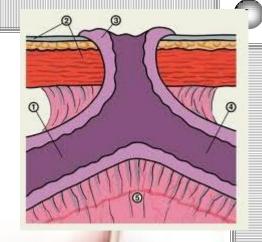


# **Fistulas**









### Fistulas

A fistula is an abnormal connection between an organ, vessel, or intestine and another structure.

If channel connect organ cavity or others cavity with surface of body it is called *external* fistulas.

If pathological channel connect two organs it is called *internal* fistulas or *stomas*.

In separated causes stomas implanted artificially and it us called **anastomoses.** 

#### Classification of fistulas On an etiology:

a) congenital (developmental anomalies); b) acquired as a result: inflammatory destruction; tumoral destruction; traumas; leaving of foreign matters; artificial applying (stomies and anastomoses). In relation to environment: a) external fistulas (cavities, organ); b) internal fistulas: between organs; between an organ and a cavity;

between an organ and the center.

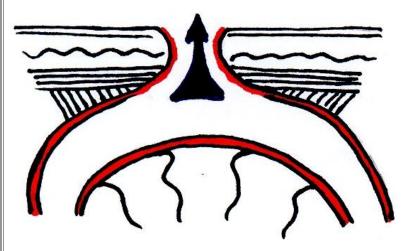
#### On an internal structure:

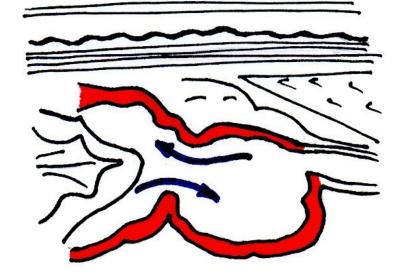
- a) granulating and epithelisational;
- b) tubular and spongiform;
- c) created and not created.

c) from cavities.

On character discharge (full and incomplete): the salivary; the cholic; the pancreatic; the urinary; the fecal; the milk; liquors; The purulent. On anatomic structure: a) from tissues; b) from organs;

### In relation to environment: (cavities, organ)

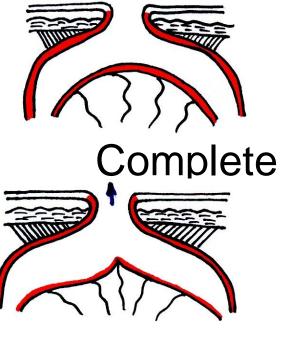


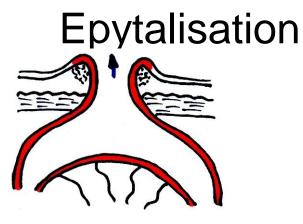


#### a) external fistulas

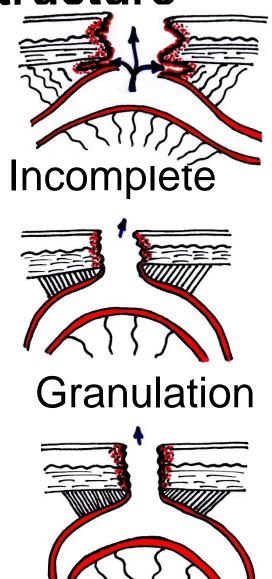
b) internal fistulas:

#### On an internal structure



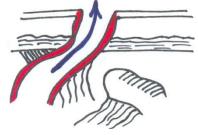


spongiform

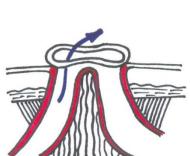


Tubular

#### On character discharge



Full



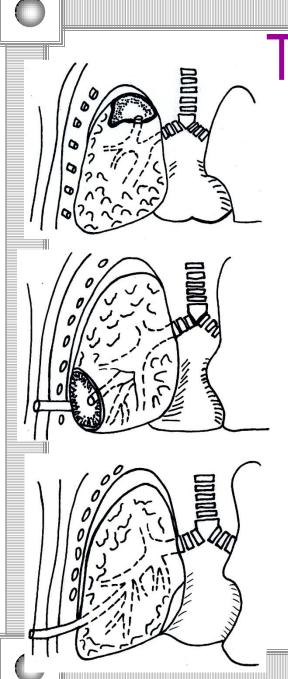
#### **On anatomical structure**

Not full

**From tissues** 

**From cavities** 

#### From hull organs: tracheo-broncial, intestinal, cholic, urinary,Sexual way



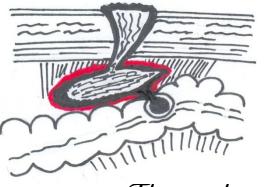
### Types of bronchial fistulas

## 1. Bronchopleural fistula in a "dry" residual pleural cavity

2. **Bronchus – pleura-dermal** fistula through a cavity of a chronic empyema

3. **Bronchus – pleura-dermal** fistula in the absence of an empyema cavity

#### Types of intestinal fistulas incompletes intestinal fistulas





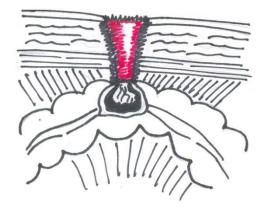
Through cavity

hiatus

#### **Completes intestinal fistulas**

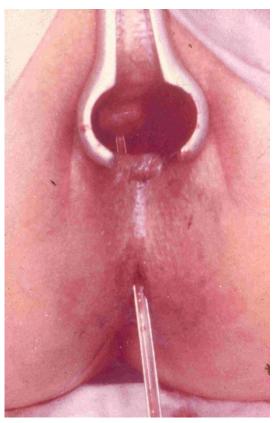


spongiforms



tubular

### Clinical type of fistulas





#### **Pararectal fistula**



Near auricular's fistulas

### Applying of artificial fistulas The purposes of applying:

- removal of contents of a cavity or hollow organ (epicystotomy, colostoma);
- switching off from a passage (applying of anastomoses);
- Tubes nutrition (gastrostoma, eyunostoma).

#### **Clinical type of fistulas**

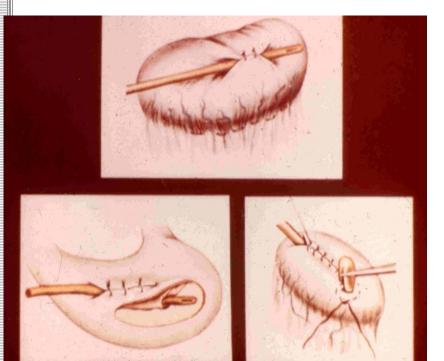




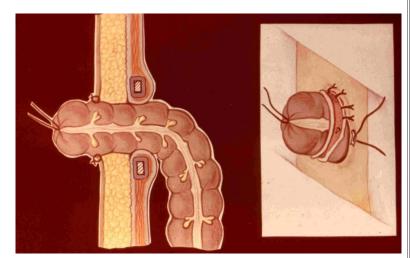
#### The artificially applied colic fistulas of anterior abdominal

wall

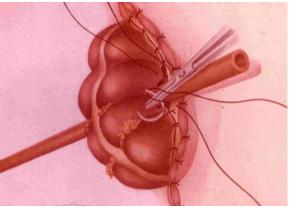
### Technique of applying of artificial fistulas (external) – anastomoses



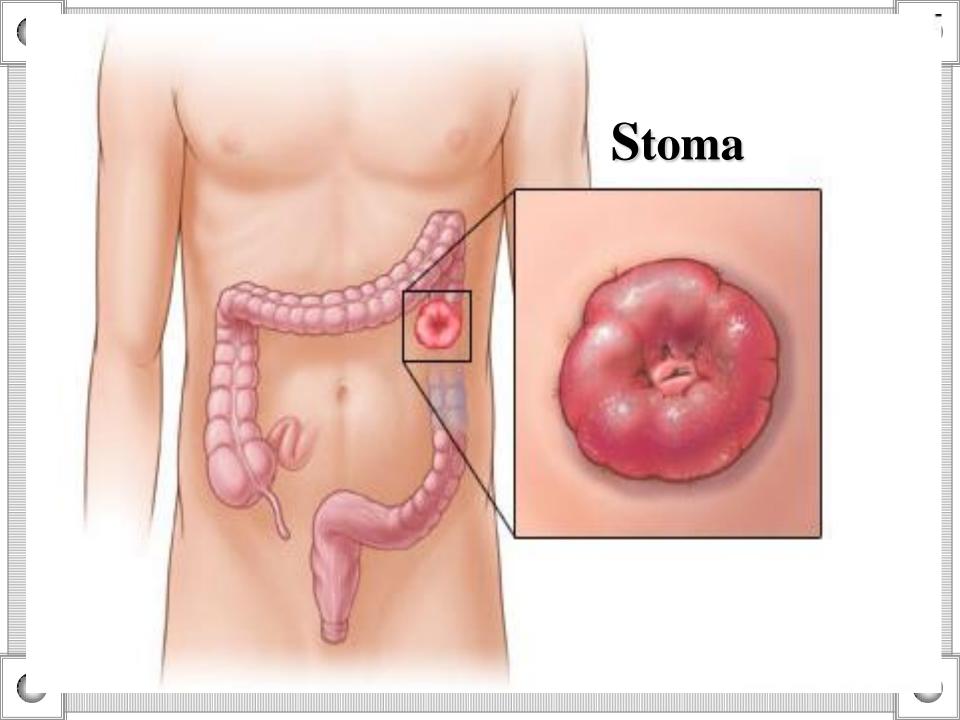
#### Gastrostoma for Vitsel



#### single-tube (intestin) ostomy)

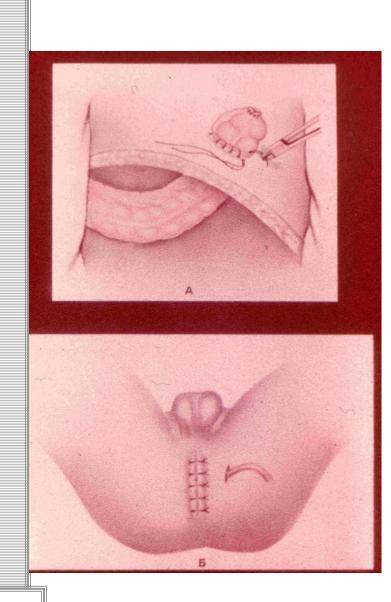


Two-tube (intestin) ostomy)

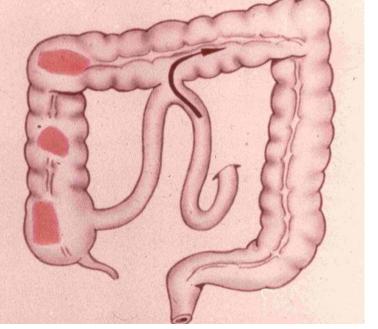


cont..

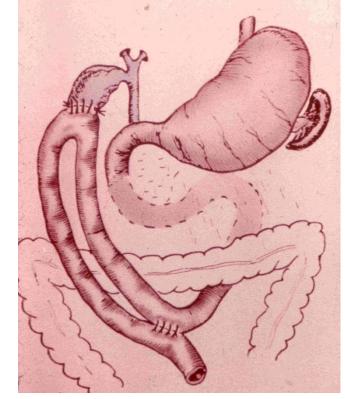
Gartman's operation (a rectum extirpation with formation of an single-tube (intestin) ostomy)



### Technique of applying of artificial fistulas (internal) – anastomoses



Thin-thick intestinal fistula



Thin-thick intestinal fistula and the cholic -thin intestinal fistula

### Epicystotomy /epi·cys·tot·o·my/ cystotomy by the suprapubic method

### Initial Management :

Urethral catheterisation
Suprapubic catheter (SPC)

### Late Management:

 Treating the underlying cause



### **Diagnostics of fistulas**

Specifics complains.

 $\geq$ 

>

- Family and special anamnesis.
- Objective examination (a type of fistula and a skin around, character and quantity of discharge).
- Fistula revision by tube.
- Fistulography.
  - Contrast X-ray examination.
  - Introduction of dyes in fistula (methylene blue).
  - Laboratory research of fistula discharge.

### Treatment of fistulas

### <u>\_ocal treatment (conservative):</u>

- protection of a skin round fistula from aggressive secrets (Lassar's Pasta, zinc Pasta);
- tamponade or fistula obturation (for protection of granulation and prevention of a irritation of a skin discharged from fistula).

#### Local treatment (surgical):

- it is urgently carried out at high full exhausting intestinal fistulas for salvage of the patient from a cachexia and electrolytic death;
- it is according to plan carried out for the purpose of fistula closing after decrease of the inflammatory phenomena and skin preparation round fistula and includes:
- excision of the pathological center supporting fistula (a foreign bodies, the sequester);
- creation of outflow discharged from fistula;
- closing of defect of a wall of the organ carrying fistula by seams (closing kolostomy);
- excision of an epithelial wall of a fistulas way (its transformation in granulating);
- resection or excision of an organ carrying fistula (seldom).

#### **General treatment:**

correction of water and electrolytic balance and metabolism disorders (transfusion of electrolytic solutions and blood substitutes); antibacterial therapy; vitamin therapy (group B vitamins); immunostimulators.

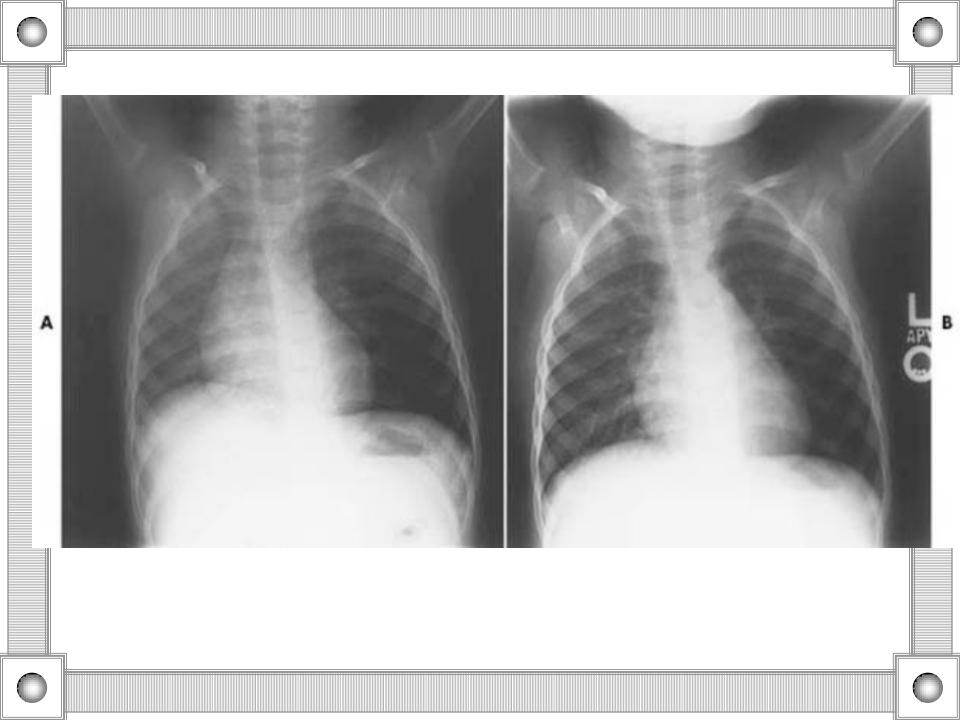
### **Foreign bodies**

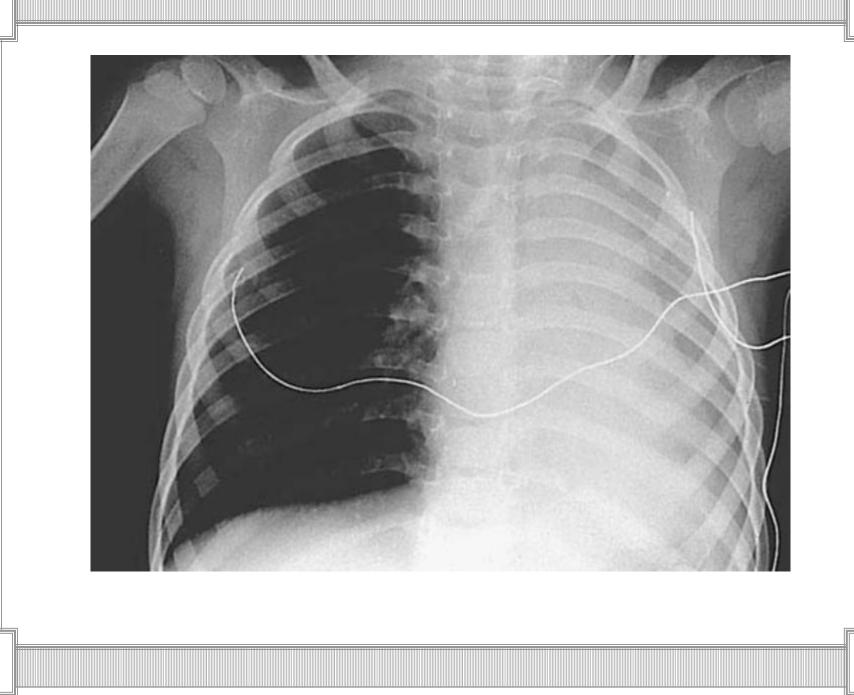
A foreign body (Latin: corpus alienum) is any object originating outside the body. In machinery, it can mean any unwanted intruding object.

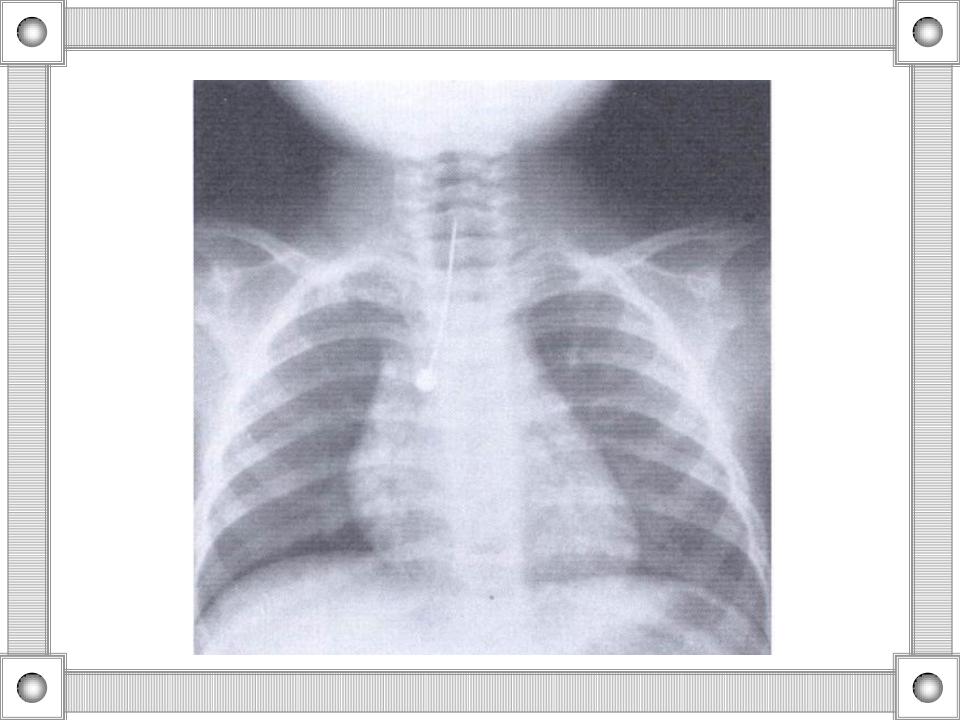
Most references to foreign bodies involve propulsion through natural orifices into hollow organs.

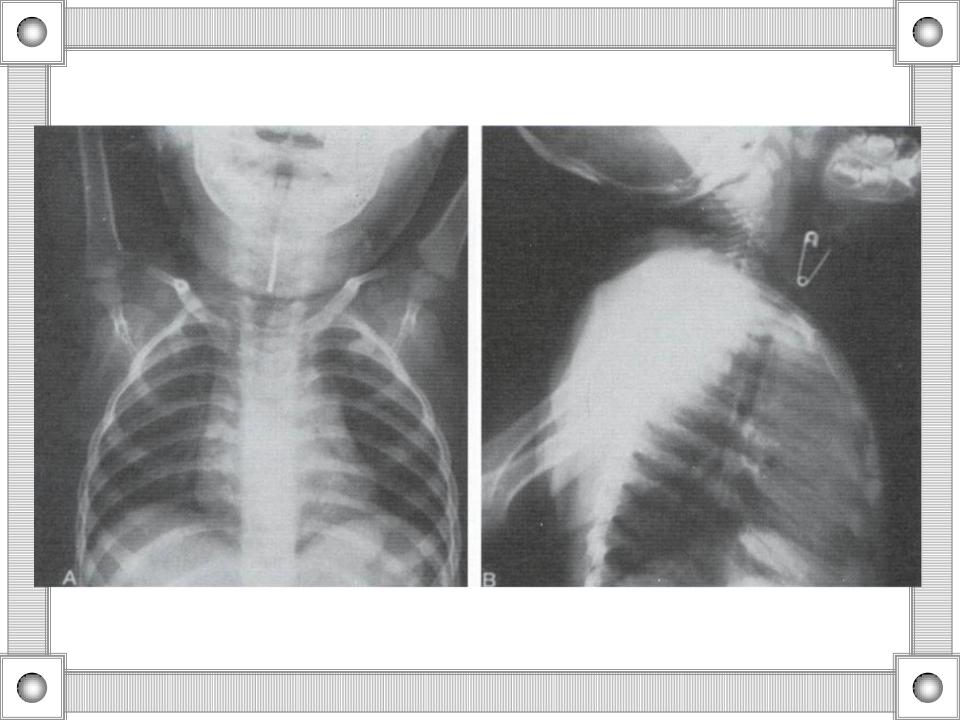
Foreign bodies can be inert or irritating. If they irritate they will cause inflammation and scarring. They can bring infection into the body or acquire infectious agents and protect them from the body's immune defenses. They can obstruct passageways either by their size or by the scarring they cause. Some can be **toxic**.

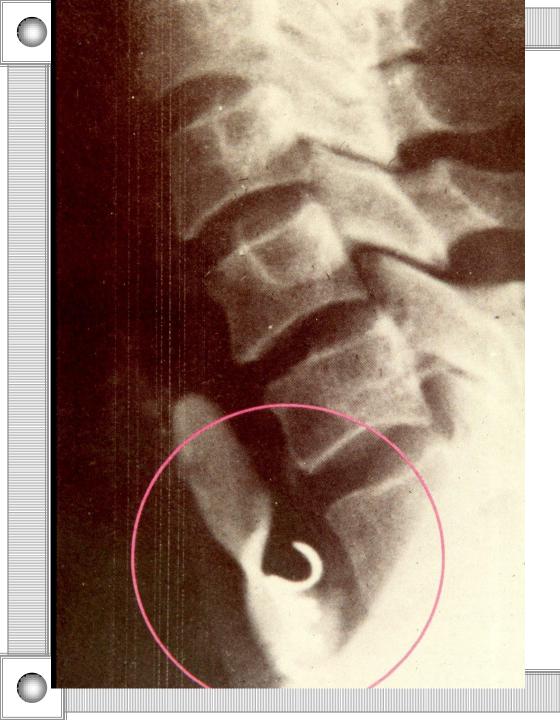
**CAUSTIC INGESTION AND FOREIGN BODIES OF THE AERODIGESTIVE TRACT** Radiography PA & lateral views of chest & neck **Inspiration & expiration** Lateral decubitus views Airway fluoroscopy 25% have normal radiography



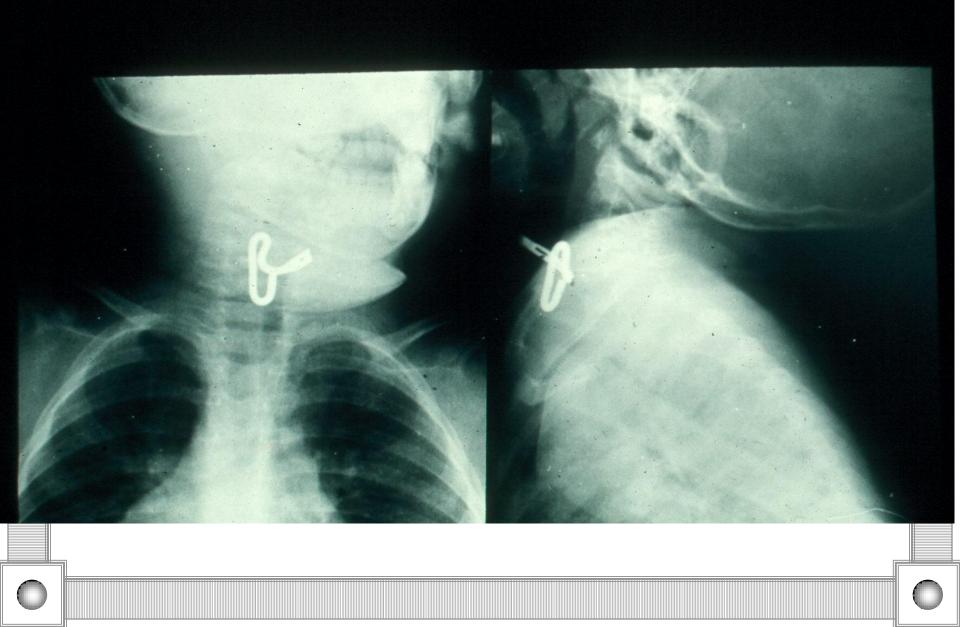


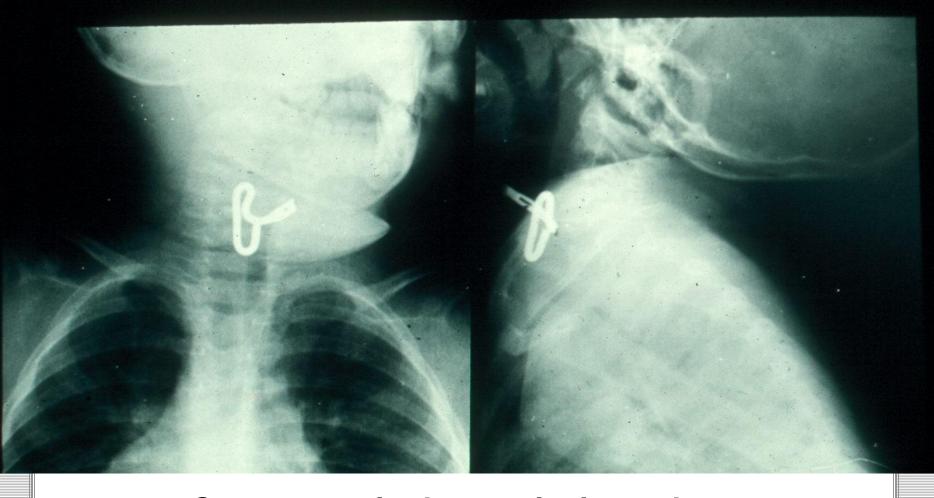






## Swallowed denture





#### Can opener in the cervical esophagus



#### A case of iron deficiency?







### Guideline for Removal

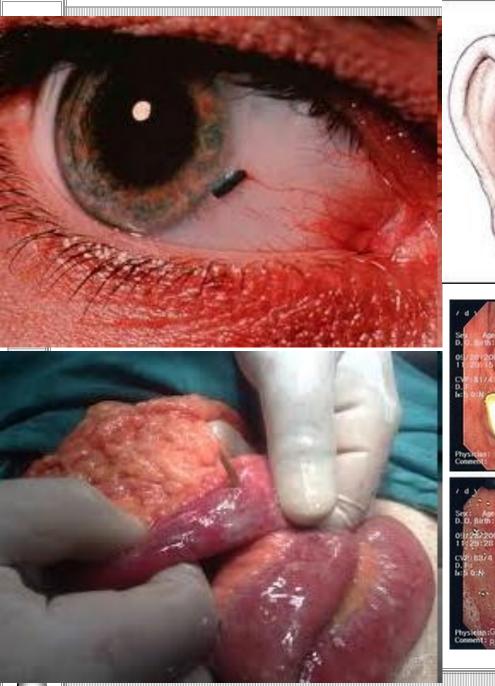
- Traumatic tattooing
- Foreign bodies in fatty tissue
- Puncture wounds to sole of foot
- Subungual foreign bodies
- Fishhooks
- Wooden splinters
- Pencil lead
- Metallic fragments

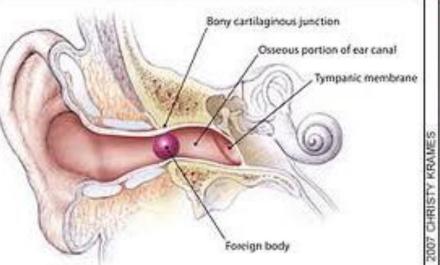


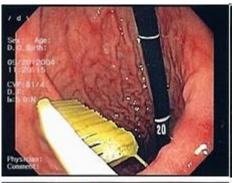
**Guidelines for Removal** Marine foreign bodies **Cactus spines** Postoperative foreign bodies **Ring removal Tick removal Zipper injuries** Hair-thread tourniquet



### RETAINED FOREIGN BODIES













### Thanks for your attentions!



