

Ministry of Health of Ukraine  
POLTAVA STATE MEDICAL UNIVERSITY  
Chair of surgical stomatology and maxillo-facial surgery

Non-gunshot and gunshot damages of soft tissues of face. Statistics, classification, features of clinic, diagnostics and treatment. Principles of surgical treatment of wounds. Stages of treatment of wounded with damages of soft tissues.

Candidate of sciences, reader Lokes K.P

# Lecture plan

1. Non-gunshot and gunshot damages of soft tissues of face.
2. Statistics, classification, features of clinic, diagnostics and treatment.
3. Principles of surgical treatment of wounds.
4. Stages of treatment of wounded with damages of soft tissues.

- **Trauma** is an influence on the organism of outward agent (mechanic, thermal, electric ray, psychical and oth.), which provoked the anatomical and functional breaches in the organs and tissues, which are accompanied by local and general reaction of organism.
- The dividing of traumas by character of damages is very important- there are distinguished the **open and closed traumas**. There is a gaping of skin and mucous membranes wounds by the open damages. The microbes can penetrate through the wound of skin and mucous, that is promoted to development of early and later complications. There are also distinguished the penetrating damages, in the presence of which the internal organs (of abdomen, of thorax, of skull, of joints and oth.) can be affected, and unpenetrating.

- In case of damages of tissues of only one type we tell about the **simple trauma**, if the different tissues are damaged-about **complex trauma**, for example, the skin, muscles and bone.
- Trauma can be direct and undirect (damages developing in the distance from the region of provoking agent influence). The single and plurality traumas (politraumas) are possible. Usually the traumas are acute.

- Symptomatology of patient with serious traumas is developed very quickly, state is often serious, often it is necessary for surgeon to orientate quickly, be able to specify the diagnosis and render first help.
- At first, the outward look of damaged place not always corresponds to the seriousness of damage.
- Secondary, not always the trauma, symptoms of which are obvious, is threatening for human life, the diagnostic of plurality traumas is especially hard in patients, which are unconscious, in a state of serious shock or alcoholic intoxication.
- Thirdly, the serious general phenomena (shock, acute anemia, traumatic toxicosis) can to conceal traumas. It is necessary to estimate then rightly and render the proper help.

## ■ **WOUNDS Definition**

- **Wounds (vulnus)** are the mechanical damage of the organism, which occur from destroying the integrity of the covered tissues - skin or mucous membrane. During this damage there can be destroyed more deep tissues, inner organs (damage of the brain, liver, stomach, kidneys and others). The injury of the covered tissues separates the wound from other kinds of damage. For example the injury of the liver, which is caused by the dull trauma of the abdomen without destroying the skin, is the rupture and the damage during the stroke by a knife in the abdominal region-wound of the liver, because we observe the destroying of the skin.

## **The main features of the wounds**

are pain, bleeding and hiatus. Their development depends on the localization of the wounds, mechanism of the damage, volume and deepness of the injury, and common condition of the patient.

## **Pain (dolor)**

It caused by direct damage of the nerves in the wounds region, and in result if it's freezing during the development of the swelling. The pain can be localized not only in the place of damage but also it can be spread over the whole region of innervation.

### **The intensivity of pain syndrome is determined:**

- Localization of the wound.
- Injuries of the big nerves trunks are present.
- The character of the weapon and the frequency of causing and wound - the weapon is *sharp* and the damage of the receptor is less, and the pain is less.
- Nerves - psychological condition of the organism.
- Pain is the protective reaction of the organism, but long and intense pain causes exhaustion of the central nervous system.



## **Bleeding (haemorrhagia)**

- Bleeding - the constant feature of the wound because of the damage of the tissue starts from skin and mucous tissues and it is accompanied by the disturbance of the integrity of vessels. The intensity of the bleeding can be different - from capillary to arterial bleeding.

### **It is determined by:**

- The presence of damage of big (or middle) vessels: arterial or vein ones.
- Localization of the wound. The most intensive bleeding is in injuring of the face, head, neck, manus -the tissue of these parts of the body has more blood than others.
- The character of the weapon.
- The condition of local and common hemodynamics. When the arterial pressure is decreasing or squeezing of the magistral vessel the intensity of the bleeding decreases.
- The condition of the coagulation system.

## **Cleft (Hiatus)**

- The hiatus of the wound is caused by the contraction of the elastic fibers of the skin. Expressivities divergention of the skin's borders of a wound first of all is determined by correlation of its axis to the Langergan's lines. These lines shoe the main direction of the rough skin structures situation. For example, for decreasing of the hiatus during the operation of the extremities the surgeons choose the longitudinal directions of the incisions. The special means of direction of the incision is in cosmetic and plastic surgery during closed skin defects. For big hiatus of the wound (incisions of the festering) the incision is made perpendicularly to the Langergan's line.

### ***Classification according to the origin***

- All the wounds are divided into two groups: operative and accidental.
- Operative wounds are caused deliberately, with treatment or diagnostic aim, in special aseptic conditions, with minimal damage of the tissues, during the anesthesia, with hemostasis and by joining with stitches of the incisive anatomical structures. In such condition the pain is not present in case of the operative wounds, the possibility of the bleeding is minimal, and the hiatus of the wound is removed at the end of the operation by applying stitches, it means that the main wound features are removed artificially.

- **The operative wounds heal by the primary tension.**
- All other kinds of wounds are accidental. The common thing of the wounds is that they are caused contrary to the will.

## ***Classification according to character of tissue injure***

- cut or incised wound (vulnus incisum);
- stab or pierced wound (vulnus punctum);
- contused wound (vulnus contusum);
- lacerated wound (vulnus laceratum);
- crushed wound (vulnus conqvassatum);
- sabre or slash wound (vulnus caesum);
- bite wound (vulnus morsum);
- mixed wound (vulnus mixtum);
- gunshot wound (vulnus sclopetarium).

## **Cut wound (Vulnus incisum)**

A sharp object causes these wounds. During the influence of the tissues the effort is concentrated on the concrete area, and this area has the high pressure, and this influence divides the tissue in the direction of sharp objects action. The surrounding tissues damage is not substantial. But the sharp object goes down to the internal organs and tissues. These wounds lead to a faint pain syndrome, big bleeding, and the hiatus depends on the correlation of the axis to the Langeron's lines. Cut wound is dangerous with the vessels damage; nervous damage if this trauma does not have such complications the wound is going to heal by primary tension.

## **STAB WOUND (Vulnus punctum) Колотая рана**

- Stab wound is caused by narrow and pointed object. The anatomical peculiarities are large depth and small area of the injured skin and mucous tissue.
- The pain syndrome is slight, hiatus is absent, the external bleeding is absent, but hematoma can develop. Its special feature is damage of the inner vessels, nerves and organs. That's why this kind of wound has the difficult diagnostics. During the stab wound the injure can be simple or with serious complications of the liver, stomach and others - this condition can lead to death. This wound can lead to spreading of infection.



### **According to the zone of damage:**

- Wounds with a small zone of damage. These wounds have a small border of the incision and the necrotic zone is very small. The wounds with small zone have no complications, small hiatus.
- The wounds with a large zone of damage. These wounds have insignificant hemorrhage, strong pain, long healing, and many complications.

### **Classification according to the level of infection**

- Aseptic.
- Fresh infected.
- Suppurative.

## Gunshot wound

**This wound has three zones of damaging:**

- - **wound canal.** In some cases there can be a bullet, or parts of necrotic tissue, blood and bacterias.
- - **direct traumatic necrosis.** Appears during the influence of kinetic energy. It consists of viable or unviable tissues, which are saturated with blood.
- - **the zone of molecular contusion.** It consists of tissues, which have malfunction of metabolism and of cellular structures. During the uncomfortable conditions, for example, the decreasing of perfusion, oxygenation, developing of the infection, the tissues devitalize (die). This zone is called "a stockpile of the following necrosis". This zone causes problems with treatment.

## **Complex anatomical character of damage**

- High kinetic energy causes not only presence of three zones, but also their complex anatomical character. What does it mean?
- During the damage very often injure of some cavities of the organism is observed. Sometimes we can meet splinter fractures of the bones, and during injure of inner organs we can observe their rupture. Not always the wound canal is the direct line from the entrance to the exit aperture. It may look as indmeet line and may cause the damage of different organs.

## **High level of infection**

- Gunshot wound is very often complicated by the development of infection. High level of infection with the necrotic mass increases the risk of suppuration. And according to big damage of the muscle and small diameter of the entrance aperture, the access for the oxygen is very difficult, and this is the big evidence for the development of anaerobic infection.

### **According to the character of wound canal:**

- A thorough damage - it has entrance and exit apertures (a bullet is out of the organism).
- Blind injury - it has only entrance aperture (bullet is at the end of wound canal).
- Tangential - the damage of superficial tissues, without the penetration to the cavities of the organism. According to the factor of damage:
- Small speed damage gunshot. The speed of the bullet is 600 m/s. The wound canal more often may be direct and blind. Such wound has, as a rule, a small entrance aperture and not big tissue damage.
- High-speed damage. The speed of the bullet is 900 m/s and more. These wounds have small entrance aperture and wide, with defect of tissues, exit aperture. Wound canal winding, that's why we may observe the injury of many organs and tissues. More destroying effect may be caused by explosive shells.
- Shot wounds. These wounds have many separate apertures, bleeding, the contusion of organs and tissues.

# bruises and laceration during treatment



# after treatment





bitten wound





# bitten wound



# Cut wound





# Cut wound



# bitten wound





bitten wound



# bruises and laceration



# hematoma





# Questions for discussion of the lecture

1. Anatomical and physiological features of soft tissues and facial bones.
2. Features of the clinic, diagnosis and treatment of non-gunshot and gunshot wounds of the face.
3. The concept of secondary "shells" in surgery.
4. Features of the primary surgical treatment of a gunshot wound.
5. Features of the provision of step-by-step assistance to victims with injuries of soft tissues of the face.



Thank you for attention!