

**Course of lectures on traumatic injuries in maxillo-
facial region**

Chisinau, 2014

Introduction

In the present study guide for maxillo-facial surgery and dental surgery, briefly, are described some traumatic injuries in maxillo-facial region, namely etiology, pathogenesis, diagnostics, of the clinical progression and treatment of the given diseased peculiarities. Course of study materials on traumatic injuries in maxillo-facial region will help students of dental departments in the given speciality study. The present manual is composed in accordance with syllabus approved for students of dental department, of the State University of Medicine and Pharmacy “Nicolae Testemitanu” of Republic Of Moldova. The manual contains the lecture material for students of 4th year of stomatological department.

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Topic № 1.

OMF traumatism, general information. Soft tissues damages.

SOFT TISSUES INJURIES IN THE MAXILLO-FACIAL REGION

All traumatic injuries are divided into occupational (industrial and agricultural) and non-occupational (household, transport, outdoorsy, sport) according to the reasons of their production.

Industrial Injury is injury coming from the execution of workers occupational functions in the production sector or agricultural sector.

Home accident is injury which is not connected with occupational functions but is produced in the result of household duties performance or home disputes. It is observed that the frequency of home accidents increases in the spring-summer period (from April until September). Around 90% of home accidents appear in the result of stroke and only 10% of home accidents appear in the result of downfall or due to other reasons. Men prevail women among injured in the ration 4:1. More often home accidents occur at the age of 20 till 40 years (60%).

Outdoor injury is injury coming from outdoor walking (human downfall due to disturbance of the general sense of well-being, ice slick, natural disasters and etc.) which is not connected with transport. About half of injured persons are persons middle, elderly and old aged. The given injury differs by slight character of injury (often: hurts, frets, wounds, teeth injury, nasal bones and zygomatic (malar) complex injuries).

Road accident produces in the result of road traffic incidents. It is characterized by multiplicity and combined injuries.

Combined injury is the coeval injury of two or more organs which belong to different anatomico-functional systems. A craniofacial injury is more often type of combined injuries.

Sport injury produces in the result of fitness and sport. There is defined the seasonality of sport injury. More often it occurs in winter months (skating, hockey, skiing) or in summer (football).

Nature of a non - firearm trauma in the maxillo-facial region.

According to nature and degree of injuries, all face soft tissues traumas are divided into two main groups:

1) *Isolated injuries of face soft tissues* (without skin integument and mouth mucosa membrane crippling (contusion); with skin integument and mouth mucosa membrane crippling (racoma or wound));

2) *Combined injuries of face soft tissues* and viscerocranium bones (without skin integument and mouth mucosa membrane crippling; with skin integument and mouth mucosa membrane crippling).

Contusion is a closed mechanic injury of soft tissues without optic violation of their anatomic crippling. It is produced under the influence of blunt item with the little force on soft tissues. This is accompanied by the expressed violation of subjecting tissues (skin structure, muscle) with the preservation of skin crippling. In the subjecting tissues there are observed injury of small vessels, hemorrhage and blood tissues imbibitions. There are originated acchymomas (the hemorrhage in the skin thickness or membrane mucosa), or hematomas (restricted blood accumulation in the tissues with the cavity formation in it).

Acchymoma is the indicant of viability of tissue injury. The “Flowering” of acchymoma is a gauge of the trauma limitation. The purple-cyanotic color of acchymoma is preserved during 2-4 days and a green coloring appears on the 5th - 6th day after trauma, on the 7th -8th -10th day color of the skin is yellow. Acchymomas disappear in 10 -14 days depending on hemorrhage sizes.

Hematoma is classified depending on:

- **their tissue placement** (subdermal, submucosal, intraperiosteal, intermuscular, subfascial);
- **localization** (buccal, suborbital, periorbital, and other regions);
- **the state of effused blood** (non-maturated hematoma, infected or maturated hematoma, organized or encapsulated hematoma);
- **the attitude to the blood vessels lumen** (non-systaltic, systaltic and arching).

Frequent contusion of soft tissues could be combined with the injury of facial skeleton bones. The augment of edema and a non-expressed functional injury could create a false presentation about only soft tissues damage isolation. X-ray examination should be executed to specify the diagnoses.

In two first days after trauma, the treatment of soft tissue injuries consists in overlapping of freeze (the icepack should be overlapped every hour with the interval 15-20 minutes) on the given area. From the third day after trauma thermal procedures (UV (ultraviolet) irradiation, ultrasound, phonophoresis with iodine paraffinotherapy, hot compress and etc.) could be prescribed. Trocsevasin (jelly 2%), heparoid, heparin ointment, Dolgit cream (the cream contains ibuprofen) and other ointments should be prescribed for the treatment of injury region.

In the case of soft tissues acute hematomas (two first days) it is prescribed the freeze and from the 3rd -4th day there are indicated thermal procedures.

Hematomas are opened in the case of their suppuration and encystations (organized hematoma).

Excoriation (racoma) is the hurt (mechanic trauma) of the superficial skin stratum (epidermis) or mouth mucosa membrane. More often it produces on the outpouching body part: nose, chin, and front, superciliary and zygomatic regions. Often racomas are accompanied by soft tissue injuries and more rarely racomas are accompanied by face and neck wounds. Such kinds of hurts occupy about 8 % of all soft tissue hurts (according to our clinic data). The following racoma cicatrization periods are distinguished:

- from the time of racoma appearance to the time crust appearance (10-12 hours);
- the occlusion of the racoma floor to the level of unaffected skin and then upward (12-24 hours, and sometimes until 48 hours);
- the epithelization (4-5 days);
- the falling-off crust (on the 6th -8th -10th day); disappearance of racoma trace.

Cicatrization terms can be changed in dependence of racoma sizes. The cicatrization takes place without any cicatrices formation.

The racoma treatment includes the manipulation by 3% hydrogen dioxide, chlorhexidine solution, adjustment by dressing of Kureosin solution, adjustment of collagen pellicle on the wound surface.

Wounds

Wound is a crippling of mucosa membrane along all its thickness (denser and deeper of lying tissues) caused by mechanic influence.

Wounds are distinguished into:

- superficial and deep,
- nonpenetrating and penetrating (in the mouth and nose cavity, maxillary antrum, eye socket and etc.)

According to the type and form of injure item, there are distinguished following wounds:

- compound,
- laceration,
- sword-cut,
- punctured,
- chopped,
- bite,
- crushed,
- degloving wounds.

Compound wounds are produced in the case of blunt item stroke with the simultaneous injury of surrounding tissues. Wounds on the mucosa membrane could be the result of teeth injury in the case of stroke in cheek region, upper and lower lip. Therefore wounds are infected by mouth mucosa microflora. The saliva which effuses from the wound irritates the skin.

Laceration wound is the wound appeared due to tissues hyperextension. It is characterized by incorrect edges form, tissue sublation or abruption and by great zone of their injury. It appears in the case of stroke by abrupt items, fall, occupational or sport injuries and other.

In dental practice laceration wounds are observed in the case of bur injury, teeth extraction tongs and other small instruments.

Sword-cut wound is the wound produced by a sharp item. It is characterized by line or fusiform with equal parallel edges. Sword-cut wounds dehisce significantly even if they do not penetrate into deep layers of soft tissues of maxilla-facial region. This occurs because of facial muscles injuries which contract strong and widen the wound. It creates a false impression about the presence of tissues defect. In the dental practice sword-cut wounds occurs in the case of tongue, lip and cheek injury by the separating disc. The microbial contamination of these affections is great.

Punctured wound is the wound produced by an acute item with small cross sections. It is characterized by the narrow and long wound tract. It is observed in the case of stroke by household piercing objects (knife, awl, screwdriver and et.), in the dental practice (elevator). The microbial contamination is significant expressed if injury of soft tissue is produced by an elevator.

Chopped wound is the wound produced because the stroke of a heavy acute item. It is characterized by a fissured form and high deep. In contrast to sword-cut wound, chopped wound has more vast soft tissues and wound edges affect. More often these affects are followed by facial skeleton bones fractures and can penetrate in cavities (mouth, nose, eye socket, skull, and maxillary antrum). Bones fractures are usually splintered. Usually the microbial contamination is expressed. Frequent it is accompanied by wound suppuration, development off posttraumatic sinusitis and other inflammatory aggravations.

Bite wound is the wound produced by teeth of an animal or a people. It is characterized by a contamination and by abrupt, crushed edges. If the human was bit by an animal this wound is contaminated by a pathogenic flora.

Crushed wound is the wound during which production occur the histotripsy and breakage of tissues. More often than not, there are injured deep placed tissues and organs (salivary glands, eye-ball, throat, weasand, tongue and teeth), great vessel and nerves. There are originated vast hemorrhage and asphyxia.

Degloving wound is the wound with the complete or almost complete separation of vast skin flap. Generally there are produced on the bulging parts of facial skeleton (nose, front, zygomatic area, chin and etc).

Clinical picture peculiarities of soft tissue wounds according to their localization.

In the case of oral region tissues affection the mucosa membrane is injured by the acute teeth edges and by broken plastic dentures. More often it is observed in the lips and cheek regions. Wounds flood ample and always are infected. If there are defected the inner and external surface of jaw body alveolar bone and also hard palate, the mucosa membrane could be not brought together, as it is solid soldered with periostenium. The injury of the mucosa membrane in the retromolar region or os, and also of the mouth cavity floor causes a vast hemorrhage and a speed edema development with the relevant clinical symptoms (pain during the ingestion, mouth opening, and tongue movement).

Dentist can give a deep wound as by bur (in the time of teeth treatment) as by a separator disc (during the preparation of teeth to prosthodontic treatable) in the region of mouth cavity floor soft tissues, tongue and cheek. In the case of injury of sublingual tissues region by separating disc, lingual arteria or vein could be affected which will contribute to the vast hemorrhage. If it is impossible to stop the hemorrhage of affected vessel by the bandage (in the wound or around it) should be done along vasoligation of lingual artery of Pirogov's triangle or external carotid artery. The tongue injuries occur during human downfall (biting of the tongue by teeth) or during the cerebral seizure, fishhook injury and other. If there are affected upper and lower lip it is observed the opening of wound edges. In the result of affection of orbicular muscle could be the absence of airtight lip-seal. Compound wounds of periorbital region can violate the eyelids movement, but oftime eyelid trauma leads to their cicatrices eversion or epicanthus formation of vertical skin ruga which close the medial triangle of palpebral fissure.

SURGICAL DEBRIDMENT

Surgical debridement is a surgical operation directed to creation of favorable condition for wound cicatrization, prevention or fight with the wound infection. It includes the elimination from the wound of nonviable and impure tissues, the final hemorrhage stop, ablation of necrotizing edges and other arrangements.

Primary surgical debridement is the first wound debridement of a patient.

Secondary surgical debridement is the wound debridement which is leaded according secondary indications, i.e. according to the following changes subjected by infection development.

Early wound debridement is performed in the first 24 hours after injury.

Primary tardy wound debridement is the primary debridement performed on the second day after injury, i.e. after 24-48 hours.

Late surgical wound debridement is performed in 48 hours and more.

Surgical debridement peculiarities of maxillo-facial region wounds:

- should be performed in full and at earliest terms;
- it is not allowed to pare (refresh) wound edges, but only nonviable (necrotizing) tissues should be debrided;
- wounds which penetrate in the mouth cavity should be isolated from the mouth cavity by the blind saturation of the mucosa membrane with the following layered closure (muscles, skin);
- as a result of lips injuries from the beginning the red border (Cupid line) should be put together and needle and then to saturate;
- wound debrides should be obligative amputated. Exception are only debrides which are in hard-to-reach places (palatal recess) as their search is incidental to additional traumas;
- in the presence of injury of eyelids or lips red border, the skin and mucosa membrane are necessary to mobilize to prevent the tissues retraction (astringent) in order to avoid further intention in the sutures line in some cases. Sometimes it is necessary to make the displacement of interchanging triangular flaps;
- in the presence of injury of salivary glands parenchyma it is necessary to suture the gland capsule and then all subsequent layers. In the presence of canal injury it is necessary to suture it or to create a false canal;
- wounds are sutured by a blind suture and are drained only if they are infected (late surgical debridement);
- in the case of expressed edema and a wide edges dihescence are used U-shaped sutures (for example: on the gauze swab a distance away the wounds borders 1.0-1.5 cm) to prevent sutures cutting out;
- in the presence of soft tissues big penetration defect the surgical debridement is ended by a suture of a skin with the membrane mucosa mouth cavity to avoid the jaws cicatricial contraction. It creates favorable conditions for the further plastic defect closure as well as prevents the formation of gross scar and the deformation of neighboring tissues;

- postoperative wound management is oftener performed by an open method namely without dressings application on the second and consecutive days of the treatment;
- to prevent the suture lines disruption, sutures shouldn't be early removed. Soft tissues of maxilla-facial region have some characteristic peculiarities by contrast with other localizations:
 - voluminous blood supply;
 - good innervations;
 - high regeneration abilities;
 - expressed local tissues immunity;
- tissues have cells around the face natural ostium which are already partially prepared for the cicatrization;
- wounds of mouth cavity mucosa membrane are bounded by saliva and it contains lysozyme which promotes the regeneration;
- microflora of mouth cavity, nose and maxillary antrum could contribute to wound contamination;

The surgical wound debridement is made after the cleaning (by antiseptic means) of skin around the wound. Hairs around the wound should be shaved as necessary. Once more the wound is debrided by the antiseptic means to eliminate foreign matters and contaminants. It is performed the local anesthesia and hemostasis. Devitalized tissues are exsected. The wound is repaired layer-by-layer by the blind primary saturation. Sutures lines are debrided by the iodine solution or brilliant green. The antiseptic bandage is applied. The first bandage is made on the next day after surgery. It is preferably to treat the wound without any bandage by open method. Only in the presence of contamination and hematomas the bandage (usual or compressive) should be applied. In the case of development of inflammatory process in the wound, abscesses must be opened and drained and then should be prescribed the medicated treatment (antibiotics and other).

The cicatrization of posttraumatic wounds can be as by primary as by secondary intention.

The cicatrization by the primary intention is the wound cicatrization by the way of its walls adhesion by fibrin roll with the formation on the surface of crust, under which happens a quick fibrin substitution by the granulation tissue, epithelization and formation of tight line cicatrize.

The cicatrization by the secondary intention is the wound cicatrization by the way of gradual filling of purulent wound cavity by the granulation tissue with the following epithelization and formation of a cicatrice.

The organizational principles of health care delivery:

The first aid to the patient is performed on the incident place (as self-mutual aid).

The predictor care is performed by persons with the secondary level of medical education (nurse, paramedic).

The primary doctor care foresees the fight with asphyxia, hemorrhage and collapse. It can be performed by every doctor notwithstanding of specialty.

The secondary doctor care is performed by the doctor, surgeon-dentist in the dental department or clinics, in the maxilla-facial emergency stations.

The secondary care presupposes:

- total pain relief;
- the elimination of debrides, blood clots, devitalized tissues and others;
- the cleaning of the wound by the antiseptic means;
- detailed hemostasis;
- the layer-by-layer wound saturation
- tetanus prophylaxis (tetanus vaccine);
- rabies virus prophylaxis (rabies vaccine) to the patients with the bite wound (the disease is presented by the motor excitement, convulsions of the swallowing and breathing muscles, paralysis development in the disease end-stage);
- examination of alcohol intoxication;
- the prophylaxis of keloid and hypertrophic scars formation, if they are mentioned in the anamnesis.

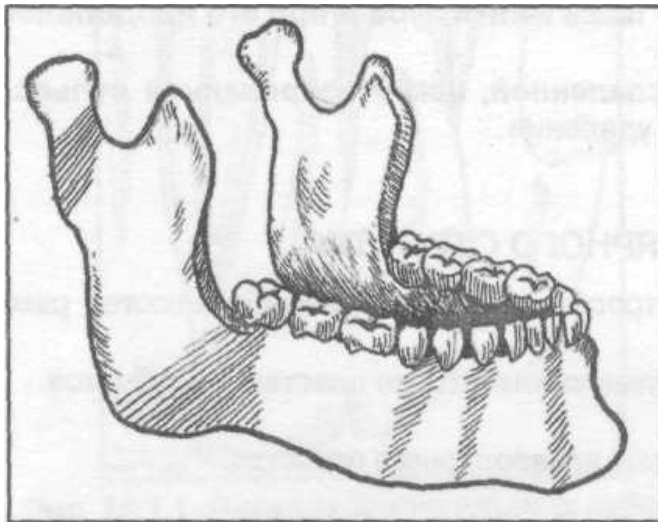
Topic № 2

Mandible fractures. Treatment of the mandible fractures (immediate, at transportation, bone synthesis).

FRACTURES OF LOWER JAWS

Fractures of lower jaw are produced more often than injuries of other facial skeleton bones.

The mandible fractures are usually observed in the typical places (“infirmity places”): in the region of the central incisors (along the middle line), canine, premolars, angle of mandible, condylar process cervix (pic. 1).



Pic. 1. Typical places of lower jaw fractures (“infirmity places”)

Classification depending from terms of injury fractures of lower jaw are:

- Current (acute), till 10 days,
- Old, from 11 till 20 days,
- Malunion, more than 20 days.

In everyday practice all fractures of lower jaw are classified according to: *localization and fracture character.*

Classification according to the localization:

- A) - unilateral; -bilateral;
- B) – single; - double; -multiple;
- C) –maxilla body fracture (opened, in the limit of tooth line):
 - a) medial (in the incisors region);
 - b) mental (in the region of the canine and premolars);

- c) in the molar region;
 - d) in the region of maxilla angle (opened and closed).
- D fractures in the jaw branch region (closed):
- a) condylar process (- floor; - cervix; -head);
 - b) coronoid process;
 - c) proper branches (lengthwise or transverse).

According to the fracture character:

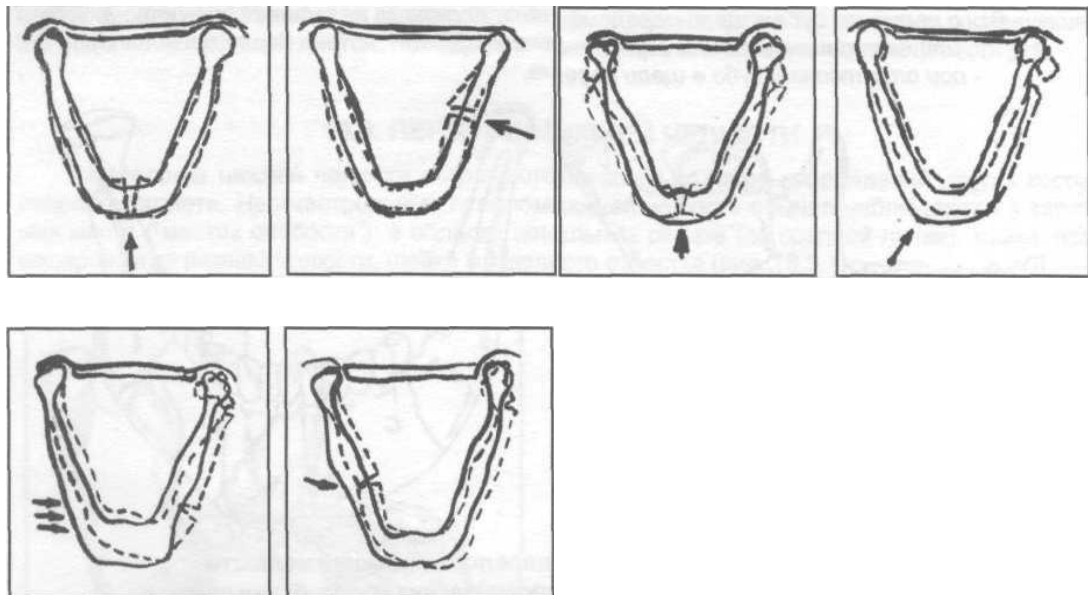
- a) - Complete; - incomplete (*subperiosteal*);
- b) – *undisplaced fragments*; - *displaced fragments*;
- c) - *linear*; - *comminuted*; - *combined*;
- d) - *Isolated*; *multisystem (with the cerebro-cranial injuries, soft tissues injuries, other bones injuries)*.

The lower jaw has an arcual form. The fracture of the lower jaw can be produced in result of deflection, flexure and compression. The jaw is broken in its “infirmity” places by the reason of force action (pic.2-3). Deflection of lower jaw fragments is performed by an action of applied force of fragments own heaviness and under the action of muscles` draft which are fixed to broken fragments. There are no fragments displacements in case of intraperiosteal (*subperiosteal*) fracture. The movement of the jaw is performed due the action of two muscle groups: elevating (posterior group) and depressing (anterior group) the lower jaw. The displacement is the significant the more muscles are fixed to jaw fragments (pic. 4).

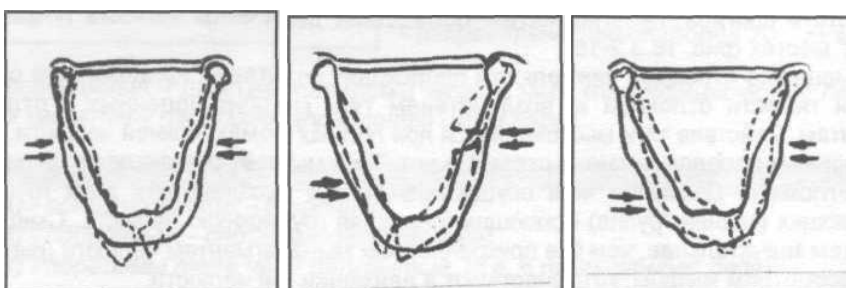
Posterior muscles group elevating the lower jaw:

- **Mastication muscle** (*m. masseter*) begins from the lower border of zygomatic bone and is fixed to the superficies of the ramus of mandible (*tuberositas masseterica*). In case of lateral muscle contraction, the lower jaw is displaced in direction of the given muscle contraction. In case of bilateral muscle contraction, the lower jaw is drawn to the upper jaw, in other words the mouth opens.
- **Temporal muscle** (*m. temporalis*) occupies the entire space of temporal skull fossa by its wide beginning and above gets to *Гшя temporalis*. Muscular fascicles converge flabellate and are directed from the lower jaw upwards, *dermad* (outwards) and some posteriorly. It is formed the firm *chorda* which goes under the zygomatic arch and is fixed to the *processus coronoideus* of lower jaw. When the temporal muscle contract, the lower jaw raises upwards and displaces a little posteriorly.

- **Medial pterygoid muscle** (*m. pterygoideus medialis*) begins in the pterygoid fossa, directs down lateral and fixes on the inner surface of the lower jaw angle. Muscle fibers are directed upwards, antieriad and inward towards the lower jaw. In case of bilateral contraction of given muscles, the lower jaw displaces upwards and moves to the fore. In case of lateral contraction, the jaw displaced against the contracted muscle.
- **Lateral pterygoid muscle** (*m. pterygoideus lateralis*) begins on a lower surface of a greater sphenoid wing and clinoid process. It is fixed to the condylar process neck and to the bursa and disc of temporomandibular joint. The muscle comes horizontal almost. The jaw moves to the fore when both muscles contract simultaneously. If only one muscle contracts, then the lower jaw displaces laterad, i.e. in direction against the contracted muscle.



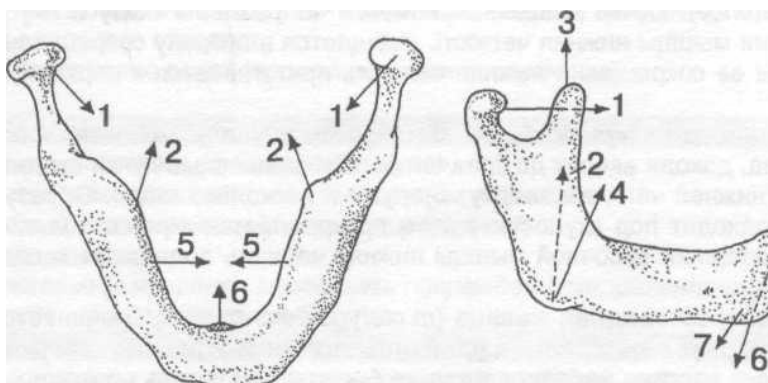
Pic. 2. The schematic illustration of production of lower jaw fractures localized in the place of place of force and in outlands (reflected fracture), in the case of unilateral force direction.



Pic. 3. The schematic illustration of production of lower jaw fractures in the case of its compression (the stroke is directed to both parts).

Anterior group of muscle depressing the lower jaw:

- **Mylohyoid muscle** (*m. mylohyoideus*) begins from the *linea mylohyoidea* on the interface of lower jaw body and goes inward, down and a little posteriorly. Along the middle line right and left muscles are connected against each other and are terminated with a tendon suture, and postoral region are connected to the body of a sublingual bone. In such a manner contracting the given muscle depresses the lower jaw and displaces it posteriorly.
- **Digastric muscle** (*m. digastricus*) consists of two venters connected between each other by tendon fixed to the body and thyrohyal. Posterior belly of digastrics muscle begins from the temporal bone mastoid process and goes downward, anterior and medial, gradually narrowing to the tendon by the help of which it is connected with anterior belly of the gastric muscle. The anterior belly is fixed to the digastrics fossa of lower jaw. The given muscle depresses the lower jaw and displaces it posteriorly when is contracted.
- **Geniohyoid muscle** (*m. geniohyoideus*) is placed above the *m. mylohyoideus* sidewise from the median palatine suture. It begins from the spina mentalis of lower jaw and directs to the body of sublingual bone. The lower jaw declines and displaces posteriorly when is contracted.
- **Genioglossal muscle** (*m. genioglossus*) begins from the spina mentalis of lower jaw. It is fixed to the body of sublingual bone divaricating flabellate and is entwined in the tongue thickness. When it is contracted the lower jaw is displaced downwards and posteriorly. The character of the fragment displacement of the lower jaw can be defined taking into consideration the draft of earlier pointed muscles. Fragments trace slip depends from the localization, character and direction of fracture fissure.



Pic. 4. The direction of muscle draft fixing to the lower jaw:

- 1- **m.pteryg.lat.,**
- 2- **m.pteryg.med.,**
- 3- **m.temporalis,**
- 4- **m.masseter,**

- 5- m.mylohyoideus,
- 6- m.geniohyoideus,
- 7- m.digastricus.

General description of the lower jaw fractures

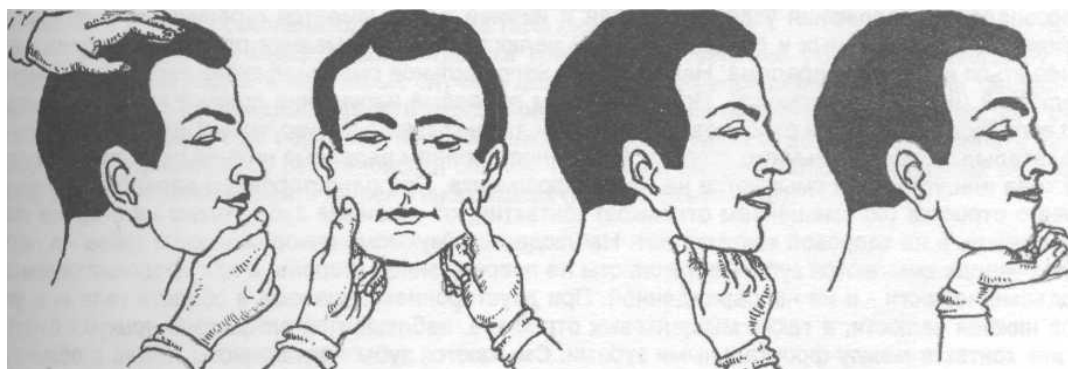
Fractures of maxilla-facial region bones are around 3% from among bones injures of a human skeleton (Лурье Т. М., 1973, 1986). Fractures of the lower jaw are from 60 % till 90% among general amount of facial skeleton bones injuries (Вернадский Ю. И., 1973, 1985; Заусаев В.И., 1981; Кабаков Б.Д., Малышев В.А., 1981; Робустова Т.Г., Стародубцев В.С., 1990; Тимофеев А.А., 1991, 1997 and other).

According to the Т.М. Лурье data most fractures of lower jaw are accounted for hard-working age group of population, i.e. at the age of 17 to 40 years (76%), and in infancy – till 15%.

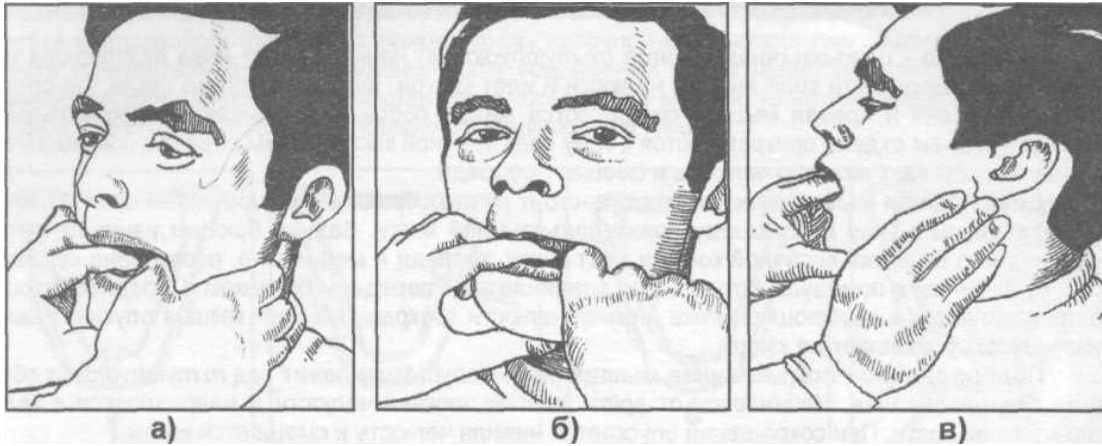
More or less 80% of fractures are produces in the limits of tooth alignment. They are opened, namely contaminated. Oftener lower jaw fractures are localized in the region of angle and submental part but can also be in its frontal part. Nearly identical there are produces unilateral and bilateral fractures of lower jaw (44% of unilateral, 49% of bilateral).

Clinical symptomatology.

The complaints are usually different and depend from the place of fracture and its character. Patients, practically always, worry pains on the define part of mandible, which sharp increase during its movement, and namely in the case of pressure to jaw (mastication and nibble). Often patients complaint on the hemorrhage from the mouth cavity and occlusion violation (joining teeth - antagonists). Can be violated the sensitivity of the lower lip skin and chin.



Pic.5. Palpation of the lower jaw at patient with the assumption of fracture.



Pic. 6 The evaluation of a pathologic loosening (mobility) of lower jaw in the precene of ftacture: a, b) mental region; c) angle region.

During the examination of the patient face should be paid attention to the presence of face asymmetry on the affected part (by the means of edema, hematoma, infiltrate and other) and also the entirety of external skin integuments (injury, frets and wounds) and their color (hyperemia, bleeding the skin thickness - acchymoma).

The examination of lower jaw should be begun from the uninjured part and to finish by injured part, moving fingertips along the posterior border of branch and lower jaw body border and vice versa. There should be defined relief roughness (bony shelves and bony defects) of palpate borders and places of their biggest painfulness. The doctor determines the movement amplitude of the head of condylar process in the glenoid cavity by the introduction of finger tips in the external auditory canal. The condylar process head could be palpated as atreriad to tragus in motionless and in movement determines the displacement of head, absence of its mobility during the mouth opening.

Violation of integrity of lower jaw bony tissue can be defined during the palpation (pic. 5-6) using the symptom of indirect stress (symptom of referred pain) which induces pains in the place of lower jaw fracture (body, angle, branch, condylar process) during the pressure by fingers on the chin. The spreader symptom means that the wood spreader is placed between teeth, teeth are occluded and a slight tap of fingers for the projecting spreader part causes pain in the place of jaw fracture (upper or lower). It is necessary simultaneous to press on jaw`s angles trying to bring them together in the case of suspected fracture of submental region.

Can be defined the violation of painful and haptic sensitivity lower lip skin and chin (during the affection of mandible nerve). During the patient examination should be defined the presence of occlusion changes (depends from the degree of fragments deflection), deflection of the middle line in the fracture side. In the process of mouth opening the chin can shift in the fracture side. It is observed incorrect teeth joining of maxilla and mandible (occlusion violation). In the time

of mouth cavity examination there are breakages of the alveolar process mucosa membrane (bleeding, covered by the fibrin accretion and other), hemorrhage in the region of transitory fold, sometimes with the bone denudation. Palpatory are defined acute bony edges under the mucosa membrane and the presence of the pathological jaw mobility. During the deflection of jaw fragments sometimes can be seen deducted cervix or teeth root, which is situated in the fracture cleft. On the X-ray picture is relevant the violation of the bony tissue entirety. The fracture line comes from the edge of alveolar process till the lower edge of mandible. In the fracture cleft can be a tooth.

TREATMENTS OF THE PATIENTS WITH THE MANDIBLE FRACTURES

Treatment goals of patients with fractures of lower jaw are to create conditions for fragments adhesion in right position in recent terms. Herewith a performed treatment should provide complete recovery of lower jaw functions. To perform all mentioned above the doctor should:

- Firstly to perform the reposition and fixation of jaw fragments for the period of fragments union (includes the tooth excision from the fracture line and initial surgical debridement);
- Secondly to create favorable conditions for the process of reparative regeneration in bony tissue;
- Thirdly to perform the preventive measures of pyoinflammatory complications in a bony tissue and surrounding soft tissues.

Liabile for excision are:

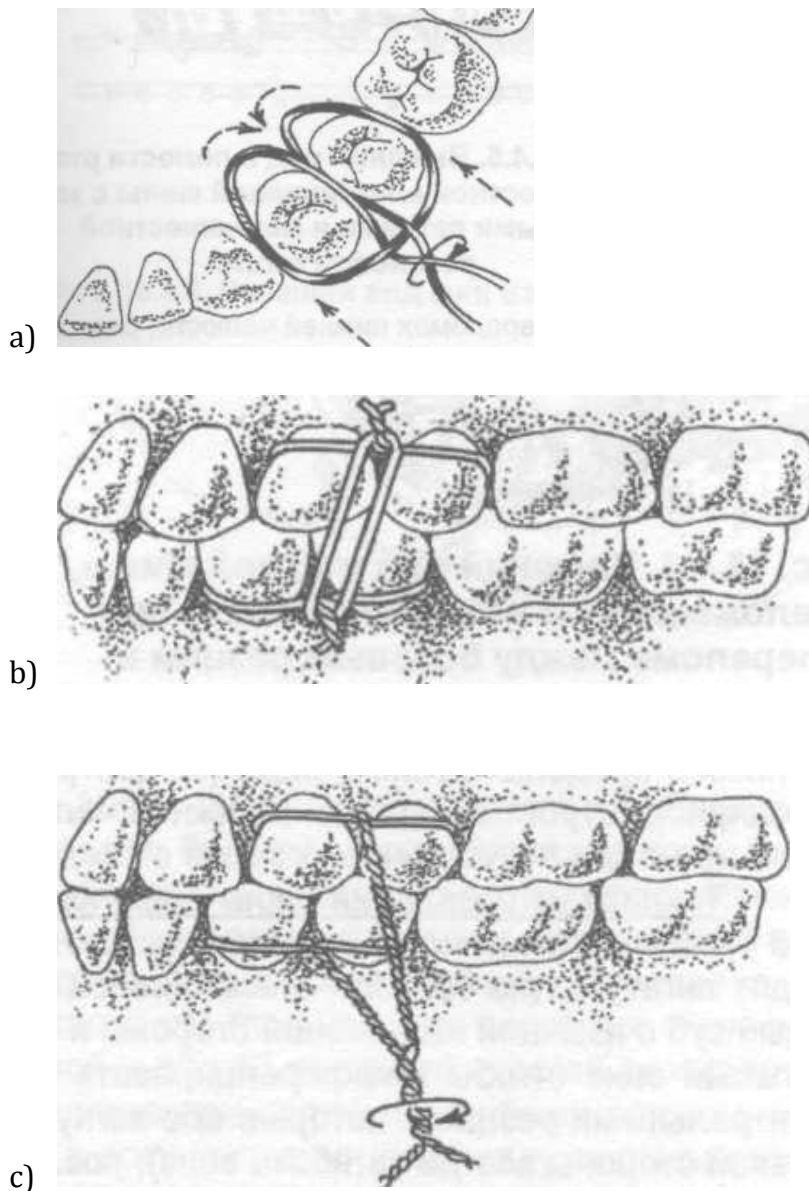
- Broken roots and teeth or completely dislocated from cavity teeth;
- Periodontitis teeth with periapical inveterate inflammatory focus;
- Teeth with presence of periodontitis or parodontosis of the middle and severe stage of disease progress;
- exposed root is in the fracture fossa or impacted tooth preventing the right apposition of jaw fragments (penetrating into fracture fossa tooth);
- Teeth unresponsive to conservative treatment and supported inflammatory occurrence.

Temporary immobilization of fragments.

It is performed on the accident place in the ambulance, in any other no specified medical establishment by paramedical worker or doctors. To the temporal (transport) immobilization of mandible fragment concern:

- Circular gauze verticomental bandage;
- standart transport bandage (consists from the solid frame – head chin strep of Entin);

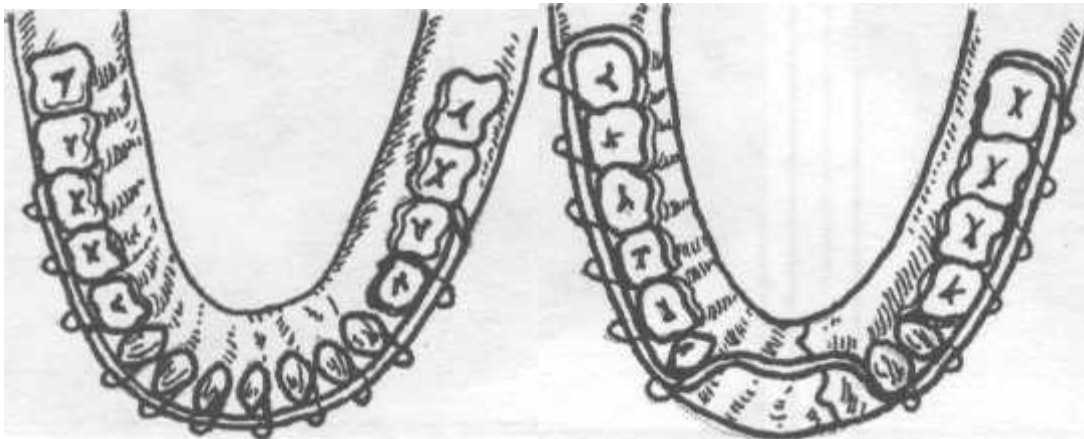
- soft chin strep of Pomerantev-Urbansky;
- intermandibular ligature fixation of teeth by wire (according to Ivy)



Pic. 7. Intermandibular Ivy loops: a) ligation; b,c)inter-maxillary fixation.

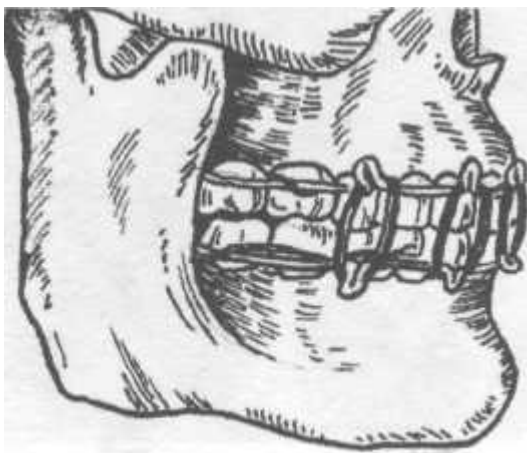
Permanent fragment immobilization

For immobilization of the mandible fragments are used conservative (orthopedic) and surgical (operating) methods. More often for permanent fixation of mandible fragments during its fracture are used wire frame (conservative method of immobilization). S.S. Tigersted (was a dentist of Russian army, Kiev) in 1915 year were offered aluminum teeth frames, which are used till present time in the form of smooth frame – bows, frame with spacer (ripped arcuation) and double-mandible frame with the anchor split and intermaxillary draft (pic. 8).



a)

b)



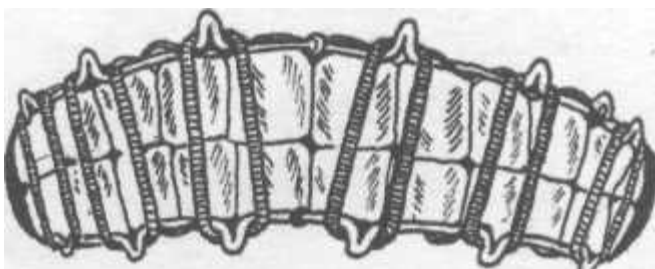
B)

a)

Pic. 8. Variants of the teeth aluminum frames offered by S.S. Tigerstedt:

a) smooth frame - bows; b) frame with spacer (ripped arcuation);

c) double-maxillary frames with the anchor splits and intermaxillary rubber draft.

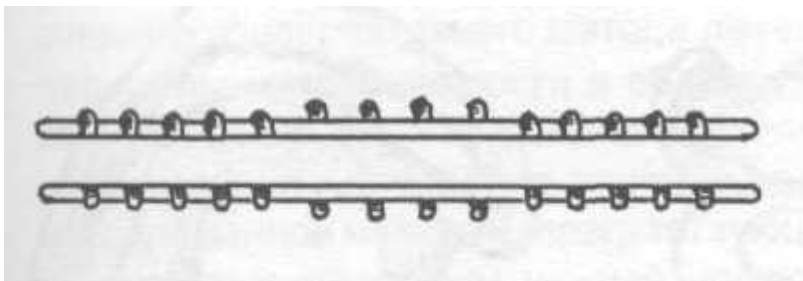


Pic. 9. Show of the mouth cavity of the double-maxillary aluminum frame with the anchor splits and intramaxillary rubber draft.

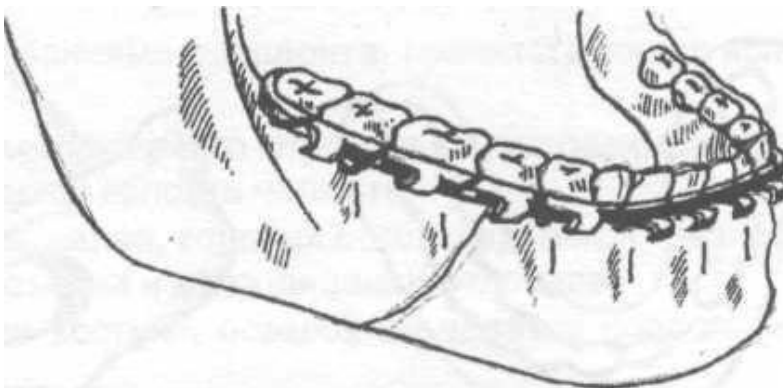
The frame with the anchor splits are applied on both jaws (pic 9). The indication of its preparation are fractures of mandible in the limit of teeth line or beyond its as without the deflection of fragments, as with their deflection, and also

with the fractures of maxilla (in the last case it is necessary to apply additionally verticomental bandage or standard chin strep and cranial cap). On every aluminum frame are done 5-6 anchor slits, which are placed in the cardinal teeth (second, fourth and sixth). The size of splits is around 3-4 mm and they are angle wise 35-40° to the tooth axis. Frames are fixed to teeth by early described method (look the technique of frame preparation). On the frame fixed on the maxilla, splits are directed upwards, and on the mandible-downwards. On the anchor splits are put on rubber rings (they are cutted from the rubber tube 8 mm diameter). To tighten the ligature wires is necessary every 2-3 days, and also 5-6 days (or as and when necessary) is necessary to change the rubber draft.

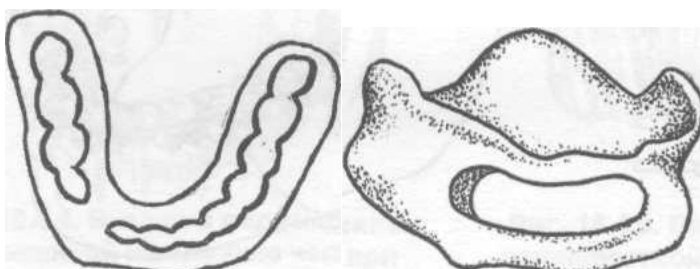
Standard teeth band frames are made from the stainless steel with the ready anchor splits were offered by V.S. Vasiliev in 1967 year (pic. 10-11). The thickness of the frame is 0,38-0,5 mm.

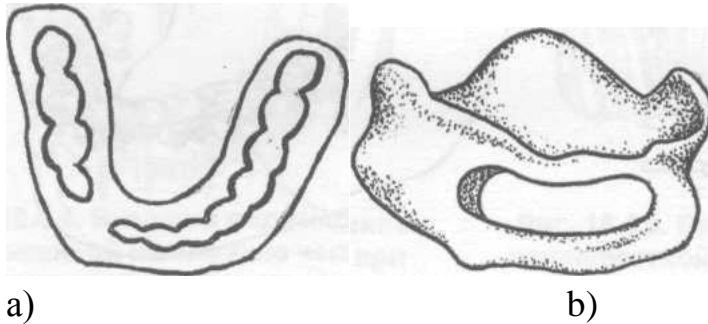


Pic. 10. The look of Vasiliev`s frames.



Pic. 11. The Vasiliev`s frame fixation to teeth during the fracture of mandible. Rare are used frames from quick –hardening plastic.





Pic. 12. Dentogingival and supragingival frames: a) Veber frame; b) Port frame;

Osteosynthesis is the surgical method of connection of bony fragments and elimination of their mobility by the help of fixing means.

Indications to osteosynthesis:

- Insufficient quantity of teeth for frame applying or absence of teeth on the maxilla and mandible;
- Presence of flexible teeth at the patient with periodont disease, preventing the usage of conservative method of treatment,
- Fractures of lower jaw in the region of condylar process head with the unreducible fragment in the case of dislocation or incomplete dislocation of jaw head;
- Interposition is the penetration of tissues (muscles, tendons, bony fragments) between fragments of the broken jaw which impedes the reposition and fragments consolidation;
- Comminuted fractures of the lower jaw, if it is not managed to put together a bone fragment in right position;
- None putted together bone fragments of lower jaw in the result of deflection.

Classification of modern methods of lower jaw fragments osteosynthesis:

1.1. *Direct intraosseous osteosynthesis:*

- 1.1.1. simultaneous introduction of fasteners (pins, bolts, nails, screws) in both fragments.
- 1.1.2. simultaneous introduction of fasteners in both fragments, but with the usage of compression devices.
- 1.1.3. preliminary fixation of fasteners (pins, bolts, nails, screws) in one of fragments.
- 1.1.4. preliminary fixation of fasteners) in one of fragments, but with the usage of compression devices.
- 1.1.5. Other types of intraosseous osteosynthesis.

1.2. *Direct extra-cortical osteosynthesis:*

- 1.2.1. Fragments adhesion.
- 1.2.2. Locking stich.
- 1.2.3. Other types of direct extra-cortical osteosynthesis.

1.3. ***Direct intraosseous and extra-cortical osteosynthesis:***

- 1.3.1. Osteosuture is made extra- or intraoral.
- 1.3.2. Osteosuture in combination with intraosseous pins, bolts, nails, screws and anchors.
- 1.3.3. Osteosuture in combination with extra-cortical pins, bolts, nails, plates, mesh and e.t.c.
- 1.3.4. Frames, plates, meshes, canals, beams fixing on the bone by screws and other fixing elements implantable in bone.
- 1.3.5. Clips of various form input in bone by different apparatus for the mechanic osteosynthesis other without it.
- 1.3.6. “Chemical” osteosynthesis with the usage of plastic masses.
- 1.3.7. Osteosynthesis with the usage of plastic masses in combination with other materials, for example pins, nails, bolts and other.
- 1.3.8. Ultrasonic welding of bone.
- 1.3.9. Other types of direct intraosseous and extra-cortical osteosynthesis.

2.1. ***Indirect intraosseous osteosynthesis:***

- 2.1.1. Kirshner wire.
- 2.1.2. bolt, nail and screw devices.
- 2.1.3. bolt, nail and screw devices, but with the compression – distraction apparatus.
- 2.1.4. devices and apparatus using as locating support the head bandage (protector) bones of facial and cerebral cranium with the input of pins, bolts, nails, and bone screws in fragments.
- 2.1.5. Other types of indirect intraosseous osteosynthesis.

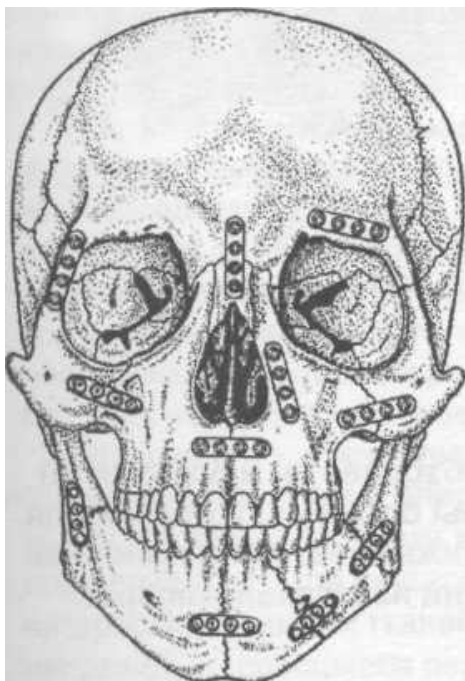
2.2. ***Indirect extra-cortical osteosynthesis:***

- 2.2.1. suspension of lower jaw fragments to the bones of facial or cerebral skull.
- 2.2.2. Locking stich with gingival splint, prosthesis (according to Black).
- 2.2.3. apparatus with the usage in capacity of fixative of fragments of elements of supra bony clamp (bony fastener) with compression – distraction apparatus and without it.
- 2.2.4. devices and apparatus using as locating support the head bandage (protector) bones of facial and cerebral skull, fixation and reposition of fragments which is performed by the help of fasteners, bolts, nails and screws.
- 2.2.5. Other types of indirect extra-cortical osteosynthesis.

2.3. ***Indirect intraosseous and extra-cortical dental osteosynthesis:***

- 2.3.1. Nails, pins, screws and anchors.

2.3.2. Nails, pins, screws and anchors input in one of the fragments and fixating ny the intermediate redisung – clamp band. The surgical intervention can be performed by an extraoral or intraoral access. The surgery is made under the general or local anesthesia.



Pic. 13. Schedules of various usages of titanium mini-plates for the osteosynthesis of facial skeleton bones.

X-ray symptomatology of the bony tissue healing after fracture.

The healing of the bony tissue after fracture is a complicate biological process, which has some stages. In first days after trauma effusive blood from the injured vessels (bone fracture) gets together and reasorbs. Necrotizing small bone fragments reabsorb and mesenchymal tissue expands which gives a rise for bone tissue cells. In the following 10-45 days it is observed the formation of primary callus due to sealed band of loose connective tissue and formation of the osteogenic tissue which produces bone. In the given period the cell growth of periostenum, endosteum and parosseous tissues takes place. It is formed the osteoid. It is the bony tissue at the stage of formation which precedes the mineralization of its intercellular substance. In the following, osteoid tissue calcifies and turn into bone tissue. At the expense of the periosteal and intraosteal reparative processes the fracture lines do not differentiate at X-ray film in 4-6 and sometimes more months (this depends on localization and character of fracture, degree of fragments deflection and etc.).

In the given period the reabsorption of excess bone amount happens and jaw bony tissue is formed definitive. In the presence of fragments gaping the duration of lower jaw fracture healing significantly rises due to chondral stage.

Posttraumatic osteomyelitis of lower jaw is identified due to the appearance of bone tissue loss in the region of mini fracture. In the case of comminuted fracture, sometimes it is very problematic to differentiate separate bony fragments from sequester.

Topic № 3

Maxilla fractures. Treatment of the maxilla fractures. Dental-paradontal traumas.

In maxillo-facial region traumatology is distinguished such region of face as “middle region”. Middle face region from above is bounded by the upper orbital line and from below by the line of tooth alignment occlusion. This region should include following bones: nose, orbital, zygomatic complex, maxilla.

Predominantly bones of the middle face zone have a vertical type of formation of trabecules corpus and the presence of contrefort.

Contrefort (French *contre-force* means an opposed force) is an accumulation of plates (thickening) of the upper jaw compact tissue which is situated in such a way that the tensions appeared during the nibble and food mastication are shared by the jaw and then is projected to other bones which are connected with it.

Азенштейн И.М. and Худайбердыев Р. И. (1962) distinguish *frontonasal, zygomatic, pterygopalatine and palatinal* contrefort (abutment).

Frontonasal contrefort is connected with the jugal abutment in the region of upper and lower eye socket borders.

Palatinal contrefort is connected with frontonasal abutment in the region of nasal incisure.

Zygomatic, pterygopalatine and palatinal contreforts are connected with the lower jaw alveolar process.

The given structure of the middle face zone provides their steadiness to the tension during mastication and is able to stand against the mechanical action. Fractures appear in the cases when the force of mechanical action exceeds the endurance of bones structure.

In the middle face area except the zones of increase fastness there are also the places of feeble impedance. Among these are all walls of maxillary antrum, lacrimal bone, sieve bone paper plate and alar bone pterygoid bone.

Abutments of upper jaw bones maintain the significant resistance if the stroke direction acts parallel to contreforts. **Upper jaw fractures appears in the result of force action perpendicular to contreforts.** *Often there are produced multiple and different fractures of middle face zone which not frequently are combined with the brain injury and cerebral cranial bones.*

Concomitant injury is the simultaneous injury of two and more anatomy regions by one or more affecting factors.

Combined injury is the injury which appears in the influence result of different traumatic factors (physical, chemical or biological).

Peculiarities of the facial skeleton architectonics not only create condition for the brain protection from the traumatic influence but also play very important role in the delivery of mechanical energy to cerebral structures.

In the presence of facial trauma such severe complications as subdural hematoma, subarachnoidal hemorrhage, cerebral vessels thrombosis, traumatic aneurysm, cervical vertebra fractures, basal skull fracture and other could be determined by close topographic-anatomical relationships of facial and cerebral skulls.

Clinical symptomatology of concomitant injury depends from the severity and character of the cerebro-cranial and maxilla-facial trauma. In the presence of concomitant trauma with the severe cerebro-cranial injuries neurological symptoms prevail in the clinical presentation which considerable complicate the diagnostic of maxilla-facial region injures. The X-ray examination performance not always is managed in necessary projections. Therefore in the presence of facial skeleton bones injury the main diagnostic method is a clinical method. The given method requires from the doctor the relevant background and practice in work with such type of patients.

All cranio-cerebral traumas are divided into 3 types:

- brain concussion;
- cerebral contusion:
 - a) mild case; b) middle case; c) severe case;
- brain compression:
 - a) against its concussion; b) without associated concussion.

MAXILLA FRACTURES

It is used Le Fort classification to determine types of maxilla body fractures. **It is established three main types of maxilla body fracture.**

The first type of the fracture is characterized in that the fracture line undergoes under the alveolar bone and under the hard palate (almost parallel to it), through the lower edge of piriform aperture and through ends of alar bone pterygoid bones and along the of maxillary antrum floor.

The given fracture is associated with the fracture of Guerrin (described by him earlier) therefore in the scientific literature the given type of fracture is named “fracture of Guerrin-Le Fort”. More often such fracture is produced by the stroke of blunt item in upper lip.

The second type of fractures (suborbital, middle). The line of fracture comes through the nose root (the place of connection of brow tine maxillary and frontal bone nasal process), then goes over the inner wall of eye socket to the lower palpebral fissure, gets through it and directs frontwards along the lower wall of arcula to the place of connection of maxillary malar process with the jugal. Behind, the fracture line comes through alar bone pterygoid processes.

Oftener such fractures are produced due to stroke of the blunt item in the region of nasal bridge.

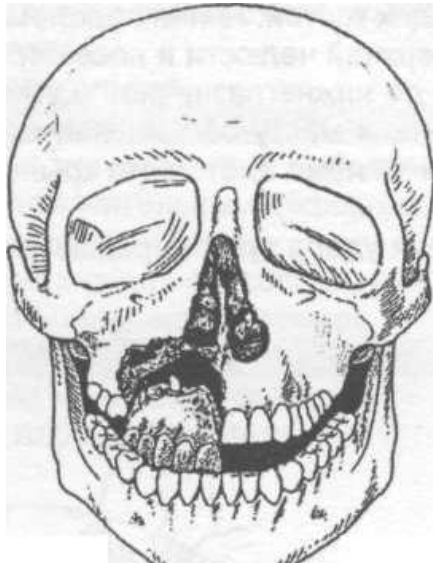
The third type of fractures (subbasal, upper). The fracture line comes in the region of nasal root (the place of connection of maxillary bones brow tines with frontal bone nasal process) along the medial eye socket wall to the lower palpebral fissure, through the alar bone pterygoid processes, then directs frontwards to the lower arcula wall, through the frontal-zygomatic joint (the place of connection of brow tine with frontal bone malar process and big alar bone wing) and jugal bridge, which is formed by a malar process of temporal bone and temporal process of zygomatic bone.

It can appear due to the stroke of a blunt item in the eye-socket region or nose floor as well as due to lateral blow in the zygomatic bone region.

Fractures of upper jaw are followed by injuries of maxillary antrum walls and hemorrhage in them. The presence of the blood in the antrum does not mean that the post-traumatic sinusitis will develop yet therefore it is not the indicant to obligative maxillary sinus surgery.

Other variety of upper jaw fractures are so called *sagittal (unilateral) fractures*, when only one upper jaw bone is twisted off. As if the jaw breaks anteroposteriorly. Outside the fracture line comes in typical place but inside (medial) along the middle line (along the palatine suture which connects both upper jaw bones in one upper jaw). Such fractures are the result of blunt item action and the obliquity of blow power from up downwards in the upper lip region (upper jaw posterior area).

Mentioned above three types of upper jaw fractures, according to Le Fort, can combine against each other. From one side can be present one type of fracture form other side can be present other fracture type. More often it is present the combination of the second and the third type of fracture. Atypical fractures of upper jaw which do not stay with earlier described schemas could be presented. There are distinguished fractures of processes of upper jaw bone alveolar (it is broken a part of alveolar with some teeth – pic.14), frontal (oftener it is unilateral) and hard *palate* (it appears in the result of the fall on the outstanding object). Comminuted fracture of the upper jaw bone anterior wall can be present.



Pic. 14. Fracture of upper jaw alveolar process

In such a manner I propose the following classification to divide non-ballistic fractures of upper jaw.

THE CLASSIFICATION OF THE NON-BALLISTIC FRACTURES OF UPPER JAW AND THEIR COMPLICATIONS (А.А. Тимофеев, 1998)

I. ISOLATED FRACTURES OF UPPER JAW.

1. Fractures of upper jaw body:

- Unilateral (sagittal);
- Typical (according to classification of Le Fort, Vassmund);
- Combined;
- Atypical.

2. Fractures of upper jaws processes:

- Alveolar;
- Frontal;
- Palatal.

3. Comminuted fractures (body and proceses).

II. COMBINED FRACTURES OF UPPER JAW:

- With cerebro-cranial injuries;
- With other bones injuries;
- With the injury of softtissues.

III. COMPLICATIONS OF UPPER JAW FRACTURES:

A – early complications (the injury and displacement of the eyeball, injury of vessels and nerves, facial pneumoedema, meningitis and other);

B – late complications (paresis and paralysis of face mimic muscle, ptosis, osteomyelitis, maxillary sinusitis, face deformation and other).

CLINICAL PICTURE

During the patient examination, the attention should be paid on the face form defect and the occlusion state (it is connected with the fragments dislocations, presence of ecchymoma (hemorrhage in the full –thickness skin and membrane mucosa) or hemorrhages, the character and localization of the soft tissues. It is observed the elongation and flattening of the middle face region, which is connected with the infraplacement of maxilla as self consistent alike with zygomatic bones. There is so called spectacles symptom what means the hemorrhage in the palpebra pectinosa. The same symptom is presented in the case of basis crania bones fracture. The difference is in the time of its appearance and prevalence. In the case of maxilla fracture the spectacles symptom appears at once after trauma, has a prevalence character and in case of the isolated fracture of the basis crania bones the symptom appears not earlier than 12 hours (more often in 24-48 hours) after trauma and does not outstep orbicular muscle of the eye.

In the case of basal skin fractures can be found out the liquorrhea. It is the escape of cerebrospinal fluid through the defect of hard brain tunic.

Nasal liquorrhea is a liquorrhea in the nasal cavity through the defect of hard brain tunic in the region of cribliform bone plate or in the place of alar bone fracture.

Cerebrospinal fluid otorrhea is a liquorrhea from the external auditory canal in case of the fracture of petrous bone. Visually this symptom is hard to define due to accompanied hemorrhage. For diagnostic of the liquorrhea presence it is used the probe of “double spot”. The effused blood forms on the wad gauze the reddish spot in the centre and the yellow aureolla of cerebrospinal fluid along the periphery. The symptom of handkerchief means that a clear handkerchief dampened by neurolymph remains soft, but if dampened by nasal secretion remains hard (“starch”).

In the case second or third type of maxilla fracture can be presented the syndrome of upper orbital fissure (ophthalmoplegia -paralysis of eye muscles), ptosis (omission of upper eyelid), sensibility absence of upper eyelid and front skin, widening and fixing of eye apple location (Zachariades N. et al.,1985). In the case of blood effusion into the orbit it is observed the exophthalmos and diplopy. In case of zygomatic bones affection appears the zygomatic syndrome which means the reduction of sensibility in the innervation zone of zygomatic-facial and

zygomatic-temporal branches of the IInd branch of trigeminal nerve, paralysis of separate facial muscle.

During the skin palpation can be defined the crepitation. The sense of crackle or rattle which appears in the result of air penetration from the aeriferous ways in the hypoderm. In the suborbital region is presented the step syndrome (according the second type of fracture to Le Fort) owing to the bone injury in the place of adjustment of maxilla bone malar process with the later surface of zygomatic bone.

There are presented occlusal disturbances as central teeth on the mandible and maxilla do not occlude against each other therefore the open occlusion appears. More often it is observed in the case of second type maxilla fracture and it is connected with the fact that all maxilla outs off the surrounding bones connection. The maxilla descends down, revolves about its transverse axes and tips posteriorly (under the influence of involution of medial pterygoid muscles, which by the one end are connected to the pterygoid process of alar bone, and by the other end to the medial surface of the mandible corner).

During the intraoral examination can be identified the effusion of blood under the mucosa membrane and violation of bony tissue entirety (step symptom) in the region of zygomatic-maxillary suture (the place of connection of maxillary and zygomatic bones).

The positive symptom of Malevich is the sound of creaked pot which appears in the result of teeth percussion on the injured part (in case of walls fractures of upper jaw processes).

Positive symptom of Geoen means pains along the fracture fissure during the pressure by the index finger on lifters (from the bottom upwards) of the pterygoid processes of alar bone. The mobility of fragments can be defined if we capture by hand fingers upper teeth and careful move of the maxilla in the AP dimensions but other hand fingers we place on the face skin respectively to supposed fracture.

Treatment. In the case of maxilla fracture, **Temporary (transport)** means of fragments immobilization are: submental pariental bandage, submental sling, standard transport bandage, elastic rubber and reticulate bandage. The aim of the temporary immobilization is to press the mandible to maxilla and to hold them in such position till the permanent fixation of fragment that which refers to the secondary care.

Methods of maxilla fragments fixation can be defined:

- Orthopedic (conservative) method of treatment presupposes the fixation of double-jawed standard or aluminum anchor splints to patients' maxilla and mandible teeth. It is applied an intermaxillary rubber draft. The capping rubber tube is laid between big root teeth for more exact apposition of fragments of

upper jaw bone. The given treatment method presupposes the future immobilization of mandible by the gypsum submental sling and by the skull cap with rubber draft. The last one can be corrected in the course of the treatment dynamics.

- Surgical-orthopedic method of treatment presupposes the fixation of the dental splint to the cranial strong bandage or to unaffected facial bones.

Surgical treatment of upper jaw injuries

R.E. Shands (1956) applied the “transmaxillary bolt” for the strengthening of the separated upper teeth, which was walked through both upper jaw bones in cross direction and through the cheek skin with the further strengthening of the given bolt to the head cap or arch if there were present injuries of skull skin integument.

М.А. Макиенко (1962) proposed to use Kirschner wires which are introduced at different angles through the broken off upper jaw into uninjured cranial bones (zygomatic bone or arch, upper jaw process of frontal bone). Wires are introduced by special equipment. Wires are chipped in such a way as not to stand proud soft tissues. Additional the author advised to use the Померанцевой - Урбанской sling or circular dressing bandage.

In the 1995 year М.М. Збарж had a shot to join broken off upper jaw bone along the frontozygomatic suture by the help of catgut. The result was negative. In the 1957 year the same author retried by the help of steel wire and the result was positive. In recent years steel plates are used to this effect.

In the presence of frontal wall fracture, В.Г. Центило (1996) proposed the trepanise of the medial wall of the upper jaw cavity through the lower nasal passage and by the way of consequent introduction of an antiseptic tampon (for 14 days). There is performed the resorbtion and the fixation of the bone fragment in right position to the solid achievement.

The most popular surgical method of upper jaw fractures strengthening is different variants of bones` sutures which join flexible and immobile facial skeleton bones (the osteosynthesis of wire suture) or the fixation of fractures by the titanic mini-plates.

TEETH AFFECTION

Clasification:

1. **Incomplete teeth fracture** (without pulpa opening): dentin and enamel fissure; dental crown marginal fracture and enamel abruption; dental crown marginal fracture and dentin and enamel abruption.
2. **Complete teeth fracture** (with pulpa opening):

- b) Opened (in the mouth cavity) are fractures with the partial dental crown and root deformation;
- c) Closed (if the entirety of dental crown) is the root fracture.

3. **Teeth dislocation:**

- a) incomplete (partial) tooth dislocation;
- b) tooth dislocation (abruption) and abruption of the alveolar process edge.

4. Dental impaction.

In case of tooth injury, the hemorrhage and then necrosis appear in the pulp which is the reason of the development of inflammatory processes in the periapical region.

This demands the performance of case follow-up for the pulp viability by electro-odontometry method. In the presence of pulp necrosis, it should be extirpated with the following canal filling.

Tooth dislocation is the deflection of the tooth in the socket in any of the side (in different ways) or in the maxilla sponge tissue, which is accompanied by breakage of tissue which surrounds the tooth.

Should be defined **incomplete, complete and impacted tooth dislocations**. More often are observed the dislocation of frontal teeth on the upper and lower maxilla. In the case of incomplete dislocation there is the deflection of the teeth in the lingual (palatal) or buccal part, but tooth did not lose its connection with socket. Patients' complaints come to pain in the tooth, increasing during the touch to it, its mobility and deflection in relation to the neighboring teeth. The tooth root deflects to the opposite to the crownwork side. The mucosa membrane of the gingival can be broken. On the X-ray picture the tooth root is shortened because of its slanting position, it is defined the widening of periodontal fissure not only in the lateral, but also in cacuminal parts of tooth root. In the case of incomplete dislocation should be tended to tooth preservation. After local anesthesia performance, it is made the manual reduction of the tooth, its immobilization by the help of ligature fixation or arch bar on the time around 2-weeks.

In the case of complete dislocation the tooth is completely dislocates from the socket and lose the connection with it.

Impacted dislocation is the variety of complete dislocation when the last tooth perforate compact plate of alveola and invade on different depth in the spongy substance of the maxilla or into the soft tissues, but on the upper maxilla - and in the cavity (nasal or maxillary). On the X-ray picture the line of periodont is absent along the whole extent. Reimplantation is performed with the preservation of alveola walls.

Tooth fracture.

Fractures of the tooth can be defined as incomplete (without pulpa opening) and complete (with pulpa opening). The last one can be open (with the affection of crownwork) and closed (root fracture), and also transverse, slanting and lengthwise. The root fractures can occur in the upper, middle and lower its third.

In the case of fishneck of the crownwork with the pulpa opening, the patient's complaint on the self-existing pains, which sharp increase during the influence of any irritant (food, cold air or water). In the place of chipped part of tooth crownwork is seen the place of denuded pulpa, which can bleed, edema of the soft tissue of alveolar process. During the root fracture it becomes mobility, the percussion is painfulness. In the process of palpation it can be discovered that only a broken part of the tooth is shifted. According the X-ray picture is seen the line of tooth root fracture.

Treatment.

In the case of fishneck of crownwork without pulpa opening is performed the slicing acute edges and reconstructs the defect of the tooth by the help of filling or inlay. In the case of crownwork fracture is observed the pulpa opening, then it is necessary to remove the tooth, the canal is filled and the defect is reconstructed by the way of inlay preparation. During the root fracture in the edge area, it is necessary to extract by operative way the fishnecked its part with the obliged preliminary filling of root canal. The tooth is subjected to the extraction in the case of fracture of the root lower dental neck and during its lengthwise fracture.

FRACTURES OF THE ALVEOLAR PROCESSES

CLASIFICATION:

- Partial- the line of fracture comes through external compact plate and sponge substance;
- complete – the line of fracture comes through all thickness of alveolar process;
- abruption of alveolar process;
- fracture of the alveolar process, combined with the dislocation or teeth fractures;
 - comminuted fracture.

The line of fracture comes above the edges of root teeth (on maxilla) or below them (on mandible) and has arcuated form. The patient complains are self-existing pains in the region of the injured jaw, increased during the joining of teeth or during the biting on the hard food. There is the violation of the teeth joining, the patients neither can nor close the mouth. It is observed hemorrhage from the mouth cavity. There are complaints for same speech violation.

During the examination is defined edema of the soft tissue of the oral region, there are bleeding on the skin, frets and wounds. The viscous saliva with the

bloody tap springs from the mouth. On the lips and cheek mucosa membrane there are hemorrhage, but on the alveolar process can be its breakages and denudation of the bone or are seen the denudated teeth edges. The occlusion is usually violated. Can be violated the form of teeth arch. During the palpation of the alveolar process is observed its pathological mobility along some teeth. The chipped part of alveolar process is flexible together with teeth. On the X-ray picture it is obvious the line of maxilla alveolar process fracture and character of violation of teeth root edges incoming in the fragment.

Treatment is performed under local anesthesia. It is leded the finger reduction of slipped fragment of the alveolar process. During the sufficient quantity of the stable teeth on the affected and non - affected maxilla area is necessary to apply the smooth frame.

Topic № 4

Fractures of the zygomatic-orbital complex. Fractures of the nasal bones. Complications of OMF traumatism.

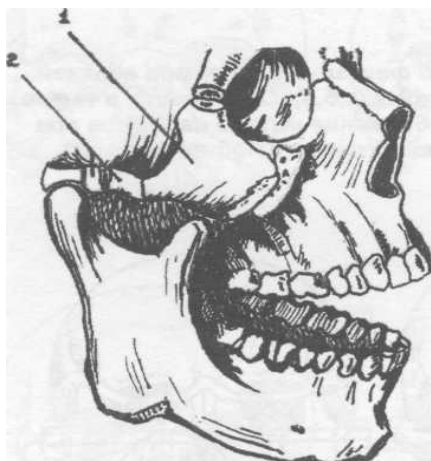
FRACTURES OF ZYGOMATIC BONE AND ARCH

The zygomatic bone is the solidest from facial bones. The zygomatic arch is formed from the zygomatic bone temporal process and the temporal bone zygomatic process. More often reasons of zygomatic bone and arch injuries are household, athletic, transport or industrial injury. Fractures of the zygomatic bone and arch can be opened or closed, linear or comminuted, without a displacement or with a displacement of fragments, ballistic or non-ballistic (pic. 15).

The typical places of the zygomatic bone fracture are:

- from the suborbital suture till the zygomatic-alveolar crest (it can be felt outside and from the side of mouth cavity in the “step” type),
- in the region of frontal-zygomatic and zygomatic-temporal suture.

In case of zygomatic bone injury the zygomatic bone body shifts inward and posteriorly which leads to the violation of entirety of the arcular outer wall, and in the case of turn of the fragment along its axis leads to injury of maxillary cavity with the breakage of mucosa membrane and appearance of nose bleed.



Pic. 15. Fractures of zygomatic complex: 1-zygomatic bone; 2- zygomatic arch.

Subjected to the trauma prescription, fractures of zygomatic complex are considered: fresh – till 10 days, inveterate – from 11 till 30 days, incorrect adherent and not adherent more than 30 days.

Clinical picture.

- The face deformation due to depression (flattening) of the zygomatic region soft tissues in the result of the deflection of zygomatic bone);
- The presence of “step” symptom in the middle part of the eye socket lower edge and in the region of the zygomatic-alveolar crest;
- The hemorrhage can appear in the transitory fold in the region of upper premolars and the first or the second molar;
- The numbness of skin of suborbital region and lower eyelid, the lateral nose part, upper lip and upper teeth gingival due to suborbital nerve injury;
- The hemorrhage in the orbital cellulose and in the eye sclera;
- The chemosis due to injury of eye socket lateral side;
- The nose hemorrhage in the result of the maxillary cavity injury.

There are complaints for the mouth opening restriction. In the case of deflections of zygomatic bone frontal process in the eye socket cavity there are observed pains and difficulties of eyeball movement. The diplopia can appear in the case of significant down deflections of zygomatic bone. On the general X-ray picture of facial skeleton bones (naso-submental setup) there are entirely violation of the lower and external edge of eye socket, continuities in the zygomatic-alveolar crest region and the zygomatic bone temporal process, the reduction of maxillary cavity transparency due to hemisinus).

In the case of **isolated zygomatic arch fracture** take place the impaction of soft tissue due to the deflection of fragments inwards and down. The impaction of the soft tissues is masked owing to the quick appeared edema, the restriction and painfulness during mouth opening as well as the difficulty of lateral movements of lower jaw at the affected part. In the axial X-ray film are visible a deformation of the zygomatic arch and the violence of continuity.

TREATMENT.

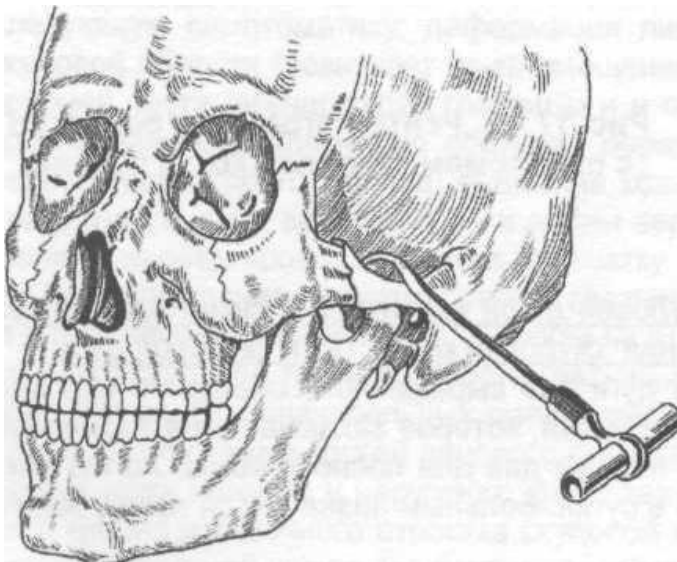
Fractures of the zygomatic bone and arch without expressed deflection of fragments can be treated by the **conservative method** which includes the indications of cold (ice cap or bulla with cold water) in first two days after trauma.

Surgical treatment is applied to all patients who have fractures of zygomatic bone and arch with fragments deflection. The diaphysis of zygomatic bone and arch fragments can be performed surgical and non-surgical.

Non-surgical (noninvasive) fragments resorption is performed in the case of easy reducible acute fractures of zygomatic bone and arch without any significant deflection of fragments. The doctor introduces a hand index finger or the metal tongue depressor wrapped by the gauze (can be used the Buyalsky

wound scoop) in the hinder region of upper fornix of the buccal cavity and then by the movement towards to the opposite side of deflection sets the fragments.

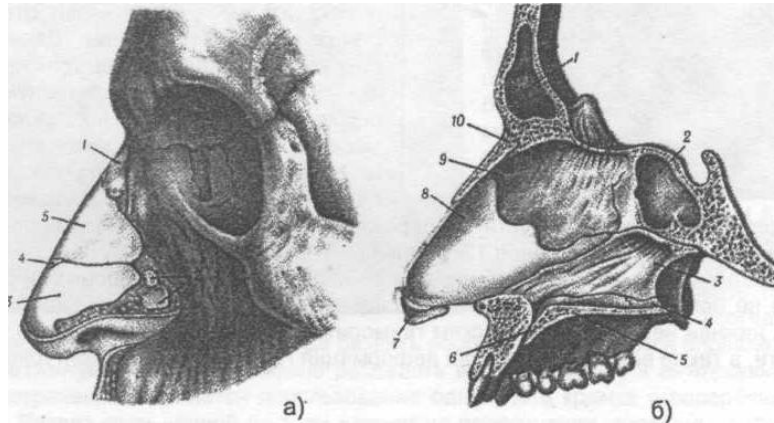
Surgical resorption can be divided into extraoral and intraoral. The usage of dental anchor with the transverse placed handle is more common (pic.16). The skin dissection of a centimeter long is made on the transection of mutually perpendicular lines: first line comes along the lower edge and the second line descends down along the outside edge of orbital cavity. The one teeth anchor is introduced under the mixed fragment, then catch it from the inside and by the movement opposite to the deflection reduce the bone (arch) in the right position. The characteristic flick sounds when fragments are put together in the right position. The absence of the bony prominence (“step”) along the posterior orbital edge, the reconstruction of the face symmetry, a free mouth opening and the accomplishment of lateral movements by upper jaw points to the right fragments reduction.



Pic. 16. The reduction of the zygomatic arch by means of tenaculum with the transverse placed handle (Limberg anchor).

Extraoral methods of zygomatic bone resorption are surgically intervention with the usage of bony suture overlapping or the osteosynthesis of fragments by miniplates (titanic or stainless steel).

FRACTURES OF NASAL BONES



Pic. 17. Nose:

a) Schematic illustration of osteochondral region of external nose:

- 1. Nasal bone,**
- 2. Small alar cartilages;**
- 3. Greater alar cartilage;**
- 4. Epactile cartilage;**
- 5. Lateral cartilage;**

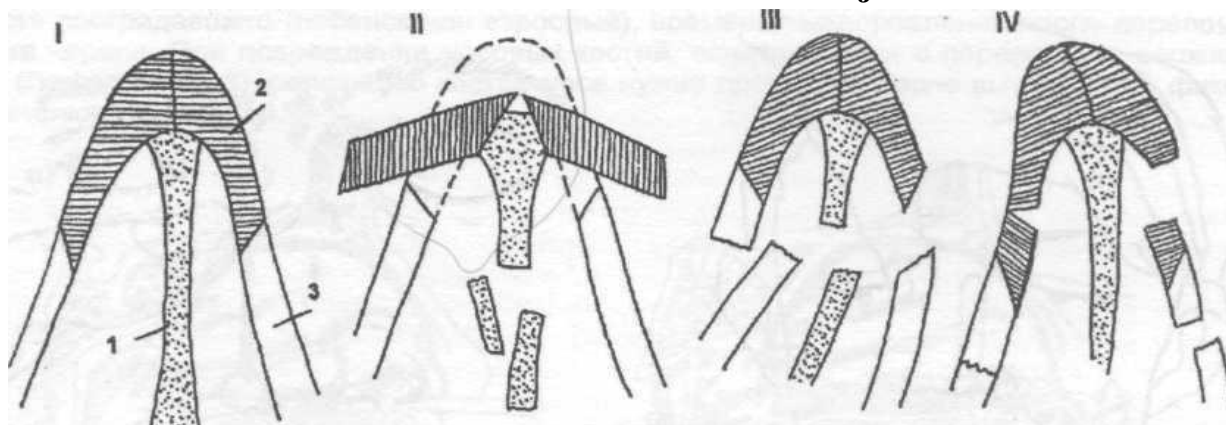
b) Schematic illustration of the osteochondral nasal septum :

- 1. Frontal sinus;**
- 2. Sphenoidal sinus;**
- 3. Vomer;**
- 4. Nasal crest;**
- 5. Hard palate;**
- 6. Incisive canal;**
- 7. Greater alar cartilage crus;**
- 8. Vomeronasal cartilage;**
- 9. Perpendicular plate of ethmoid bone;**
- 10. Nasal bone.**

For the clinician it is more convenient to use the Ю.Н. Волков classification of nose bone fractures, proposed in 1958 year. According to the given classification all nose fractures` injures are divided in 3 groups:

1. Nose bones` fractures without fragments displacement and without the external nose deformation (opened and closed);
2. Nose bones` fractures with fragments displacement and the external nose deformation (opened and closed);
3. Nasal septum injury.

Classification of all nasal bones injuries



Pic. 18. The scheme of nasal bones fractures (frontal section):

I:1- nasal septum; 2- nasal bones; 3-frontal bones;

II- fracture in the form of the nasal fornix flattening in consequence of sutures detachment between the nasal bones, between the frontal processes and nasal bones.

III- the nasal fracture with the suture detachment between the nasal bone and frontal process on the side of stroke and the fracture of the frontal process on the opposite side;

VI- the fracture with the lateral deflection of the nasal arch and inward impaction of nasal slope fragments.

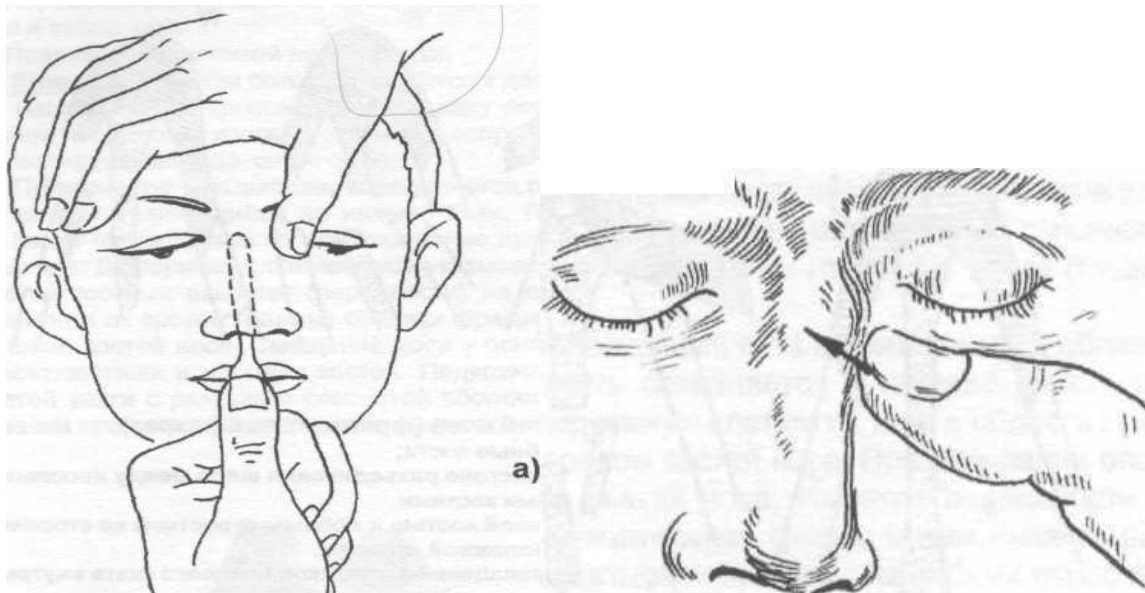
Clinical picture.

The patients` complaints are:

- the deformation of the nasal arch,
- the nasal hemorrhage,
- the soft tissues edema,
- the hemorrhage in the nasal skin and eyelids,
- pains,
- the violation of nasal breathing and osmesis.

Fractures of the nasal bone can be accompanied by the cerebral contusion (nausea, faintness and other symptoms).

During the examination and palpation is defined the sharp painfulness edema of soft tissues in the nose region which is developed on lower eyelids. The bulge is preserved during some days. The hemorrhage can be observed not only in the skin structure, but also in the region of palpebral conjunctiva. The nasal arch deformation points to the nasal bones fracture. During the palpation there are defined bony prominences on the nasal arch and slope. There is present the mobility of bony fragments (depending on trauma terms). The significant trauma can result the breaking of nasal bones. The displacement of the nose at the bottom signifies the frontal processes fracture of the upper jaw and nose bones. The subdermal crepitation indicates the fracture of cribriform bone with the abruption of the mucosa membrane and the appearance of emphysema because air penetrates from the nose through injured tissue under the face skin during the nose blowing. A straight and lateral X-ray film of nasal bones provides the data about the localization and character of the fracture.

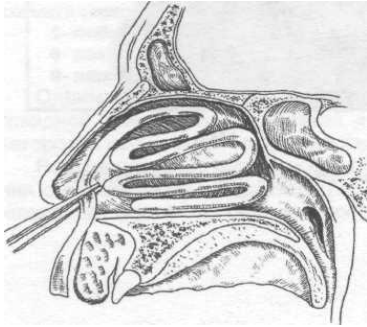


Pic. 19. The reduction of nasal bones: a) instrumental reposition; b) finger reposition.

Treatment.

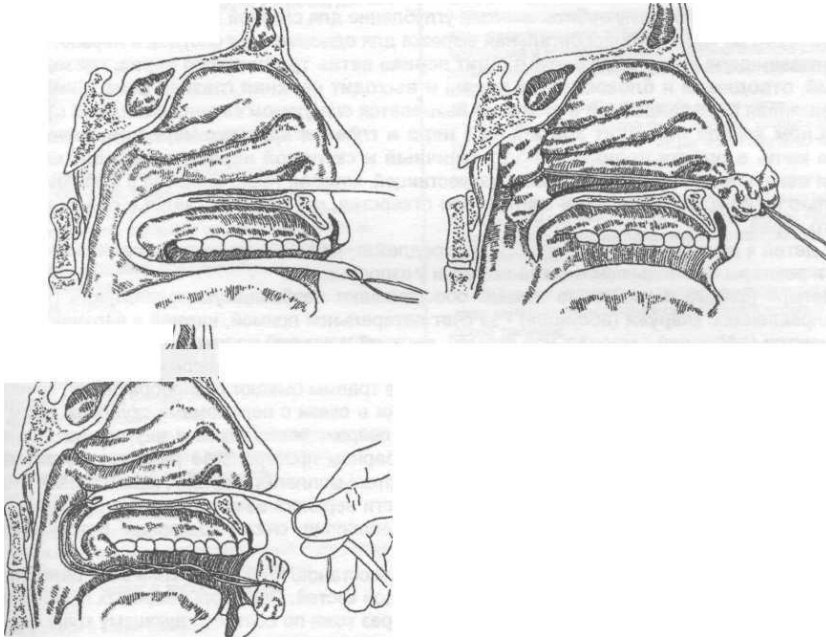
The reduction of nasal fragments is performed under the local or general anesthesia. The reduction of nasal bone fragments (lateral arch deflection) is performed by the big finger of a right hand in the case of arcuation to the left and accordingly by the left hand during the arcuation to the right. The characteristic flick sounds when fragments are deflected in the normal position. Retroposed fragments (to the side of nose cavity) are set by the help of nasal narrow elevator, on which preliminary was put on the steril rubber tube, which guarantees the atraumatism (pic.19). The upper and middle nasal ducts are tamponed by the

iodoform turunda(pic.20), damped in the liquid paraffin to prevent the repeated deflection and retention of them in the right position. In the lower nasal duct there are introduced wrapped buy the iodoform turunda rubber tubes to provide the respiration. Endonasal fixation is withheld during six –seven days. The collodion bandage should be applied during the multicomminuted nasal arch fracture. In the presence of nasal hemorrhage is used the posterior nasal cavity packing (pic.21).



Pic.20. Schematic illustration of anterior nasal cavity packing

In cases when fractures of nasal bones are combined with brain commotion is required a neurologist consultation, profound rest and strict bed confinement. When the fractures of nasal bones is combined with fractures of basal skull or cerebrospinal rhinorrhea, the nasal reposition is temporary contraindicative as there is a real danger of meningitis development in coming days after trauma. The reposition deadline is variable and depends on a set of conditions: a fracture character and complications, patient age, recovery time after basal skull fracture. In the presence of nasal bones injury connected with upper jaw fractures (Ileфop IIнд or IIIрд), the reposition of nasal bones should be made after countertraction and fixation of upper jaw bones.

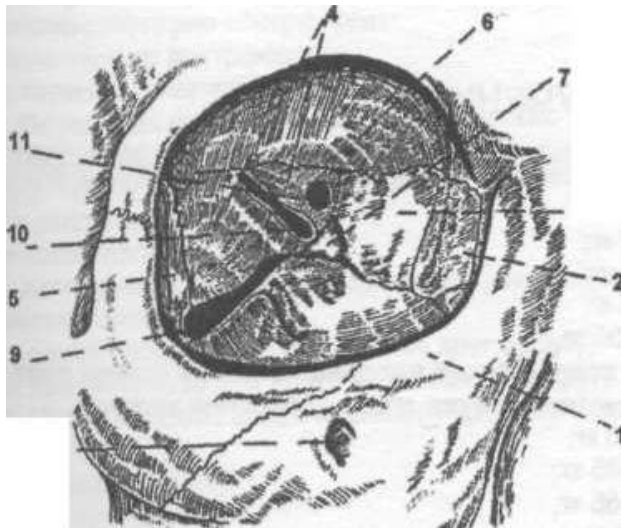


Pic. 21. Posterior nasal cavity packing : a) catheter introduction; b) passage of tampon; c) fixation of tampon.

Injuries in nasal cavity can result to the future formation of adhesion between its separate parts or to the tissues replacement (mucosa membrane, concha, septum) by massive scars (commissures) – *synechia*, which interrupt the respiratory and osmotic nasal function. In case of nasal bony malunion it is developed the expressed deformation of nose in bony or osteocartilaginous parts what is followed by the violation of nasal breathing. This is the indicant to perform plastics to eliminate given deformations. Early and adequate treatment provides good functional and cosmetic outcome.

ORBITAL FRACTURES

Orbital cavity (pic. 22) is the conjugated vallecule in the skull where is placed eyeglobe with its assist device.



Pic. 22. Orbital cavity.

1 – frontal process of upper jaw bone; 2 – lacrimal bone; 3 – orbital plate of ethmoid bone; 4 – alar bone; 5 – orbital surface of the zygomatic bone; 6 – orbital part of frontal bone; 7 – palatine bone; 8 –intraorbital foramen of upper jaw bone; 9 – lower orbital fissure; 10 – superior orbital fissure; 11 – optic canal.

Medial wall of the orbital cavity is formed by the frontal process of upper jaw bone, lacrimal bone, orbital plate of ethmoid bone and body of the sphenoid bone anterior from the optic canal.

Lateral wall is formed by the zygomatic bone orbital surface and greater wings of sphenoid bones.

Upper wall is formed by the orbital part of the frontal bone and lesser wings of sphenoid bones.

Lower wall (floor) is formed by the zygomatic bone and upper jaw, and back part is formed by the orbital surface of a cognominal palatal bone process.

In the upper external orbital cavity angle there is the vallecule for lacrimal gland, but at the inner third of its upper border there is an incisure for the cognominal vessels and nerves. Through the upper orbital fissure in the orbital cavity enter the first ramus of a trifacial nerve, oculomotor, abducent and trochlear nerve and it is emerged upper orbital vein.

The given zone injures symptomatology is named – *orbital apex syndrome*.

The optic nerve and ophthalmic artery pass along the orbital canal. Through the lower orbital fissure infraorbital and zygomatic nerves penetrate in the orbital cavity, but lower orbital vein emerges. Orbital walls are covered by periostenum which is closely intergrown with bony frame along its border and the region of optic canal where periostenum wind into optic nerve membrane.

Posterior tooth anlage present close to the lower orbital border in children. Form and size of orbital cavity by 8-10 ages are in much the same in adults. Four direct and two oblique muscles provide an essential mobility at all directions: outward (abduction) due to lateral rectus, upper and lower oblique muscles; inward (adduction) due to medial rectus, upper and lower direct muscles; upward due to upper direct and lower oblique muscles; down due to lower direct and upper oblique muscles.

Orbital cavity fractures are different depending on trauma's mechanism, but more often there are injuries of lower wall owing to fractures of zygomatic bone and upper jaw per IInd and IIIrd type. Also the inner wall of orbital cavity is injured in case of upper jaw fractures per IInd and IIIrd type. In the retrobulbar space there are developed ophthalmocoele or orbital apex syndrome - ophthalmoplegia (ocular paralysis), ptosis (superior eyelid descent), insensibility of superior eyelid and frontal skin, dilatation and fixed position of pupil due to hematoma formation. There are present diplopia and visual impairment. There are fractures of upper and lower orbital border.

Treatment.

The treatment of orbital cavity fractures includes the reconstruction of the anatomical entirety of zygomatic and upper jaw bony fragments. In the presence of the upper or lower orbital border isolated fracture there are made the skin dissection along a relevant orbital border, exploration of fracture fissure, release of interposing soft tissues which are reduced and fixed to the uninjured orbital bony regions by titanium mini plates or chromic catgut.

Comminuted fractures of the lower orbital wall are treated by tight iodoform tamponade of the maxillary antrum and the reconstruction of lower orbital wall. The tampon end is output through the preliminary made fistula in the lower nasal passage (rhinostoma). The post-surgical wound is sutured. The iodoform tampon remains in maxillary antrum somewhere about 14 days.

In the presence of lower orbital wall bony defects it is necessary to perform the plastics by auto bone or by alloplastics (titanium, teflon, silicon and e.t.c.). To be sensible to the fact that all injuries of orbital cavity are followed by eyeball closed injuries (contusion, commotion, impaction) patients should be treated in cooperation with oculist.

COMPLICATIONS OF SOFT TISSUE INJURES

All complications can be divided into immediate (in the incident place), early (in the stage of medical evacuation and in the medical treatment facility in the course of the first week after trauma) and late (appear not earlier than a week after trauma), which can appear during the soft tissue affection.

To the immediate complications refer:

- asphyxia,
- acute respiratory failure,
- hemorrhage,
- collapse and shock.

Early complications are:

- asphyxia,
- respiratory failure,
- early hemorrhage,
- syndrome of acute disorder of water-electrolytic balance in patient organism.

Late complications are:

- secondary hemorrhage,
- bronchopulmonary disorders,
- purulence of the wound,
- keloids and hypertrophic scars,
- contracture of mastication muscles,
- posttraumatic ossificans myositis of masticatory muscles,
- paresis and paralyzes,
- parasthesia and hyperesthesia,
- salivary fistula and other.

Asphyxia is a pathological state which is determined by an acute and subacute proceeded hypoxia and hypercapnia manifested by heavy respiratory failure, blood circulation and nervous function.

Иващенко Г.М. (1951) classifies 5 types of asphyxia according to the origin:

- 1) **Dislocation asphyxia** appears in the result of tongue falling back at patients with the bilateral mandible fracture (mainly in the submental region).
- 2) **Obturbative asphyxia** develops due to closing of upper respiratory tract by foreign matter, vomiting matters or blood clot.

- 3) **Stenotic asphyxia** appears due to edema of throat, vocal cords and subligamentous space tissues in the result of the impaction of throat posterior spaces by hematoma.
- 4) **Valve asphyxia** develops in the case of closing of the laryngeal inlet by the lacerated tissues flap from the back wall of the palate (during the entrance the drop flap is stuck and in the valve form covers air access through the true glottis in the weasand and bronchi).
- 5) **Aspiration asphyxia** is observed in the case of hit (aspiration) in the weasand and bronchi of vomiting matters, blood clots and mouth cavity content.

In the presence of dislocation asphyxia an acute management consists in putting of the patient on one side (on the side of injury) or facedown. In appropriate case the tongue should be underran (in the horizontal area) and fiber ends should be fixed around the neck or to the firm applied dressing. Injured persons in the state of insensibility should be evacuated in the recovery position, but persons in conscious state should be evacuated in the semirecumbent or semisitting position. In the case of obturative asphyxia it is necessary to remove from guttur all blood clots and foreign matters by the finger (wrapped by gauze or bandage). As far as possible the suction should be used to clear the guttur cavity by suction unit, which will assure the free air access. It is prohibited to underran the tongue in the case of obturation asphyxia, as this promote the lift of foreign matters in the lower area of upper respiratory tract. In the presence of aspiration asphyxia, it is required to sanitize the trancheobronchial tree by the help of tracheobronchoscopy (medical endoscope for the visual examination of weasand and bronchi) though the tracheostoma. It is performed the bronchoscopy namely the examination of the lower respiratory tracts, based upon the exanimation of the inner surface of weasand and bronchi. If the given instrument is absent the sanation of respiratory tracts is performed by the vacuum suction.

If it is impossible to eliminate cause of obturative and aspiration asphyxia as well as stenotic and valve asphyxia it is performed the surgical intervention directed to the normalization of aspiration function.

Cricotomy is the prosection of the throat by the way of degloving and discission of annular cartilage.

Cricotracheotomy is the degloving and discission of the annular cartilage and upper tracheal rings.

Conicotomy is the discission of throat in the interval between annular and thyroid cartilage (in the region of elastic cone).

Conicocentesis is the puncture by thick needles (3 or 4 pc. according to the lumen width) of the throat part and interval between annular and thyroid cartilage.

Trachycentesis is the puncture of the weasand by thick needles.

Hemorrhage

The hemorrhage namely bleeding from the blood vessels can be primary and secondary. Primary hemorrhage appears at once after vessels affection. Secondary – appears later, in some time, after vessel affection. The secondary hemorrhage can be early, late and anticipate. Early secondary hemorrhage appears in 1-3 days after trauma because of expulsion of clot from the injured vessel in the result of blood pressure rise (for example, during the edema liquidation, in the case of insufficient immobilization). Late secondary hemorrhage appears in 5-6 days after trauma and later. It is conditional upon purulent fusion of a clot or wall which forms the traumatic aneurysm. Secondary anticipate hemorrhage (multiple appeared) is observed in the presence of purulent-necrotic processes.

The body weight consists of 6-8 % of human blood or 4.5 – 6 liters. **Status of patient is determined by extend of blood loss.** **Moderate blood loss** is 20% from the volume of blood circulation. **Profuse blood loss** is accompanied by shock of a moderate severity and is 20-35% from the volume of blood circulation. **Fatal blood loss** is 35-50 % from the volume of blood circulation and is followed by preagonal and agonal state.

In the result of blood loss can develop a hemorrhagic collapse and then a hemorrhagic shock.

If the level of hemoglobin in blood is lower than 80g/l and the hematicrit is lower than 30% (hematocrit norm: child – 36-44%, women 36-47%, men 40-50 %), the packed red cell or blood transfusion is indicated. It should be remembered that hematocrit indicators begin to correspond to the real blood loss only after 8-10 hours of blood loss.

Collapse is an acute developed circulatory inefficiency, which is characterized by the falling of vascular tone and decrease of circulating blood mass. It is manifested by the sharp lowering of the arterial and venous pressure, by brain hypoxia signs and arrest of the body vital functions depression.

Shok is an acute developed and life threatening pathological process, which is characterized by the heavy violations of the central nervous system activity, blood circulation, respiration and metabolism. The shock is determined by following clinical features: cold, weeping, pale-cyanotic or marble coloring of the skin; sharp delayed blood circulation in the nail bed region; trouble and sometimes confused mental state; dyspnea (labored breathing).

In the presence of primary hemorrhage first care consists in overlapping of compression band on the bleeding wound. In the case of profuse hemorrhage it is indicated the digital occlusion of the vessel which supply the given anatomic region. **The facial artery** is pressed a few centimeters from the place of interception of mastication muscle frontal edge with the lower edge of mandible. **Subsurface temporal artery** is pressed on 1 cm anteriorly and upward deviating from the ear antihelical. **Common carotid artery** is pressed by the finger to the vertebra spine of the sixth neck-bone (this is the place of interception of clavisternomastoid muscle and horizontal line on the level of upper annular cartilage edge).

RESPIRATORY DISTRESS

Respiratory distress can occur as well as in early and late periods after trauma. It is conventional to distinguish the respiratory distress according to central, peripheral and combined type.

In the presence of peripheral type respiratory distress there are obturation of breathing passages by the vomit masses, blood or mucus which fall in the breathing passages due to violation of tone of lower jaw muscles, tongue and throat as well as in the result of pharyngeal reflex lowering. This can be presented as in the case of maxilla-facial trauma in their pure form as in the case of its connection with the cerebro-cranial trauma or thorax trauma.

The central type of breathing distress occurs at patients with maxilla facial trauma which is combined with the cerebro-cranial injuries. This type of respiratory distress is characterized by full patency of breathing passages against the expressed cyanosis and dyspnea which appears in the result of violation in the central nervous system. The patient care consist in the introduction of air syringes by mouth, nose or by mask with the usage of lungmotor (artificial respirator).

In the presence of combined type breathing disorders main doctor measures should be oriented to the elimination of obstruction (occlusion) and restoration of adequate ventilation of tracheobroncheal tree. The treatment of the patient should take place in the Intensive Care, Anesthesia and Resuscitation Unit.

KELOID SCARS.

In the face wound treatment the optimal cosmetic result can be achieved of the extent if sutures lines penetrate perpendicular to main mastication directions along so called "force lines". If lines of suture run out the direction of force lines than appear hypertrophic scars namely scars which visible projects above the skin surface.

Михельсон Н.М. (1938) distinguishes 4 stages of scar formation:

Ist stage – epithelisation (2-2.5 weeks);

- IInd stage – swelling (3-4 weeks);
- IIIrd stage – contraction (2-3 weeks);
- IVth stage – malaxation (3-4 weeks).

The excessive skin scar enlargements are divided into 3 groups:

1. hypertrophic scar;
2. false (cicatrical) keloid;
3. true keloid.

True (spontaneous) keloid develops self-existing namely without anterior skin injury. False (cicacritical) keloid develops in the place of former (burns, ulcers and others).

MYOSITIS OSSIFICANS (CAVALRY BONE).

The myositis ossificans of the masticatory and temporal muscle can be present after trauma (the stroke in the region of ramus mandible, traffic traumas and other). The myositi assificans appears in 1.5-2 months after trauma. The patient`s compliances are restrictions of mouth opening, the presence of immobile solid and rather tender swelling with exact borders in the region of the masticatory or rare temporal muscle. X-ray examination shows the presence of focuses of assification in the region of the injured muscle. The treatment includes the excision of the post-traumatic appearances together with the section of changed muscle.

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