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Debridement of Gunshot Jaw Fractures

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Abstract

The article presents the material obtained during treatment of the 1500 wounded in during the civil war in Afghanistan. We describe a new method for primary surgical treatment of gunshot wounds and method removal gunshot defects of the mandible using invented compression-distraction device.

Keywords: Osteoplasty; Gunshot Jaw Fractures; Sparing

Introduction

As the history demonstrates, surgeons' dog of gunsmith's footsteps and never can outmarch them. Military surgeons better than anybody else understand that increase of capacity of fire arms is significantly ahead of achievements of medicine in studying morphology and pathology of a wound, character and scope of its debridement and other methods of the wounded' treatment. Bone wound (its hardness is 1.11) same as soft tissues by high velocity bullet of a contemporary firearm is accompanied by formation of temporary pulsating cavity. It function resembles an interstitial explosion. Herewith a bone is transformed into shallow dust; it is thrown away through an entrance and exit whole; small parts of bone as splinters remain sticking to the wound walls. Great part of bone and teeth as the splinters tear, snatch soft tissues out and throw them away from wounded' body. Therefore exit wound more than entrance wound 20-80 times in bone wounding. It cannot be compared with wounding of soft tissues where exit wound little more than entrance wound.

That is why I completely agree with an opinion of [1,2] that gunshot wounds inflicted by modern firearms are osseous and soft tissues defects rather than a familiar wound canal.

Low velocity and low energy bullets used during World War II did not create a pulsating cavity; they in fact punched tissues but did not knocked them out [3]. Every time when a new generation of firearms emerges, it brings along new wounds unlike those of the past. This fact requires a review of the tactics of surgical debridement of gunshot wounds. This time has come.

Nevertheless "the general principles of surgical debridement of maxillofacial gunshot wounds" developed in the middle of the World War II are still recognized in my country up to now [4-6]. In the West, the situation is the same [7-9]. These principles require a *sparing* debridement of a gunshot wound: bone splinters joined with soft tissues and therefore considered viable must be left in a wound, but those disengaged (not connected with soft tissues) - must be removed; it is necessary to smooth sharp bone edges on the ends of splinters and fragments; to reduce and fix fragments in the proper position, to reconstruct a bite, lay down splinters in their place; soft tissues on wound edges should be cut off economically removing only evidently nonviable tissues; a wound could be sutured in the area of natural apertures, and only put the edges close in other facial regions.

Material and Methods

Taking part in Afghanistan war, I treated about 1500 wounded and 984 of them had fractures of the jaws. Among them isolated wounds of soft tissues numbered 31.5%, neck wounds - 2,2%, the mandible wounds – 38,3%, the maxilla wounds - 14,7%, both jaws - 9,6%, zigomatico-orbitalis complex - 2,0% and dental fractures - 1,7%.

I could notice that at wounding of the mandible 38,4 % of the wounded had immediate general complications. So, 19.6 % of the wounded had a concussion of the brain and at 5.2 % a brain bruise, shock 1-III degrees – at 6.3 %, a bleeding – at 6.5 %, an asphyxia – at 0,8 %. At wounding of the maxilla which is firmly united to a cerebral skull the general immediate complications arose at 56.7 % of the wounded (during the Second World War at 3,8 % of the wounded only). Among them a loss of consciousness - at 39,1 %, caused by a brain bruise – at 18,1 %, a concussion of the brain – at 21,0 %, shock – at 13,3 %, the bleeding had arisen at 3,8 %, an asphyxia – at 0,5 % of the wounded. At the big face destructions and a hemorrhage the wounded arrived the weakened.

From the table it is visible that, the brain bruise at wounding of the maxilla occurred in 3,5 times more often, than at the mandible wounding, shock arose in 2 times more often, and the bleeding and an asphyxia almost - in 2 times was more rare. The brain bruise was accompanied by a loss of consciousness within several hours and often transformed to coma, which can continue up to 7 days. Shock and a bruise of a brain at 97 % of the wounded arose after wounding by a bullet.

In the acute period of the craniocerebral trauma due to wounding of a facial skeleton on EEG, disrithmic and reactance depression on afferents stimuli were found out. At 52.5 % of the wounded, they had moderate character, without accurate dependence on wounding terms. Asymmetry of the cerebral hemispheres was observed at 30.0 % of the wounded, and disturbances of a spatial rhythm - at 71.0 %. At perforating wounds of the maxilla from a short distance, changes on an EEG are more expressed on the side of an outlet of a bullet.

Concussion and bruises of a brain at 4.9 % of the wounded in soft tissues of a neck arose owing to diffusion of a stroking wave of a blood on cerebral substance spread inside of large blood vessels. At these the wounded of change on an EEG have usually been less expressed, than

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at wounding of a facial skeleton and were not strong expressed with disturbances of biological currents of a brain.

Our physical and electrocardiographic researches cardiovascular system condition in the acute period of wounding face and neck allow us to reveal pathological alteration in 83.3% of the wounded. Dullness of heart tones, instability of arterial pressure with a tendency to a hypotension, labiality of pulse, a tachycardia, the disturbance of a heart rhythm caused by change automatism of sinuso-atrial node, excitability and conductivity of heart impulse, a myocardium hypoxia, and metabolic disturbances were found.

Clinical symptoms of disturbance of cardiovascular system and appreciable changes on an electrocardiogram were most often observed in the first 3 days from the wounding. They didn't depend on wound localization, but depended on severe of wound, of a hemorrhage, presence of painful shock, time from the moment of wounding.

At a serious trauma, with a long painful syndrome appeared an arrhythmia up to a circulatory arrest, a spastic stricture of a larynx and bronchi, expansion of peripheral vessels with the phenomena of a hypotension, respiratory disorders in a kind apnea, replaced superficial and a hurried breathing. On this background the hypoxia developed.

We established that disturbances of cardiovascular activity it was much more often observed at the wounded who went to attack, saw the coming enemy, were under bombardment, in an encirclement, got to ambushes, than at those who has been wounded unexpectedly, casually. Functional disturbances under influence β-adrenoceptive blockers, corticosteroids, Acidum ascorbinicum and ATF disappeared for 8-10 days from an initiation of treatment, to the same term homodynamic normalization became perceptible.

Disturbances of intraventricular conductivity and metabolic changes in a myocardium had more proof character and in most cases 30 days and more after wounding remained even later. At an uncomplicated current of wound raised with the help of sympathicoadrenal systems the general reactions of an organism carried out self-control of the broken mechanisms and such the wounded didn't demand special treatment. They needed medical observation and leaving, putting off of a stressful condition and a pain and wound dressings.

There are five kind of asphyxia: dislocation, obturation, stenotic, valvate, and aspirative. For asphyxia liquidation fist of all everything must be removed from the mouth. In dislocation asphyxia tongue should be put out from the mouth and fix with pin and ligature to bandage or to chest skin. It is more effective. Obturation asphyxia requires removing foreign body from the throat. In case of stenotic asphyxia big vessels of neck have to be tie or stitch up. In valvate asphyxia flap of mucous membrane which closes entrance of larynx should be lift and temporary stitch somewhere. Later maxillofacial surgeon will stitch it properly. An aspirative asphyxia liquid (blood, saliva, water, etc) mast be removed like in sinking into water. In the last resort tracheotomy may be done excepting aspirative asphyxia. During Second World War asphyxia happened in 0,5% of the wounded. I did not observed the wounded with asphyxia.

Thus, wounding of face and neck produces a big complex of pathophysiological disturbances caused by painful syndrome, hypoxia, shock, hemorrhage, morphofunctional disturbances of organs and systems, together with influence of psychoemotional overburdening of a fighting situation and climatic factors.

During the first year of practice in the Afghanistan Central Military Hospital, I strictly kept to above-mentioned *sparing* principles of military medical formula. An annual review at the end of the first year was disappointing: wound festering happened in 26, 9% patients, suture line disruption - in 19, 2%, gunshot osteomyelitis developed in 42, 3% of the wounded.

Comparing with the period of World War II, when the principles of sparing debridement of gunshot wounds dominated in the Soviet Army, gunshot osteomyelitis developed in 48-96% of the wounded.

Results received did not satisfy me at all. That is why I started to elaborate a new tactics of Primary Surgical Debridement (PSD). In the second part of 1982, I finally elaborated and started to apply a Radical Primary Surgical Debridement (RPSD) of a gunshot wound and, first, bone wound, removing all splinters and cutting off all perished and questionable tissues and suture the wound.

The main idea of the radical PSD is very simple and consists of several stages in their strict consequence:

1) First stage is processing of a bone wound including (a) removing all bone splinters and dental fragments from wound, (b) removing out roots of teeth, in particular those situated at the end of a bone fragment (stamps), (c) sawing of the ends of bone fragments (by bur, drill, cutter, circular saw etc.) to emergence of *intensive capillary* bleeding which is an indicant of vitality (viability) of tissues.

2) Excision of soft tissues at the walls of a wound to emergence of *intensive capillary* bleeding as above said; in particular it is related to stale (not fresh) wounds which have their walls covered with layer of necrotic tissues.

3) Immobilization of a jaw fragments. Application of the Compression-Distraction Device (CDD) helps to put the mandible fragments close together (sometimes to a full contact), to suture easily a diminished wound inside the mouth and from outside. This enables us using a phenomenon of gradual distraction osteogenesis to start an early primary osteoplasty practically right after having finished PSD. In absence of CDD, the mandible fragments are not reduced along the bite, but are put closer together with help of above-anchor dental splints trying to minimize thereby a defect of bone and soft tissues. This gives a chance to suture a wound tightly.

When half of the maxilla was removed with bullet and other one fractured it can be fixed by antlers splint, bimaxillar dental splints (anchor splints) in combination with mitella, using Adams method employing the mandible;

4) Wound suturing starts with application of sparse interrupted stitches on a tongue wound (if exists) and *tight interrupted sutures* on a wound in mouth cavity. Than *tight interrupted stitches* are applied along vestibule of mouth, on prolabium (vermilion border), thoroughly controlling conjunction of its thresholds (borders), on muscles, hypoderm and derma. A wound is mandatory drained. If necessary dermal flaps are cut out and shifted to ensure a better wound closure. In case if the defects of soft tissues are major a button

sutures on rubber stoppers from antibiotics flasks is possible to apply, or sew together derma with mucous membrane of mouth cavity.

Radical PSD saves a patient of wound festering, eruption of stitches through its edges and gunshot osteomyelitis. Obviously, application of CDD in the process of RPSD of a wound is an ideal mode. Osteoplasty by local tissues and four versions of non-free osteoplasty of the mandible invented by me enable us to initiate a distraction of callus and eliminate of defects long from 1 to 15 centimeters practically after 7-10 days compression, which was started immediately after RPSD [10-12]. Osteoplasty by local tissue of the mandible (in defects up to 4,5 centimeters long) consist of bony fragments fixation with CDD, their bringing to close contact and regrinding of their edges to create a congruence. Compression is performed and after 7 days, distraction is carried out.

There were elaborated four versions of non-free osteoplasty of the mandible. Non-free osteoplasty is applied in large size of the mandible defect (from 4 to 15 centimeters) where a close contact between bone fragments is not possible to achieve. After the mandible fragment fixation with CDD a closed osteotomy of one or both fragments (stumps) of the mandible is performed with a usage of wire saw; a compression is started; in 7 days a distraction is initiated. These methods of osteoplasty give an opportunity to eliminate composite bone-soft tissues defects in a low third of face. Defects are 10-15 cm long may be liquidated for 5-7 month.

After having performed an approximation of stumps with dental splints in 10-12 days, i.e. after scarring of skin wound, it is possible to start distraction with a use of rubber rings.

As distinct from CDD, this method is an alternative but it is not possible to guarantee a full elimination of bone defect because it is difficult to observe distraction speed equal to 1 millimeter in 24 hours; however, it is always possible to stretch scars and to restore occlusion.

A wide wound is arose when the mandible body was torn off by bullet together with soft tissues. Before starting stitching such wound, it is necessary to prepare and mobilize skin of neck and cheeks and mucous membrane in sublingual area, to cut off wound edges up to capillary bleeding and to stitch skin together with mucous membrane. In case if tissues of a mouth bottom are significantly hang down it is useful to apply relaxation (retention) button stitches with rubber stoppers. In case of a proper application a wound would heal in 7 days. Under CDD usage practice, such a composite defect is eliminated in 5-7 months.

A huge cavity emerges into a mouth cavity in case of shooting out a half or whole of the maxilla; the cavity is extended up to the bottom of orbit. Wound's surfaces are places of fractures of maxillary sinus walls wide only 1 mm, all other areas are covered with nasal and maxillary atrium mucous membrane. Thin bare parts of bone are cut off; mucous membrane is excised up to capillary bleeding, lifted over a bone and is stitched together. Then using above mentioned practice surgeons stitch cheek skin together with mucous membrane. Those surgeons who normally pack such a cavity are making a mistake, creating by this practice an emerging of multiple polyps on mucous membrane of remaining walls of upper jaw atrium.

For temporary separation of mouth cavity and the maxillary sinus one could use antler splint, which must be replaced with a temporary plastic protective plate in nearest time.

In case of absence of teeth on a remaining part of upper jaw or its complete absence ligatures using Adams method can fix this plate.

In case of complex shooting out of the maxilla and fracture of orbit bottom, its content shifts down into mouth cavity. I reduced of orbit bottom by my finger and fixed it with one or two Kirschner pins below it across the face through both zigomatic bones

In case of complete absence of orbit bottom its content shifts down into mouth cavity and it is possible to maintain with nothing but a help of gauze plug with ointment balm Vishnevsky and antler splint or preferably with a temporary protective plastic plate which could be fixed using Adams method.

Eyeball breakage of or traumatic enucleation are frequently accompanied with a fracture of upper wall of an orbit. After a remove of its splinters a defect up to 1, 5-2, 0 cm diameter could emerge. Neurolimph lavishly effuses through it in case of a breakage of dura mater (pachymeninx). I succeeded in stopping neurolimph effusion by using a piece of adipose tissue cut of corpus adiposum buccae.

These pieces of adipose tissue are put manually in a bone defect and hold it for 1-2 minutes. As a result, I receive an "adipose rivet", which has a waist in a gap of bony defect, and two umbrella shaped enlargements: in the top in a skull cavity and in the bottom – in a wound. After that a wound is been closed by a biological diaphragm - a freeze-dried and soaked in an isotonic NaCl (sodium) solution pachymeninx, abdominal membrane, pleura.

In case of shooting out of the maxilla and soft tissues, a stitching of skin with mucous membrane is recommended as it was described above.

After bilateral perforating wounding of the maxillary body in front plane during bilateral maxillary sinusotomy by Caldwell-Luc I frequently discovered small blood clots in atriums, little thin bony plates - chips of upper jaw atrium walls and small hole in walls. Operating trauma for good reasons was several times larger than a wound caused by a bullet of an enemy. I abandoned from maxillary sinusotomy and started to insert with a help of a probe one long perforated drainage tube along the whole wound tract. Atriums and nasal cavity were rinsed through it three times a day. Bone chips and blood clots were washed away and suppurative genyantritis did not emerge.

Non-perforating wounds when a wounding projectile is sitting in an atrium certainly require maxillary sinusotomy performed through a vestibule of mouth or projectile entrance depending of its size. It is not recommended to speed up with removing of a projectile which went through an atrium and stopped at infratemporal, pterygopalatine fossae or parapharyngeal space, because (1) this intervention is interfacing with additional significance traumatism and (2) these foreign bodies normally encyst without appearance of suppurative inflammation in 99,8% of patients.

A foreign body situated near an internal carotid artery wall and threatening to provoke an arrosion of blood vessel and a secondary bleeding must be definitively removed. To perform this temporary

osteotomy of a zigomatic arch is executed; a coronoid process could be resected as well if necessary, than a surgeon penetrates into infratemporal fossa. A search of a wounding projectile must be carried out very cautiously because of close lying of maxillary arteria and pterygopalatyne venous plexus.

Hard palate wounds are usually accompanied by shooting out an alveolar bone. This defect could be closed with help of a tissue flap taken from a near part or a gauze tampon soaked in antiseptics or Liniment balm Vishnevski, which is fixed by a temporary protective antler splint.

It is very complicated to take a tissue flap from a patient's tongue. However later on this defect could be closed with a help of a tube flap.

Only 17, 6% of the wounded need to have the maxilla immobilization, when in case of shooting out one-half of the maxilla reverberatory fracture of another one happens as well. In these cases, the most effective is method Adams, but low ends of ligatures must be attached not to the maxilla, but to the mandible by means of dental splint, special hooks or circumferential wiring and rubber rings. The latter provide "hammering" of upper jaw into above laying bones. Usage of mini plates with screws and bimaxillar splints with mitella less effective, usage of Kirscher's pins is not effective because of only one point of pin's fixation – one malar bone.

A thick cortical bony layer on a mastoid process determines an emerge of a round bone defect (as a coin) with a diameter of 2-3 cm, which can be closed by a pedicle flap taken from nuchal region or usage of approximation (approaching) button sutures.

Results

As the practice of the World War II shows when low power low velocity wounding projectiles were used and surgeons performed a sparing PSD of gunshot wounds of the mandible, a gunshot osteomyelitis emerged in 48,0-96,0% of the wounded, bone defects and false joints remained in 25,0-45,0% of the wounded [13].

After a radical PSD of gunshot facial wounds caused by more powerful high velocity projectiles with usage of CDD a number of patients with gunshot osteomyelitis of the mandible was reduced up to 6,4%, i.e. almost in 7-15 times; a gunshot osteomyelitis of the maxilla was not registered at all; a number of disabilities lowed down to 6,1%, i.e. reduced almost in 4-7 times. In this connection, disability was associated with unrestored total or partial defects of upper jaw, absence of eye, paralysis of facial muscles as a result of damage of a facial nerve. 0.8% the wounded perished due to complex wounds incompatible with life. 93.1% the wounded were returned to duties, i.e. on 32. 0% more than in American forces during Vietnamese war [14].

Discussion

In the first year, I strictly complied to above mentioned military medicine doctrine principles of *sparing* surgical debridement of gunshot wounds and repeatedly made it certain that compliance to them is accompanied by a large number of complications, enlarges a number of disabilities and dooms casualties to a numerous plastics surgeries, which could avoided with the change of tactics of PSD of a gunshot wound.

Let us analyze these principles. One of them requires a certainly repositioning of the mandible fragments by means of dental splints and at the same time, another principle insistently recommends isolating of a bone defect from a mouth cavity by stitching of oral mucosa.

It is well known that fractured fragments of any bone always shift towards a fracture point or a bone defect minimizing thereby defects of bones and soft tissues.

After gunshot jaw, wounding made by contemporary weapons very frequently bone defects emerge as well as defects of skin and mucous membrane.

Therefore after a reposition of the mandible fragments to their normal position it is practically not possible to stitch wound of mucous membrane. Moreover, a surgeon after reposition of the mandible fragments beforehand dooms wounded to (1) emerging in him bone defects and (2) follow-up bone plastic surgeries. Such large wounds must be packed with tampons for takes it under protection from microbes.

However small vibration movements of bone fragments, lingual muscles, bottom of mouth cavity, lips and cheeks permanently displace a tampon inserted into a wound; it never provides a hermetic closure of bone wound, which inevitably leads to expansion of microbism in surrounding soft tissues and bone marrow. Arising following inflammation is interpreted as gunshot osteomyelitis and is accompanied by rejection of sequesters.

Next principle brings under regulation a sparing attitude to bone splinters. I have determined that sparing attitude to bone splinters (remains) connected with soft tissues practically always is complicated by gunshot osteomyelitis. I managed to notice that discirculative effects caused by wounding are progressing with time. In first 24 following hours bone splinters are still bleeding a bit after a trial nipping off with cutting forceps; however I have never observed any bleeding from them at the beginning of the second day or later in spite of their connection with soft tissues.

Amputation of a bone splinter from a soft tissue pedicle is not accompanied by bleeding from a pedicle. Furthermore, after an amputation of a pedicle itself its base very rarely sprang up phleboid bleeding, but never a microvascular one. This tells that there are serious microcirculation disruptions in this ostensibly (supposedly) "feeding" pedicle, which are shown by microvascular thrombosis with "water pipe" syndrome.

Besides similar phenomenon occurred in past. So [15] described the following: "Soft tissues serving as feeding pedicles for bone splinters frequently necrotize; bone splinters which were initially light clear gradually darken. Even having provided timely debridement of wounds and attendance of them sphacelous tissues start evolving unpleasant putrefactive smell in 5-10 days after wounding." Earlier they wrote that patients arrived in rear hospitals 3-4 weeks after gunshot wounding with gunshot osteomyelitis diagnosed. In these cases a certain amount of free floating necrotic bone splinters were identified in wound (necrotic feeding pedicles had already lysed - M.Sh.) as well as edge necrosis of jaw fragments ends.

It is surprising that after such a prestigious and unbiased

statement official military medicine keeps insisting on necessity to keep bone splinters in wound believing them as viable.

To clarify this I carried out a morphological research of bone splinters initially connected with soft tissues and having been removed from wound 6-72 hours after wounding. It is well known that there are a number of cavities inside of bone for osteocytes and canaliculus where branches of these cells come through. Fissured space between cells with their branches and a wall of bone canals is filled with extracellular (interstitial) fluid. It delivers nutrients and oxygen along blood vessels to cells and takes back waste products – metabolites [16]. Destruction of intraosteal canal system in bone splinter results in defluvium of liquid from bone, hypoxia and death of osteocytes caused by agglomerated metabolites. After examining of histological slides from bone splinters I identified that a death of bony cells and a bone splinters in whole occurred 24 hours after wounding. These splinters had left by a surgeon in wound ostensibly (supposedly) as viable change into primary sequesters which alarmed their appearance with acute suppurative inflammation and ichorous smell, which [15] wrote about. Thus, a bone splinter appears a first factor of wound inflammation.

As a second factor of emergence of inflammation of bone wound as I see it is necrosis of osseous tissue at the ends of bone fragments, which had received only smoothing out, and trimming treatment during *sparing* PSD.

YM Zbarzh made an important comment [15] on this: "In case of osteomyelitis a sequestrectomy carried out without resection of ends of bone fragments did not bring positive results" (underlined by me - M.Sh.). It turns out that a surgeon has to wait until gunshot osteomyelitis develops in wound before making a decision to resect ends of bone fragments. Is it not better to do the same at PSD of wound without letting osteomyelitis developing? Osteomyelitis delays treatment and damages mentality of patients, it interrupts and deforms a system of microcirculation in bone and soft tissues, causes sclerosis of ends of bone fragments and complicates conditions of further osteoplasty.

By he by, [17] experimenting in dog kept to the same opinion: "To avoid developing of osteomyelitis… all bone splinters were removed in both fracture area and along a wound canal. Ends of jaw fragments affected to any degree by posttraumatic necrosis were partially resected and smoothed".

For good debridement of a bone wound, it is necessary to know well a structure of its walls. G.N. Berchenko et al., Y.G. Shaposhnikov, B.Y. Rudakov [18,19] specify two zones of tissue damage. To my observation there are three similar damage zones at the walls of gunshot wound: a zone of primary necrosis where bone and soft tissue cells died at the moment of wounding; a zone of following (total) necrosis where metabolic process stopped in cells and they will inevitably die in nearest 24 hours (b); a zone of cellular parabiosis where half of cells will die and a demarcating line will emerge (c); and finally, a zone of healthy tissues (d). Having known these zones it is easy to understand that cutting off and smoothing only bone ledge at the ends of bone fragments at *sparing* PSD does not give practical results, because two first zones remain and tissues in these zones reject from the ends of bone fragments via inflammation process.

These inflammation effects in infected bone wound against breaches of microcirculation in bone fragments in the aggregate with inflammation around splinters and in dying soft tissues remaining after a *sparing* non-radical PSD lead to development of gunshot osteomyelitis. This process is accompanied with appearance of real sequesters at the ends of bone fragments. Development of gunshot osteomyelitis delays treatment, rejection of sequesters leads to emerging of bone defect or enlarging of its size, contributes to formation of bad scars and deformation of face; it does not allow a surgeon to initiate plastic operations at early stage.

A research conducted above determines that a sparing principle of debridement of bone and soft tissue wound promotes development of *gunshot osteomyelitis of jaw and festering in wound*.

It is easy to assure one; because during a sequestrectomy I removed bone splinters from wound left by myself in past [20] and small size sequesters having separated from ends of bone fragments.

Same analyses gives an understanding of the reasons of developing of gunshot osteomyelitis of the mandible in 48,0 - 96,0% of the soviet wounded during World War II, whose wounds were treated by *sparing surgical debridement*.

Conclusion

Treatment of the wounded with gunshot damages of facial skeleton is carried out according to the following principles:

1) evaluation of the general health conditions of a wounded and conduction of necessary actions applied to emergency conditions: shock, coma, asphyxia, arterial bleeding; 2) careful examination of a bone wound from outside and in mouth cavity, using palpation from outside and in mouth cavity, check-up of a wound and a wound canal by finger, by probe where finger can't get through. Herewith is necessary to make up a perception about bullet route and anatomic formations on its route, which could be damaged. This examination is painless in few hours after wounding because tissues are losing their algetic sensitivity; 3) removing all foreign bodies from wound including teeth on the ends of bone fragments, splinters of teeth and bones of all sizes; 4) cutting away necessary size bone segments from ends of bone fragments (stumps) till appearance of active capillary bleeding; 5) preferably carrying out a non-free osteoplasty of the mandible and osteoplasty with local tissues by means of CDD; in CDD absents osteosynthesis or bimaxillary splint must be used as was recommended above; 6) fixing of the fragment of the maxilla by Adams method using low jaw and isolation of the maxilla defect from mouth cavity by means of Adams method; 7) cutting off soft tissues on wound walls to emerge of active capillary bleeding; 8) application of primary stitching, using button sutures, if necessary, and drain of wound; 9) using practices of soft tissues plastic surgery; 10) prevention and control of infection; 11) prescription of physical therapy; 12) therapeutic exercises; 13) preparation of complex dentures.

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