

The perfection of pre-hospital anesthetic methodology in conditions of catastrophes**S.Kajaia, Kh.Khavtasi.****Georgian Critical Care Medicine Institute, Military Hospital of The Ministry of Defense.
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Here are used an experience got during a work of coalition forces medical services in Spitac-Leninakan 1988 and Imereti 1991 earthquake areas. Also are analyzed materials of liquidation of medical problems occurring during natural and technological disasters in recent years. Accuracy of methodological approach was tested during a special operations carried out in the different regions of Georgia.

Key words: catastrophes, methodology.

In the process of preparing the work, we analyzed and used the experience gained at the epicenter of the earthquakes in Armenia in 1988 and in Imereti (Georgia) in 1991 and experience gained in service of the Coalition Army deployed in Iraq. Also, the data about the recent terrorist attacks and the data about natural and technological disasters from the medical services of different countries. The correctness of the used methodological approach was verified during the special operations in certain regions of Georgia. According to modern understanding, the anesthetic provision of the injured and the wounded in wars and disasters not only includes the adequate painkilling but also the complex of activities including the prophylaxis of the disorder of vital functions of the body and controlling them if necessary. The patients (injured, wounded) must not be attending or participating in the surgeries undergone by them. This can be achieved by general Anesthesia (is attending) and by sedation (is attending but not participating). The same issue must be considered during the qualified and specialized caring, as well as during the process of medical evacuation. Persons of different qualifications participate in the above-mentioned process-beginning from a soldier and a lifeguard, ending with hospital anesthesiologist-reanimatologist. Despite the rank of the specialists and the stage of the pre-hospital period, the matter must not be crucial, as the approach to the issue and the work done must be similar. Apart from this, the origin of the injury does not have a practical importance. Due to the above-mentioned, the purpose of this work is to enable the person having the minimal medical qualifications to take care of the injured during the pre-hospital period.

The aims of the anesthetic provision during pre-hospital period are:

- Abolishment or reduction of the factors causing the nociceptical aggression
- Painkilling
- Restoration and preservation of the respiratory function
- Restoration and preservation of the circulation of blood

The reduction of nociceptive aggression involves the disposal of the pain-causing factor but if this is impossible, then the reduction of its impact on the body. For instance, evacuation from the place of fire, the disposal of the damage-causing chemicals etc. Medical manipulations also reduce the intensity of pain to a large extent. Painkilling involves full liquidation of the ache using local or general anesthetics. Restoration and preservation of the respiratory function consists of the complex of activities aimed at the maintenance of the supply of oxygen to the organs. Restoration and preservation of the circulation of blood consists of the process of controlling the heartbeat and the circulation of blood and the complex of activities aimed at the preservation of the circulation of blood. Anesthesia is one of the most important parts of the anesthetic and reanimatic provision due to the fact that painkilling or reduction of pain lowers the systematic reaction of the body to trauma which can cause serious disorders, reflected in metabolic and functional derangement. In field condition, local or general anesthesia is used. It is impossible to conduct the most sophisticated form of anesthesia-combined balanced inhalational narcosis of trachea if the material-technical, medical and proper security provision does not exist. Qualified staffs are necessary for the above-mentioned. For this reason the focus in field conditions must be on local and general inter vein anesthesia. It is necessary to follow certain rules regardless of the method used for the anesthesia:

1. The risk of the anesthesia and the operation must be defined
2. If the patient is in the state of shock (which is quite frequent in military field anesthesia), the type and the degree of the shock must be defined.
3. The technique and the prescription of the anesthesia should be selected according to the risk
4. The condition of the patient must be assessed after finishing the operation

The order of evacuation and the type of transportation must be planned in advance, if impossible-the technique of the treatment must be selected Vein narcosis with the preservation of spontaneous breathing has a wide range of advantages and disadvantages. Advantages: quick start, mostly without excitements and unpleasant feelings, technical simplicity, the minimal amount of equipment needed. Disadvantages: the danger of the depression of cardiovascular and breathing centers, the fall in the arterial pressure, the increase in the activeness of the pharynx and larynx, the harmful

influence on the parench organs, the weak relaxation of the muscles and long-term post-narcosis sleeping. In hospital conditions, vein narcosis is being referred to for relatively short operations and manipulations but it takes the first place in pre-hospital field.

The types of the inter-vein narcosis in pre-hospital field are:

- Vein narcosis using Novocain and its analogues

Alcoholic narcosis

- The narcosis using the barbiturates
- The narcosis using the sodium oxybutirate
- The narcosis using ethomidation
- The narcosis using Ketamine
- Ataralgesia
- Neuroleptanalgesia
- The narcosis using Propofol

Using our experience and according to our recommendations, in the cases of catastrophe, the priority should be given to the narcosis using Ketamine, Ataralgesia and Neuroleptanalgesia. The narcosis using Ketamine with the preservation of spontaneous breathing has been becoming frequent since the 1960s and nowadays, it is the most common method in pre-hospital field. Ketamine (Kaliphosle, Ketanest, Ketalar) can easily be dissolved in fat, because of which it gets into the brain quickly. It triggers the excitement of the Limb System of the brain and the excitement of myocard. Neat Ketamine is used before the formation of narcosis strength, it triggers the cataleptic hyper-tone, the state of stupor (often with open eyes), arterial hypertension and tachycardia, hyper-salivation, hallucinations (often with the state of being delirious) and short-term apnoe. Ketamine raises the consumption of oxygen by the myocard and the brain. The depressive impact on the breathing system can be averted by using the low dose of the medicine slowly. Ketamine does not have a considerable impact on the liver and the kidneys. Allergic reactions are rare. The medicine is fully dissolved in the liver within 2 hours of usage and is fully secreted by the kidneys and the intestine. Ketamine is one of the best for analgesia in conditions of spontaneous breathing to conduct minor and some of the average operations: minor interference for analgesia, for the reposition of twisted and broken parts of the body, for the treatment of burnings, for the introductory narcosis of the patients being in the state of shock. The side effects of the narcosis using Ketamine are: epilepsy, mental illnesses, pheochromocytoma, the pathological processes taking place by the increase of

inner-skull pressure, the heart failure, and hypertension. It should be emphasized that the above-mentioned pathologies are rare among the armed forces. The skull traumas caused during wars or catastrophes are exceptions, in cases of which, the usage of ketamine is not recommended.

The body often give variable individual reactions to Ketamine. Because of this, it is recommended to start the narcosis in field conditions with the low doses of the medicine (0.5mg/kg) before using the standard dose-5mg/kg, especially with children and the elderly. This approach enables us to notice and disable the side effects of Ketamine at the same time. Apart from this, it is possible to reach the level of surgical anesthesia using these doses. Apnoe and the psychomotor excitement are the most important form the side effects. Apnoe is not always transient and active interference is necessary with 5-8% of the patients. The traditional pre-medication of the mono-narcosis using Ketamine involves the usage of Atropine, Anti-allergic medicines and Diazepam. However, based on our experience, only the usage of diazepam is recommended in field conditions, which has two reasons: 1. Ketamine lowers the consistence of Histamine in the plasma of blood 2. Ketamine triggers the increase in the inner-eye and inter-cranial pressure. Due to the above-mentioned, the reason against using anti-allergic and adrenimimetic medicines becomes clear. In field conditions, it is recommended to conduct the low-dose analgesia using Ketamine,, especially with the deficiency of resources, when it is almost impossible to conduct intensive therapy. .In field conditions, the inter-muscular anesthesia are used as well as the inter-vein anesthesia. It must also be taken into consideration that, in field conditions (due to military or other types of trauma) influential or average hypovolemia is frequent which is important while choosing the medicine dose. During the inter-muscular anesthesia with Ketamine, after pre-medication i.e. after using the dose of 10mg of Diazepam, the patient is given Ketamine with the dose of 6-8mg/kg in the muscle. Within 4-5 minutes, among 85% of the patients the sufficient depth of anesthesia is developed without the depression of breathing and psychomotor excitement and with disorientation and the preservation of verbal contact. On top of that, 77% of the patients fall asleep after 8-10. From this moment, it is needed to use Ketamine again with the dose of 4mg/kg to reach the surgical stage of the narcosis. The duration of the narcosis is 25 ± 5 minutes. So, to maintain the stage of surgical anesthesia, it is necessary to use Ketamine again with the same dose. During the inter-vein anesthesia with Ketamine, after using the 10mg dose of Diazepam, the patient is given the Ketamine with the dose of 1-1.5 in the vein. Within approximately 1 minute, the reduction of pain is developed, with disorientation and the preservation of elementary verbal contact and without the depression of

breathing and psychomotoral excitement. It is needed to use Ketamine with the same dose again after 3-4 minutes in order to reach the surgical stage of the narcosis, which causes the disappearance of phonation and the formation of narcosis sleep among 84% of the patients. After 3-5 minutes, the condition of deep sleep and surgical narcosis is reached, duration of which is 20 ± 3 minutes. To maintain the surgical stage of narcosis, it is necessary to re-use the medicine every 15 minutes with the dose of 1mg/kg (including the first injection). In cases of inter-vein and inter-muscular anesthesia, if the duration of the narcosis exceeds two hours (which is indeed undesirable), the inter-vein re-usage of Diazepam is necessary due to the impact of anesthetic on Central Neural System. As a result of this, the absolute majority of the patients wake up without hallucinations and psychomotoral excitement-with retro-gradual amnesia.

The mono-narcosis with Ketamine	Inter-vein anesthesia	Inter-muscular anesthesia
Pre-medication	Diazepam 10mg in the muscle	Diazepam 10mg in the muscle
Introductory narcosis	Inter-vein usage 1-1,5mg/kg - The same dose after 3-4 minutes	6-8mg/kg in the muscle - 4mg/kg in the muscle after 10 minutes
Basic narcosis	Inter-vein usage with the dose of 1mg/kg every 15 minutes	The dose of 4mg/kg in the muscle every 20 minutes

According to the given grid, during the narcosis with Ketamine, the restoration of consciousness with intervals is frequent. As a result of this, it becomes possible to have an oral contact with patient. This fact is an important negative point. At this moment, the degree of analgesia is acceptable, but it becomes essential to select the dose of the medicine individually in order to avert the same cases. Ataralgesia, which is one of the methods of general analgesia is conducted by combining ataractic medicines (minor tranquilizers) and drugs. From ataractic medicines, Diazepam is the most commonly used and from drugs-Phentanille. Diazepam (with standard doses) has little influence on breathing and hemi-dynamics. It has a sedative, sleeping, weak myo-relaxing and anti-cramp effect. Due to this fact, It is for pre-medication as well as the initial and the basic narcosis in cases when hemi-dynamics is unstable and the operational risk is high. Painkilling is conducted by drugs (mostly Phentanille is used). Pre-medication is conducted by the classic scheme-using 2 ml of Phentanille in advance and then, using Diazepam with the dose of 1.5-2mg/kg slowly within 2-3

minutes (if infusion therapy is being conducted) or very slowly diluted to 25-30ml. The revelation of the effect of narcosis is proportional to the speed of the giving the medicine. The vision of the patient becomes vague and fixed at one pot. With the increase of disorientation, the breathing becomes slightly rare and deeper, the pulse and the arterial pressure remains almost the same. The state of narcosis is being developed without excitement. In order to maintain the state of narcosis, from the moment of the patient falling asleep, Phentanille is being added with the dose of 2ml every 20 minutes and Diazepam is being added with the dose of 10mg every 1.5-2 hours. Approximately half an hour prior to the end of the operation, the giving of the afterward doses must be stopped. After 15-20 minutes, the patients wake up slowly with stable breathing and hemi-dynamics and without psychomotoral excitement. In field conditions, relatively different doses are used for ataralgesia. After the classic pre-medication, Diazepam must be used with the dose of 20mg and Phentanille (without waiting for sedation) with the dose of 0.005mg/kg. The satisfactory degree of analgesia is reached within 5-6 minutes and is maintained for 40-50 minutes. In order to lengthen the narcosis, the addition of Diazepam with the dose of 10 mg every hour and Phentanille with the dose of 0.005mg/kg every 45 minutes is needed. It is possible to conduct ataralgesia according to the identical scheme, with the inter-muscular usage of the medicines. In this case, the dose of Diazepam is 0.5g/kg and the dose of Phentanillee is 0.01mg/kg. During ataralgesia, the additional usage of the medicines is often followed by the long-term, second-time sleep with stable breathing and hemi-dynamics. The above-mentioned matter makes it possible to comfortably transport the injured on long distances. Neuroleptanalgesia became a wide-spread method in anesthesiology during the past 40 years. The essence of neuroleptanalgesia is the simultaneous impact of neuroleptics and anesthetics on the hill-optic of the human brain, under-hill canal and reticular formation. These factors cause in the independence of the psychics and the depression of movement without the narcosis. Based on the combinational selection using many neuroleptics and analgesics, it has been proved that the usage of Droperidol and Phentanille are the two best options. Droperidol (Depidrobzperidol, Droleptan, Neurolidol, Inaphsene) trigger the depression of willing movements, decelerates the action of adrenaline and nor-adrenaline, lowers the arterial pressure, eliminates the spasm of peripheral vessels and improves the peripheral blood flowing, merely depresses breathing. Droperidol has an anti-vomiting effect. 1 ml of any type of Droperidol always contains 2.5 mg neat substance. Its usage can be muscular as well as inter-vein. The second component of neuroleptanalgesia - Phentanille (Alphentanille, Remiphentanille, Sublimaze, Caldid,

Bitrile, Neptanile, Phentaneste) is the best analgesic (it is much stronger than Morphine). It starts coming into effect immediately after the usage and its effect lasts for about 20-30 minutes. It triggers analgesia (guarantees the analgesia of surgical manipulations), bradycardia, makes the breathing rarer, causes the depression of the reflexes of the pupil of the eye and the cornea. It can be used under the skin, in the muscle or in the vein. The mixture of the above-mentioned medicines, which is called Thalamonale, is the most common. It contains 2.5mg of Droperidol and 0.05mg of Phentanille, i.e. 1ml of Droperidol is added to 1ml of Phentanille. Thalamonale does not have all the effects that its components do. It causes neither the lowering of the function of the breath center nor the development of hypo-tone, which is vital. Neuroleptanalgesia is used as the method of introductory and base narcosis, as the potential of the local anesthesia, for inter-vein and inter-muscular narcosis and for the inhalational endo-tracheal narcosis. In the pre-hospital field, the priority is given to neuroleptanalgesia for a range of reasons, such as: minimal toxicity, large therapeutic diapason, being easily controllable, profound analgesia and neuro-vegetative protection, stable hemodynamics, anti-shocking effect, psychological calmness and amnesia, anti-vomiting effect. The negative point of neuroleptanalgesia re: the stiffness of muscles, the provocation of extra-pyramid symptoms (causing the shrinking of chewing muscles, nistagm and so on). The negative effect of neuroleptanalgesia is hypo-volemia. It is recommended to have access to reanimating equipment on the spot of neuroleptanalgesia. In pre-hospital conditions, neuroleptanalgesia must be conducted by modifying the classic method. Pre-medication is conducted with the traditional method. For introductory and basis narcosis Thalamonale must be given to the patient every 2 minutes with the dose of 2ml until the surgical stage is reached. After reaching the surgical analgesia, 1ml of Thalamonale must be used every 15-20 in order to maintain and lengthen the surgical stage. In case of the inter-muscular usage of Thalamonale, its dose and the intervals between usages must be doubled. The given methodology does not mean that it is always necessary to conduct pre-hospital analgesia. The principle of field medicine i.e. first aid, qualified medical aid (if possible), stabilizing the condition of patients and timely transporting them to the institution of higher medical level, always remains the same.

ნარკოზის ოპტიმალური სახეების შემუშავება კატასტროფებისათვის
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საქართველოს კრიტიკული მედიცინის ინსტიტუტი, სსიპ „გორის სამხედრო
ჰოსპიტალი“ . თბილისი, საქართველო.

გამოყენებულია სპიტაკ-ლენინაკანის 1988წ და იმერეთის 1991წ მიწისძვრების
კერებში, აგრეთვე ერაყში დისლოცირებული კოალიციური ჯარების სამედიცინო
სამსახურის მუშაობის დროს მიღებული გამოცდილება. ასევე გაანალიზებულია
უკანასკნელ წლებში მომხდარი ბუნებრივი და ტექნოლოგიური კატასტროფების
სამედიცინო პრობლემების ლიკვიდაციის მასალები.

დამუშავებული მეთოდოლოგიური მიდგომის სისწორე შემოწმებული იქნა
საქართველოს სხვადასხვა რეგიონებში განხორციელებული სპეცოპერაციების დროს.
გასაღები სიტყვები: კატასტროფები, მეთოდოლოგია.