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ВАРИАНТЫ ВРЕМЕННОЙ ИММОБИЛИЗАЦИИ ПРИ ПЕРЕЛОМАХ ЧЕЛЮСТЕЙ

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Как в мирное, так и в военное время переломы костей лицевого скелета являются актуальным явлением (от 5-6% до 7-9% от всех травматических повреждений скелета) и требуют рациональных методов лечения. При этом, на долю переломов нижней челюсти приходится 65-85%, верхней челюсти – 4-6%, скуловой и носовой костей – 7-9% и 4-7% соответственно. Необходимость иммобилизации обусловлена риском возникновения болевых ощущений и осложнений, таких как кровотечение, микробная контаминация, асфиксия, повреждение нервов и сосудов. В статье проводится сравнительный анализ способов транспортной иммобилизации челюстей на примере травм, полученных в условиях военного времени или в момент чрезвычайных ситуаций. Были выбраны внеротовые методы, удерживающие отломки челюстей посредством повязки, прикрепленной к мозговой части черепа, и внутриротовые, имеющие межчелюстное лигатурное скрепление. ***Заключение.*** Стандартная пращевидная повязка Энтина имеет преимущество по сравнению с повязками по Гиппократу и по Померанцевой-Урбанской. Она достаточно универсальна и может быть подогнана под размер головы любого пострадавшего, обладает приемлемой прочностью и надежностью фиксации челюстей. Выявлены преимущества методики Айви в сравнении с другими методами межчелюстного лигатурного скрепления. Ее достоинством является прочная и качественная иммобилизация отломков челюстей, возможность использования при множественных переломах, простота применения, что позволяет рекомендовать методику Айви для использования при возникновении показаний.

Ключевые слова: *перелом челюсти, временная иммобилизация, повязка, лигатурное скрепление.*

VARIANTS OF TEMPORARY IMMOBILIZATION IN JAW FRACTURES

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In peacetime and in wartime, fractures of the bones of the facial skeleton are an important phenomenon (5-6% to 7-9% of all traumatic skeletal injuries) requiring use of rational treatment methods. The share of mandibular fractures accounts for 65-85%, of maxilla – 4-6%, of zygomatic and nasal bones – 7-9% and 4-7%, respectively. The need for immobilization is associated with the risk of development of pain and complications, such as bleeding, microbial contamination, asphyxia, injury of nerves and blood vessels. The article gives a comparative analysis of means of transport immobilization of jaws on examples of traumas received in the wartime and in emergen-

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cy situations. There were chosen extraoral methods that hold jaw fragments with the help of bandage secured to the cerebral cranium, and intraoral methods with maxillomandibular ligature fixation. ***Conclusion.*** Standard Entin head-chin strap has certain advantages over Hippocratic cap bandage and Pomerantseva-Urbanskaya method. It is sufficiently universal and may be adjusted to any size of the head, possesses sufficient strength and provides reliable fixation of jaws. Ivy's method was found to have advantages in comparison with other methods of maxillomandibular ligature fixation, which are strong and high-quality immobilization of the jaw fragments, possibility of use with multiple fractures, simplicity of application. All this permits to recommend Ivy's method for use in case of indications.

Keywords: *jaw fracture, temporary immobilization, bandage, ligature fixation.*

In conditions of wartime and in emergency situations, the first medical assistance is given at the stage of evacuation. Temporary immobilization of fractures is of much importance in this period due to a risk of development of complications in the maxillofacial region threatening the life of the victim. There often arises a question of selection of a rational method of transport immobilization of jaws based on the peculiarities of the clinical picture of the trauma.

Thus, the *aim* of work was comparison of methods and means of temporary immobilization of the jaws based on the analysis of literature sources.

For immobilization of jaws transportation splints are used that are bandages of different design. In the literature methods of use of bandages are described for fixation of jaw fractures with characteristic clinical peculiarities [1-3]. To arrest bleeding in case of fracture of the upper jaw and lower jaw beyond the dental arch, compressive bandage is often applied. In case of jaw fractures under field conditions with multiple ruptures of soft tissues, a variant of standard Entin's head-chin strap is considered for use [4]. The choice of this method was determined by existence of this fixture in a standard tool bag of a medical instructor of Russian Armed Forces and Ministry of Emergency Situation of Russia. According to T.P Dyubkova, in transportation of the victim with use of Entin's strap no purulo-inflammatory complications occur on the 3rd-4th day, and the bone fragments of jaws are reliably fixed. The author notes that in fractures of the lower jaw within the dental arch, this bandage should be used only to hold the bone fractures, since excessive pressure on the fragments may worsen their displacement and cause asphyxia [5].

Use of Hippocratic cap bandage in combined fracture of the upper and lower jaw was considered an alternative to Entin's strap, since it may be applied by a specialist of any qualification. In case of fracture of both jaws it holds the bone fragments and prevents their displacement.

Variants of the extraoral temporary immobilization were considered on an example of Hippocratic cap in comparison with other methods. L.M. Marmysheva, et al. experimentally determined dependence of the time of development of purulo-inflammatory complications on speed of application of the bandage. The authors think that the faster the bandage is applied, the lower the probability for development of complications in the maxillofacial region [6]. I.S. Kopetsky states that use of these structures does not require any invasive manipulations for their application [7]. According to many authors, risk of aspiration in case of vomiting may be eliminated by a rapid removal of the bandage by a victim without any effort. However, Hippocratic head-chin bandage does not satisfy all the requirements: immobilization of the jaw fragments is insufficiently rigid, and this ban-

dage made of bandage gauze, is unreliably secured to the head and often slips down especially in loss of consciousness [8-10].

Some authors give preference to a standard elastic four-tailed bandage of Pomerantseva-Urbanskaya [11-13]. In experiments, this bandage proved to be simple in use and convenient, that is, its application does not require much effort. V.Yu. Ziambetov notes impossibility of using this bandage in fractures of edentulous jaws [14].

The majority of authors in their works consider use of means that may be at hand (a pen, a stick, a plate) for temporary immobilization secured to the head with a handkerchief, rope, belt, and serving an improvised fixating base [15,16]. K.A. Sveshnikov proposes use of the undamaged removable dentures together with head-chin strap as a means of transportation immobilization in case of fractures of edentulous jaws [17].

Fixation of fragments of the low jaw within the dental arch, fractures of the alveolar process of the upper jaw and of multiple fractures of jaws can be achieved using maxillomandibular ligature tying. Some authors use a wire 0.5 mm thick as a ligature [18]. V.V. Maslyakov, et al. found out a common condition for use of all intraoral immobilization methods. They state that for one-jaw bandage the presence of 2-3 stable teeth is required on each fragment of the lower jaw, and for two-jaw bandage there should be stable teeth in both jaws with the undamaged upper jaw. Use of this method is limited in fractures of both jaws and in the presence of mobile teeth or teeth in the fracture zone [19]. I.Yu. Lebedenko gives the priority to Ivy's method of ligature fixation based on the introduction of wire in the form of a hairpin through the interdental space with twisting of its ends in the vestibule of the mouth. The author notes that in case of fracture in the region of a branch or in the zone of the second and third molars of the lower jaw this method is unrealizable, since there is no possibility to pass the ligature on both sides of the fracture line. In opening the mouth, for example, in vomiting, the vertical wires are readily cut, and the main part of the structure is retained in the mouth cavity [20]. A.V. Lepilin noted that parodontium of teeth that participates in the maxillomandibular fastening, is under the load of holding the jaw fragments in correct position and of counteracting muscles that lower the mandible [21].

For comparison, I.M. Samokhvalov considers the possibility of using Kazanyan's method based on the passing of the ligature around the teeth of jaw fragments and antagonistic teeth in the form of "eight" with twisting of the wire ends in the vestibule of the mouth. The method suggests existence of a thick wire bundle in the vestibule of the mouth which may traumatize oral mucosa. Besides, I.M. Samokhvalov indicates the necessity of repeated application of ligatures in case of their breakage or after untwisting for examination or for hygienic procedures in the oral cavity [22].

The same author emphasizes peculiarities of Vilga's method with use of a wire requiring fixation with special structures in the form of a button, and of Geikin's method using lead pellets for fixation of the ends of the wire in the mouth cavity, which is ecologically unfriendly and difficult for access [23].

A.A. Mikhailov emphasizes method of Gotsko that uses a polyamide thread instead of ligature wire which is tied on the vestibular side and passes through the interdental space from the vestibule into the mouth cavity and back. The author notes that the method is less traumatic and rather effective, but is difficult for implementation in conditions of limited time and without special qualification [24].

M.V. Peshkov, et al. came to the conclusion about unreasonableness of using mobile teeth or teeth in the zone of fracture that are subject to obligatory extraction. If possible, pairs of stable antagonistic teeth should be used [25].

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After analysis and comparison of peculiarities of methods of temporary immobilization we think it would be reasonable to present the generalized data in the form of a table (Tab. 1).

Thus, it was ascertained that use of extraoral methods of jaw immobilization has a number of advantages. A possibility of use of bandages in the early stage of medical evacuation prevents development of complications of the maxillofacial region and permits to provide fast and timely fixation of the jaw fragments. The peculiarity of bandages consists in holding of the soft tissue flaps in case of multiple ruptures, and of fragments of edentulous jaws, which is impossible with use of ligatures. Convenience of assembly and disassembly of all extraoral immobilization methods, and also of methods of maxillomandibular ligature fixation by Ivy and Gotsko, is a positive moment under risk of aspiration with vomitus. However, use of bandages is ineffective in multiple fractures of jaws and does not provide sufficient quality of fixation of the fractured jaw fragments (which is the advantage of ligature).

The most commonly used and effective extraoral structure of temporary immobilization of jaws is Entin's standard four-tail bandage that possesses common for all bandages advantages and disadvantages, and, besides, has individual advantages. Existence of this fixture in a standard kit of combat medics of Russian Armed Forces and Ministry of Emergency Situations of Russia, determines its predominant use in military environment and emergency conditions. Use of rubber cords attached to a standard cap ensures a reliable fixation of jaw fragments, which makes it superior to bandages of other structures: of Hippocrates and Pomerantseva-Urbanskaya.

It was also found that Ivy's method of maxillomandibular ligature fixation possesses the most of advantages: simplicity of structure and convenience of use, high-quality and reliable fixation of jaw fragments, absence of additional fixation elements characteristic of Vilga's and Geikin's methods. Method of Gotsko is difficult in implementation which is a considerable drawback. All intraoral methods are characterized by bad accessibility in the field which considerably limits their application.

Conclusion

On the basis of the obtained results it may be concluded that standard Entin's four-tail bandage possesses advantages over Hippocratic cap and Pomerantseva-Urbanskaya bandage. It is sufficiently universal and may be adjusted to any size of head, possesses adequate strength and provides reliable fixation of jaws.

Ivy's method possesses advantages in comparison with other considered methods of maxillomandibular ligature fixation. Its advantages consist in a strong and reliable immobilization of jaw fragments, possibility of use in case of multiple fractures, simplicity of implementation, which permits to recommend it for application with indications.

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Table 1

Comparison of Extraoral and Intraoral Methods of Temporary Fixation of Jaws

Method / Assessment Criterion		Availability of material in the field	Convenience of assembly and disassembly in mouth cavity	Existence of elastic maxillomandibular ligatures	Existence of rigid maxillomandibular ligatures	Existence of additional fixation elements	Existence of standard fixation cap	Fixation to brain part of skull	Speed of application	Quality of fixation of jaws	Use on edentulous jaws	Use in multiple fractures	Use in multiple ruptures of soft issues	Use at early stage of medical evacuation
Extraoral methods (bandages)	Entin	-	+	+	-	+	+	+	+	-	+	-	+	+
	Hippocrates	+	+	-	-	-	-							
	Pomerantseva-Urbanskya	-	+	+	-	+	+							
Intraoral methods (ligature fixation)	Ivy	-	+	-	+	-	-	-	-	+	-	+	-	-
	Kazanyan	-	-	-	+	-	-							
	Vilga	-	-	-	-	+	-							
	Geikin	-	-	-	-	+	-							
	Gotsko	-	+	+	-	-	-							

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