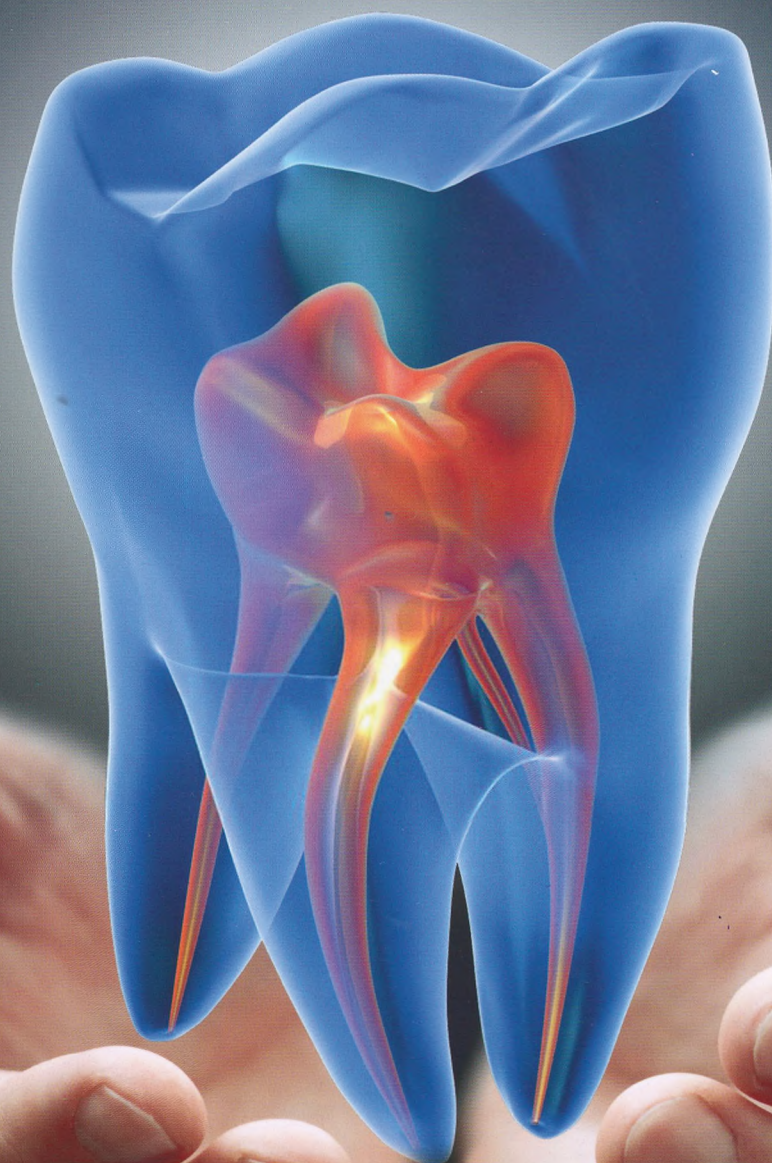




Использование ксеногенных тканей в реконструктивной хирургии органов полости рта

Тиш-жағ тизими аномалиялари патогенезида цитокинларнинг роли

Study of ultrastructural changes in the nerve fibers on an experimental model of acute trauma of inferior alveolar nerve



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Таким образом, у больных с ВРГН при сочетанном назначении актовегина до операции наблюдается потенцирующее друг друга фармакологическое действие, направленное на угнетение активности системы ПОЛ и повышение энзимной системы АОС. Можно предположить, что важным звеном в механизме активации заживления операционного поля является экономное и достаточно целенаправленное поступление необходимого количества молекулярного кислорода.

Под действием актовегина снижение ПОЛ на 5-е и 9-е сутки исследования характеризовалось, в свою очередь, восстановлением резервов АОС и по системе "обратной связи" подавлением ПОЛ. Фармакологическое действие актовегина также опосредуется стимуляцией функциональной активности системы цитохром Р450, активацией окислительно-восстановительных процессов, энергообразования, подавлением интенсивности ПОЛ, усилением пролиферативных процессов и активацией системы АОС.

Следовательно, результаты клинических наблюдений убедительно свидетельствуют о высокой терапевтической эффективности сочетанного применения двух лекарственных форм актовегина до и после операции.

Выводы

1. У детей с врожденной расщелиной губы и (или) неба метаболические процессы в тканях ротовой полости значительно нарушаются.

2. После уранопластики базисная терапия оказывает недостаточное влияние на ПОЛ и АОС в тканях ротовой полости, послеоперационное течение осложняется нарушением заживления раневой поверхности и расхождением швов.

3. Включение в комплекс послеоперационной терапии актовегина способствует значительному улучшению многих показателей ПОЛ-АОЗ, поэтому его назначение для повышения эффективности послеоперационного лечения детей с врожденной расщелиной губы и (или) неба можно считать патогенетически обоснованным.

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STUDY OF ULTRASTRUCTURAL CHANGES IN THE NERVE FIBERS ON AN EXPERIMENTAL MODEL OF ACUTE TRAUMA OF INFERIOR ALVEOLAR NERVE



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Аннотация

Предложен способ формирования моделей травматического неврита на экспериментальной модели острой травмы нижнего альвеолярного нерва. Авторы проанализировали ультраструктурные изменения в нервном волокне на третий, десятый и тридцатый день. На третий день после травмы мы наблюдали нарушение внутрисистемной гемомикроциркуляции, вызванное повышенной проницаемостью сосудов. К 10-му дню эксперимента в периневральной ткани и самом нервном волокне преобладали дегенеративные и воспалительные процессы. На 30-е сутки после повреждения сосудисто-нервного пучка нижнего альвеолярного нерва дегенеративные и воспалительные явления в нервном волокне сменились дегенеративными и склеротическими процессами.

Annotation

We propose a method of forming models of traumatic neuritis in an experimental model of acute trauma of the inferior alveolar nerve. We analyzed the ultrastructural changes in the nerve fiber on the third, tenth, and thirtieth day. On the third day after the injury, we observed a violation of the

intrastem hemomicrocirculation caused by increased vascular permeability. By the 10th day of the experiment, in the perineural tissue and the nerve fiber itself, degenerative and inflammatory processes dominated. On the 30th day after the injury of the neurovascular bundle of the inferior alveolar nerve, degenerative and inflammatory phenomena in the nerve fiber gave place to degenerative and sclerotic processes.

Key words: Ultrastructural changes in the nerve fiber, Experimental model, Traumatic neuritis, Inferior alveolar nerve.

Traumatic neuritis (TN) of the inferior alveolar nerve in the outpatient dental practice is one of the most frequent complications arising from non-compliance with the technique of conduction anesthesia, endodontic treatment of molars and mandibular premolars, dental implants, removal of third lower molars (especially regarding retention and dystopia).

Problems of damage and regeneration of the nervous tissue and pathological changes in the nerve fiber during treatment were discussed in many scientific publications (Nozdorachev D.A., Chumakov E.I., 1999; Timofeev A., Vesova M., 2006; Popelyansky J.Yu., 2005; Edranov S.S., 2008). At the same time, most of the works describes the morphological changes that occur with the complete crossing of the nerve.

Significantly less research were devoted to injuries accompanied by short-term mild damage to the inferior alveolar nerve, although such damage is the most characteristic of outpatient appointments with a dentist. We have developed a method of forming models of TN, the most characteristic of dental reception. It was found that the most pronounced inflammatory and then dystrophic morphological changes in the nerve and perineural tissues develop in animals that have undergone injury from short-term compression of the neurovascular bundle. However, it still needs to be discovered, what kind of ultrastructural changes are caused by such trauma and how long it takes for these changes. Data on this will allow developing methods of pathogenetically directed therapeutic aids for the prevention and treatment of traumatic neuritis.

Purpose of the study

The aim of our research was to study about the ultrastructural changes in inferior alveolar nerve fibers in the early periods after damage on an experimental model's injury caused by short-term compression of the neurovascular bundle.

Materials and methods

In 9 laboratory rats of the Wistar line, under intramuscular anesthesia, the mucosa and periosteum were dissected in anticipation of the mouth and the preparation of the neurovascular bundle of the inferior alveolar nerve was carried out, then a hemostatic clamp was applied to the later for 30 seconds. After the procedures were performed, the mucoperiosteal flap was put in place and fixed with interrupted catgut sutures. In the postoperative period of 2 days the animals received inside a suspension of nime sulide 2 ml, 2 times a day. At terms of 1st, 3rd, 10th and 30th days, they were taken out of the experiment. In order to obtain a review of microscopic preparations, as well as for studying the state of connective tissue elements, we used conventional histological methods of staining with Hematoxylin-Eosin and Van Gieson. The material for electron microscopy was prepared according to the standard technique: fixed on cold in 2.5%

glutaraldehyde solution on phosphate buffer with a pH of 7.4, followed by fixation by Millohing one percent solution of OsO₄. After dehydration in acetone, the nerve pieces were poured into epon and placed in a thermostat at + 60° C for 48 hours to polymerize the resin. UMTP-7 ultramicrotome was used to obtain semi-thin sections, on the basis of which targeted sharpening of the pyramids was carried out. Ultrathin sections were stained with uranyl acetate and lead citrate by Reynolds, viewed and photographed in a transmission electron microscope PEM-100.

Results and discussion

The developed methodology of the experiment stimulates situations that arise during the short-term penetration of the dental implant into the mandibular canal, removal of the lower molars (including retained and dystopic third molars) directly adjacent to the inferior alveolar nerve.

When observing the animals of this series in the 1st day after surgery there was swelling and hyperemia of soft tissues around the operating wound that spread to neighboring areas. Animals were lethargic, poorly consumed food. By the 3rd day tissue edema slightly decreased, hyperemia persisted and slight infiltration appeared around the edges of the wound. Palpation of tissue in the wound area caused a violent motor reaction of animals. By the 10th and 30th day on the mucous membrane of vestibule of the mouth was determined dense whitish scar, slightly towering over surrounding tissues. Palpation of tissues in the scar area in animals caused a moderate motor response.

After 24 hours of surgery, microscopic examination showed signs of edema and serofibrinous soaking at the edges of the wound. tissue structures, foci of necrobiosis and hemorrhages with disorganization of glandular structures, signs of vacuole and granular dystrophy with hyperchromia and karyopcnosis of nuclei. In electron microscopic examination areas of pronounced microcirculatory disorders revealed morpho-functional signs of transcapillary metabolism with disorganized intracellular organelles of endotheliocytes, basement membrane, pericytes. There were patches of endothelial cell cytolemma detachment from the basal membranes, in their cytoplasm – micropinocytotic vesicles, numerous finger like outgrowths in capillary lumen. Pericyte cores – marginal standing chromatin, cariolemma invagination were also determined. The nerve consists of separate fibers and was surrounded by endoneurium. Myelin sheath has lost their clarity to external contours.

By the 3rd day of development of the preparations were revealed inflammatory and reactive changes and circulatory disorders directly in the nerve and surrounding tissues. In the distal segment from the site of injury, the plethora of blood vessels were noted in nerve sheaths. The vessels were paralyzed and filled with blood, they were marked with phenomena of stasis and hemagglutination. The main changes that were detected by electron microscopic examination shows predominantly the myelin sheath of the nerve were affected and in significant to a lesser extent, the substance of the nerve trunks. First of all, it should be noted that the myelin nerve fibers in ultrathin sections in the overwhelming majority have a rounded or (depending on the cut) oval shape. In general, the nerve retains its structure and consists of individual nerve fibers surrounded by a fibrous connective tissue endoneurium and a connective tissue perineural envelope.

On the part of endoneurium, the phenomena of edema,

expressed with some separation of individual nerve fibers, accompanied by focal loosening of connective tissue fibrils with their fragmentation and loss of clarity of the outer contours of the myelin sheath were noted. In most fields of the view, myelin sheath of the nerve appears to be sharply osmiophilic, homogeneous, and high electron-optical density and has more or less clear outlines. At high magnifications, it can be determined that, structurally, it consists of ordered, tightly packed, parallel to the fibrillar structures between which only some places define insignificant gleams and enlightenments, the appearance of which, apparently, is the result of a violation of their spatial organization in the process of technical processing of the material. The myelin sheath of the nerve is surrounded by perineural cells that have an elongated nucleus with a clearly contoured nuclear membrane and evenly distributed euchromatin along the karyoplasm.

In the zone of perivascular edema (in the area of direct clamping) along with dystrophic changes in endothelial cells in the form of homogenization of cytoplasm, hyperchromic nuclei, irregularly shaped with deep constrictions, changes in pericytes were noted. The cytoplasm of the later is homogenized, the nuclei are enlightened, there were signs of destruction of the karyolemma, an uneven distribution of chromatin.

By the 10th day, in the tissues surrounding the inferior alveolar nerve, phenomena of significantly decreased edema and circulatory disorders were noted, although in this period there were areas with signs of edema, stasis and diapedesis was seen. Mature fibrous connective tissue appears in surrounding tissues with a predominance of mature forms of cellular elements like fibroblasts. In electron microscopic study of drugs of this period it turned out that rounded nerve fibers are found almost everywhere, in the myelin sheath of which focal enlightenments are clearly visible. The latter have a rounded or irregular shape and are located in the thickness of the myelin sheath, closer to its inner or, on the contrary, outer edge. At the same time, in the area of such enlightenments, the outer boundaries of the myelin sheath lost the clarity of its contours, and the sheath itself becomes highly osmiophilic, homogeneous. Inside the detected enlightenments, it is possible to determine the fragmented, loosened fibrillar material, which allows to make a conclusion not only about the focal edema of the myelin sheath, but also about the violation of its integral structure. In some cases, enlightenment, located in close proximity to the inner border of myelin sheath, accompanied by a zone of edema, penetrating into the nerve trunk in the form of a lacuna were found.

From the side of the main substance of the nerve trunk, as a rule, there were only mild edema in the form of loosening and some loosening of the fibrous structures without any pronounced focal changes. It was also noted the active formation of collagen fibers in paraneural tissues. Thus, collagen fibers with characteristic transverse striation are collected in compact bundles. Among the collagen fibers visible fibroblast, morphological features corresponding to collagenoblast type II were determined. Its cytoplasm is almost entirely occupied by expanded cytoplasmic reticulum cisterns filled with loose flaky substance. The core is hyperchromic and had abnormal forms. As for circulatory disorders, expressed in the previous term, on the 10th day, the phenomena of increased permeability remained in vascular wall with perivascular edema, dilation and fullness of small caliber vessels were observed, there were also violations of transcapillary transport with the formation of a large number of

micropino-cytosis vesicles.

By the 30th day after injury around the nerve were determined a tight scar. The structure is coarse, orthochromatic, collagen fibers, between which there were single fibroblasts and fibroclasts. At departments, apparently close or exposed immediate clamping injury, met foci of incompleteness of fibrillogenesis, loose polymorphocellular infiltrates, plethora postcapillary vessels and perivascular edema were seen. Foci of young granulation tissue were noted, surrounded by an area of inflammatory infiltration and productive reaction with intense fibrillogenesis; these foci extended the zone of scar-transformative changes in the tissues surrounding the nerve. In electron microscopic examination of this period, the cytoplasm of cells having different electron density, various size and shape of the vacuole, and the loosening of the cytoplasmic membrane occurred, which was accompanied, first of all, by the swelling of the mitochondria with the clearing of their matrix, reduction, disorganization and fragmentation of the crises. The focal ripples of densely packed myelin fibrils attracted attention, shell with the advent of enlightenment of various sizes and cone-shaped protrusions directed towards the center appeared, representing the detachment of one or several myelin fibrils by edematous fluid. Sometimes in one field of view it was possible to detect several such protrusions from the side of the myelin sheath. Axial cylinder turned off from myelin shell. In some cases, the inner membrane lost its integrity, and then inside the lacunae, fibrous and partially fragmented osmiophilic fibrillar structures were found.

In many areas, the edematous fluid is due to the rupture of pinned osmiophilic membranes penetrated inside the axial cylinder that was accompanied by loosening of neurofilaments, violation of their integrity and the appearance of electro-optically transparent areas of irregular forms with blurred borders. This period is characterized by an almost complete normalization of circulatory disorders in the surrounding tissues. Only in some areas (apparently, directly subjected to compression by clamping) in post-capillary vessels, plethora, stasis continue to occur, signs of edema and disorganization of collagen fibers occur. Plasma cells with signs of high functional activity were found among cellular elements, as evidenced by the intracellular organelles, in particular, developed rough endoplasmic reticulum.

So a short 30 second impact of the compression of neurovascular bundle, including the lower alveolar nerve in animals, in the absence of therapeutic benefits, leads to significant ultrastructural changes in the nerve and perineural tissues: pronounced degenerative-inflammatory processes, manifesting itself as a violation of the normal structure of functionally significant structural elements, alternating by 30 days with degenerative and sclerotic phenomena.

Findings

On the 3rd day after injury in the tissues of the inferior alveolar nerve, there is a violation of intra-stem blood microcirculation due to increased vascular permeability walls, its plasma impregnation and perivascular edema, causing circulatory hypoxia. At the same time, reactive changes were observed in nerve fibers appear to be partially reversible, representing a reaction to acute circulatory hypoxia and a direct mechanical alteration.

By the 10th day of the experiment, in the perineural tissues and the nerve fiber itself a degenerative-inflammatory process, that manifest themselves as a violation of the normal

structure of the majority of functionally significant structural elements.

By the 30th day after tissue dissection and compression of the neurovascular bundle of the inferior alveolar nerve, degenerative-inflammatory phenomena in the nerve fiber are replaced by degenerative and sclerotic processes, and in the surrounding tissues by the development of gross cicatricial changes with foci of incomplete fibrillogenesis.

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ОЦЕНКА ВЛИЯНИЯ КОМПЛЕКСНОЙ ТЕРАПИИ НА ДИНАМИКУ ЭНДОГЕННОЙ ИНТОКСИКАЦИИ ПРИ ФЛЕГМОНАХ ЧЕЛЮСТНО-ЛИЦЕВОЙ ОБЛАСТИ



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Аннотация

Цель: сравнительный анализ эффективности комплексного лечения флегмон челюстно-лицевой области. **Материал и методы:** под наблюдением были 66 больных с флегмонами челюстно-лицевой области, разделенные на

2 группы в зависимости от схемы лечения. Результаты: у больных 1-й группы под влиянием традиционной комплексной терапии показатели сорбционной способности эритроцитов и уровень среднемолекулярных пептидов снижались недостаточно быстро. У пациентов 2-й группы гипохлорит натрия оказывал на гнойную рану благоприятное влияние, о чем свидетельствовала заметная нормализация лабораторных показателей, отражающих степень эндогенной интоксикации. Выводы: раствор гипохлорита натрия может использоваться для лечения пациентов с острыми гнойно-воспалительными заболеваниями челюстно-лицевой области.

Ключевые слова: флегмоны челюстно-лицевой области, эндогенная интоксикация, сорбционная способность эритроцитов, среднемолекулярные пептиды.

Annotation

Based on the study of indicators of endogenous intoxication in 66 patients with phlegmon of the maxillofacial region, an increase in the level of endotoxemia was revealed. In the first subgroup of patients, after traditional complex therapy, there was an insufficiently effective decrease in parameters of erythrocyte sorption capacity (ESC) and medium molecular peptides (MMP). The results of the study in the 2nd subgroup of patients showed a favorable effect of sodium hypochlorite solution on purulent wounds, which was manifested by a noticeable normalization of laboratory indicators reflecting the degree of endogenous intoxication to purulent wound.

Лечение острых гнойно-воспалительных заболеваний челюстно-лицевой области остается одной из наиболее актуальных проблем хирургической стоматологии [2,7]. Поиску эффективных мероприятий при этой патологии посвящены многочисленные исследования отечественных и зарубежных авторов [1,4-6]. В последние годы лечение больных с острыми гнойно-воспалительными заболеваниями челюстно-лицевой области привлекает все большее внимание специалистов челюстно-лицевой хирургии в связи с увеличением частоты и тяжести течения этих заболеваний [3,8,9].

Цель исследования: сравнительный анализ эффективности комплексного лечения флегмон челюстно-лицевой области.

Материал и методы

Исследование проведено у 66 больных с флегмонами челюстно-лицевой области, которые в зависимости от проводимой терапии были разделены на две группы. В 1-ю группу вошли 33 больных, у 30 из которых острый гнойно-воспалительный процесс занимал одну, у 3 – две анатомо-топографические области. Эти больные получали только традиционную комплексную терапию. Во 2-ю группу были включены 33 больных с флегмонами челюстно-лицевой области, у 28 из которых патологический процесс занимал одну, у 5 – две анатомо-топографические области. В этой группе проводилась комплексная терапия в сочетании с орошением раны раствором гипохлорита натрия, который получали с использованием аппарата Эсперо-1. Сорбционную способность эритроцитов (ССЭ) определяли по методу Тогайбаева – Кургузкина (1987). Количество среднемолекулярных пептидов (СМП) определяли по методу Габриэляна и соавт. (1981).