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NERVE TISSUE DAMAGE IN DENTAL IMPLANTATION PRACTICES

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Abstract

In the process of performing Dental spelling, damage to the trigeminal nerve branches (such as the inferior alveolar, tongue, chin or suborbital) is a complication that can develop.

Direct damage to nerve fibers can occur as a result of injury, inflammation, or an infectious factor. Often, trigeminal nerve branches are affected during anesthesia manipulation, Valve separation, bone augmentation Assembly, osteotomy, and the installation of a titanium support directly into the bone. Since the restoration of the affected nerve fibers is very problematic, the best tactic to treat such complications is prevention. Therefore, it is very important for the doctor to understand the features of the histology and anatomy of the nerves of the face-jaw area and to have information about the symptoms that accompany their injuries.

Practicing doctors must take into account the tamoils of comparative diagnosis, identify the causes of the development of certain symptoms in order to carry out various practices. Treatments for lesions of the Trigeminal nerve branches include the use of various pharmacological drugs, follow-up with physiotherapy, or even the removal of a problematic dental implant.

In this article, we will discuss approaches to the treatment of dental patients with nerve damage in the area of the face-jaw associated with the practice of dental implantation,

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as well as the main aspects of the etiology and pathogenesis of such pathologies in general.

Anatomy and histology of the three-horned nerve

The three-horned nerve is the fifth and largest pair of cranial nerves, consisting of the following branches: r.ophthalmicus (V1), R.maxillaris (V2) and r.mandibularis (V3). The lower jaw fiber is the largest fiber, innervating the lower lip, chin area, teeth, adjacent soft tissues, lower jaw and part of the outer ear. The movement fibers of the lower jaw branch are not prone to damage during the implantation process, as they leave the main fiber before the nerve fiber exits the outer hole. The main structural unit of the nerve is the nerve fiber.

The structure of V3 is dominated by nerve fibers with myelin. Each axon and Schwann cell is covered with connective tissue called endoneurium. Groups of nerve fibers form bundles surrounded by the epineurium. Damage to any part of the nerve bundle can lead to sensoneural diseases. The Trigeminal nerve consists of 7000-12000 axons, and the number of bundles varies in different parts of the face-jaw area. The inferior alveolar nerve (PAN) Can (consists of more than 10 bundles), the lingual nerve contains only a few similar nerve structures that it eats.

Since PAN is characterized by a large number of nerve bundles, its regenerative abilities are also much higher than that of the lingual nerve.

Types of nerve damage

Damage to the Trigeminal nerve can be triggered by compression, stretching, complete or partial disruption of the nerve fiber. The lesion can cause senso-neural changes in terms of tactile sensitivity, pressure, temperature, and pain. Such pathologies significantly affect the patient's comfort and ability to speak normally, eat, kiss, shave, make-up, brush teeth and drink. In addition, senso-neural disorders also affect the patient's ability to communicate normally in society. Symptoms of these pathologies can be identified directly during surgery (in the presence of a painful symptom) and during long-term monitoring of the patient's condition.

The following terms are used to describe traumatic Axon foci of varying degrees of complexity:

- neuropraxia is a furnace in which the integrity of the nerve fiber is maintained and the mechanism of injury is associated with stretching or blunt force injury; sensitivity is usually normalized for several days or weeks.

- *axonotmesis* - it is a nerve lesion in which the processes of its degeneration and regeneration develop, but the Axon itself does not lose its integrity and the sensitivity normalizes for 2-4 months; however, after recovery the sensitivity may be slightly less than before the intervention and is accompanied by dysesthesia in some clinical cases.

- *neurotmesis* – this is a nerve damage in which its integrity is impaired and there is little chance of restoring normal sensitivity.

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The International Association for the study of pain has standardized the nomenclature of traumatic nerve injuries. In particular, the definition of the term paresthesia, previously used for desensitization, has been changed. The terminology used gives the following definitions:

- ***paresthesia***-change in sensitivity without unpleasant sensations;
- ***dysesthesia***-is a change in sensitivity that is accompanied by unpleasant sensations;
- ***anesthesia***-loss of sensitivity.

Terms such as allodynia (onset of pain in triggers that do not normally trigger pain), causalgia (presence of constant burning pain), hypostesia (decreased sensitivity to triggers), hyperesthesia (increased sensitivity to triggers) are also used to describe changes in Senso-neural functions.

When the nerves stretch or contract, the perineurium protects the bundles from damage. However, stretching of the nerve more than 30% can lead to its structural damage. With a complete violation of the integrity of the nerve, the development of signs of anesthesia and a decrease in certain sensory functions are noted. With a partial violation of the integrity of the nerve fiber, various signs of damage can occur, including dysesthesia.

It is important to note that the presence of constant pain after surgery is not a criterion for determining the potential full recovery potential of the function of the affected fiber. After peripheral nerve damage, Vallerian degeneration begins to develop, which takes several weeks and even months. Below the traumatic intersection, Axon necrosis develops. In these cases, degeneration is progressive and irreversible, lasting up to 18 months. The possibility of treating the Tickled nerve area is influenced by factors such as the patient's general health, age and type of damage. The main point in the process of nerve repair after injury is the formation of scar tissue in the area of the endoneural tubules.

Assessment of traumatic injuries of the Trigeminal nerve

PAN is often affected during the installation of Dental Implants. Signs of damage to the lower alveolar nerve include anesthesia, paresthesia, or dysesthesia on the skin, lower lip, cheek, and gums. Patients with tongue nerve damage are characterized by uncontrolled stshlak detachment, tongue biting, a feeling of heartburn, loss of taste, changes in speech and swallowing function, swelling of the mucous membrane and tongue. Both during and after practice, all possible signs of a violation of senso-neural functions must be documented.

Mechanoceptive tests include static touch with a soft brush, two-point recognition, and determining the direction of movement of the brush. The detection of needle prick sensation and thermal stimuli is classified as a nociceptive diagnostic treatment. To compare the indicators, not only the furnace area is diagnosed, but also the symmetrical area, thereby accurately determining the reality and level of senso-neural disorders. When the patient complains of loss of sense of taste, a piece of cotton soaked in salt or sugar is used for diagnosis.

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Spread of traumatic nerve injuries

After implantation, in 0-36% of clinical cases, a permanent violation of sensitivity in the lip area is noted due to traumatic damage to the nerve fibers. However, this information can be considered somewhat outdated and does not correspond to modern approaches to implantological practice. After all, previously, dental surgeons often used vestibular incisions during surgery, so sensitivity disorders developed. To date, during the installation of Dental Implants, mucous membrane incisions are made at the top of the residual Ridge, and the entire procedure is planned in advance, taking into account the data obtained after computed tomography. Thus, it can be assumed that the spread of nerve fiber lesions as a result of implantation is significantly less than 36%.

Dannan and colleagues reported that the frequency of nerve damage during implantation reaches 2.95% in cases of temporary senso-neural changes (169 out of 5 treated patients) and 1.7% in cases of implant-related irreversible neuropathies. In another study, it was shown that the frequency of nerve damage after surgery in the maxillofacial area reached 2.69% (1,559 out of 42 patients), while the percentage of irreversible senso-neural diseases was even lower, but the exact number was not shown in the study. According to the author, such indicators of implant-related lesions of nerve structures are also very high for clinical practice. Temporary disorders of mucous membrane sensitivity can often be associated with edema, which is observed for the first two weeks after surgery.

Traumatic damage to the lingual nerve during surgical procedures

The lingual nerve in the area of the molars of the lower jaw passes through the soft tissues on the lingual side of the jaw. Sometimes the nerve is located coronal on the surface of bone tissue and is firmly embedded in the cortical bone plate on the side of the tongue. Therefore, any surgical intervention in this area should be carried out very carefully. After the removal of the third molar of the mandibula, damage to the lingual nerve is reported in 0.5-2.1% of clinical cases. Traumatic disorders of the lingual nerve during dental implantation are not a common phenomenon and are very rarely reported.

In order to avoid such complications when installing Dental Implants, the following rules must be observed: You can only perform intraserebral incisions without blunt incisions and without separating the cap from the side of the tongue; it is necessary not to overstretch when separating the cap and observe a safe distance during osteotomy. Of all reported cases of senso-neural changes associated with damage to the lingual nerve, 90% disappear within 8-10 weeks after surgery.

Preoperative planning: prevention of traumatic nerve injury

In order to avoid most of the complications associated with the installation of Dental Implants, it is necessary to ensure careful planning of surgical intervention. The use of the possibilities of Computed Tomography and surgical templates makes it possible to avoid unexpected results of yatrogenic intervention. When installing a dental implant,

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a bone thickness of at least 2 mm should be left between its apical part and the coronal part of the inferior nerve canal. In addition, it is important to adhere to the established length of the osteotomy and strictly adhere to the bone preparation protocol. The presence of a bone thickness of 2 mm also prevents excessive compression of bones in the nerve area after the installation of a titanium bony inner support (figures 1-2).

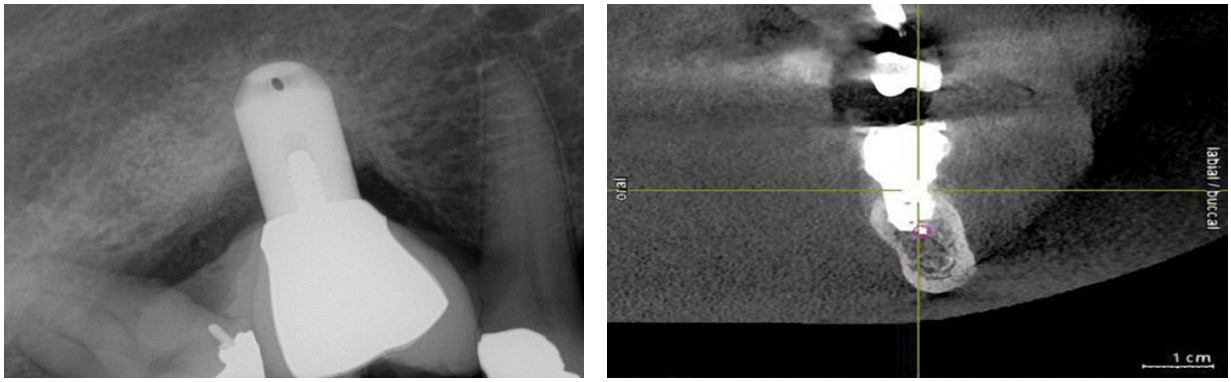

Figure 1. The Implant was installed in tooth area 30. After the anesthesia effect ended, the patient began to complain of the presence of paresthesia in the area of the right lip and chin. An X-ray taken immediately after implantation shows no signs of penetration of the implant into the lower nerve canal.

Figure 2. The Implant was installed 10 years ago, and during this time the patient was able to adapt to changes in sensitivity. CT examination shows that the implant in the 30 tooth area is much closer to the nerve canal than before.

If necessary, short dental implants can be used to ensure intervention safety. It is also important for the doctor to familiarize himself with the absolute length of all dental hard tissue sharpening equipment used during manipulation, since not taking into account these parameters can lead to a deepening of more than 0.4-1.5 mm compared to the selected safe limit. It is also recommended to use special plugs to control deepening into bone tissue. Nevertheless, the doctor must understand that neither the thickness nor the density of bone tissue above the nerve area during the osteotomy process ensures the safety of its condition, therefore, it is strictly forbidden to apply a lot of force and pressure during bone preparation.

Finally, it should be noted that up to 50% of claims related to nerve damage after implantation are caused by the patient's lack of Informed Consent, which the doctor must receive before the operation. To compare with the data obtained after implantation, it is also a good idea to assess the patient's neurosensory parameters before the intervention.

Local anesthesia: possible cause of nerve damage

Traumatic damage to the mandibular and lingual nerves can occur during anesthesia due to needle damage, hematoma, and exposure to the components of the anesthetic solution. The mechanisms of such lesions have not yet been studied. In one retrospective study,the frequency of nerve damage during anesthesia ranged from 1/26,762 to

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1/160,571, 6 cases,while Haas I Lennon predicted such complications at 1/785, 000. Other data suggest that the prevalence of short-term temporal lesions of the mandibular and lingual nerves as a result of anesthesia ranges from 0.15% to 0.54%. Whereas, cases of the development of constant changes in the sensitivity of the same etiology are extremely rare, their prevalence is 0.0001-0.01%. After mandibular anesthesia, 3-7% of patients experience the feeling of a vine beating.

However, when practitioners point out that the patient reacts very sharply to the introduction of the needle, the latter must be removed and slightly modified. Methods for treating or preventing nervous complications associated with anesthesia treatment have not yet been developed. Between 70% and 89% of cases of anesthesia-related senso-neural lesions develop in the area of the lingual nerve. This tendency can be explained by the fact that the lingual nerve consists of only a few bundles, while the inferior alveolar nerve consists of a very large number of them, which in turn increases its chances of renewal. From a geometric point of view, everything is explained in a much simpler way: the size of the needle is on average 0.45 mm, the diameter of the lingual nerve is 1.86 mm, and the diameter of the lower alveolar nerve is 3 mm.

Anesthesia-related neuropathy often develops after anesthesia with 4% solutions of articaine or pilocarpine. Compared to lidocaine, pilocarpine and articaine cause 7.3 and 3.6 times more senso-neural disorders. Garisto and colleagues reported that the rate of complications with the administration of 4% solutions of prilocaine or articaine in 9 out of 4 studies was higher than with low concentration anesthetic injections. According to the authors, local anesthesia should be avoided with these drugs in order to reduce the frequency of associated neuropathies after yatrogenic intervention. However, according to Malamed and colleagues, cases in which arcticaine demonstrated a greater correlation with neuropathies than lidocaine are episodic and lack adequate evidence-based reasoning. Similarly, in 2013, after an extensive review of the literature, Toma and colleagues concluded that studies showing high neurotoxicity of articaine were a design retrospective.

The authors concluded that direct damage to nerve fibers is the main cause of the development of senso-neural diseases, while the latter is almost unrelated to the chemical toxicity of the anesthetic used. In general, there is disagreement in the literature on this issue, therefore, clinicians should decide on the use of a high concentration of anesthetics, taking into account the interpretation of previously obtained data and the recommendations of drug manufacturers, based on the conditions of each individual clinical case.

Osteotomy treatment during implantation

Osteotomy treatment should be done with good sharp sharpening equipment and abundant watering. Hypothetically, overheating of the intervention area during osteotomy can lead to traumatic nerve injury. Due to excessive heat, the volume of bone necrosis is directly proportional to the preparatory temperature at which the yatrogenic intervention was performed.

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In cases of progressive resorption, in which Eriksson and Albrektsson perform osteotomy for 47°C 1 minute, taking into account the displacement of the position of the opening of the jaw, making a transcretal incision is a counter indication, instead it must be transferred to the side of the tongue. When installing implants ahead of the chin opening, CT scans should be carefully analyzed to help determine if the chin nerve ring is present.

Laxative separation treatments

As a rule, the separation of the cap does not cause any senso-neural diseases, but the doctor should still pay great attention to the implementation of this yatrogenic intervention in the chin area. The doctor should clearly understand where the nerve of the jaw comes out of the hole in the jaw, so that when separating the cap, it does not cause damage to the nerve fiber.

Tooth removal

Before taking molars and premolars on the lower jaw for further installation of Dental Implants, the ratio of the position of their roots to the position of the lower alveolar and chin nerves should be carefully studied. Curettage of the pockets after resection should also be done very carefully, since periapical lesions can often be located near nerve structures (figures 3-4).

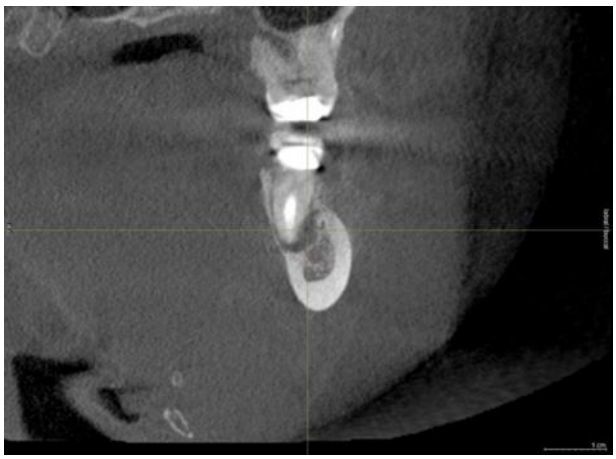

Figure 3. The patient asked for help for pain in the 31 tooth area. The X-ray shows signs of acute apical periodontitis.

Figure 4. The results of the diagnosis of KLKT indicate that the pathological hearth is located near the nerve canal. The tooth was carefully removed.

Pharmacological therapy of neuropathies associated with the installation of Dental Implants

There is no clear idea which drugs are best used in the diagnosis of traumatic nerve foci of the face-jaw area. Some authors prefer corticosteroids and non-steroidal anti-

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inflammatory drugs (Nsyaqds). At the same time, it should be remembered that the use of various pharmacological agents is relevant only if the integrity of the nerve fiber is preserved. In cases of impaired sensitivity, after injection, the patient can take dexamethasone 4 g / ml directly to the injured area and increase the dose of steroids after 3 days. In case of nerve compression or fiber damage during surgery, 1-2 ml of dexamethasone is administered intravenously, after which dexamethasone is administered orally for 6 days (4 mg, 2 tablets after meals – three days, then 1 tablet after meals – another three days).

Steroids can be prescribed for 5 to 7 days in case of impaired nerve integrity. Sensitivity disorders help stop 800 mg of ibuprofen, which should be taken three times a day for 3 weeks. If neuropathy develops after removal of the implant, patients can be prescribed 800 mg ibuprofen three times a day and 500 mg amoxicillin at the same frequency for 5-7 days. In parallel, 50 g of Prednisolone is prescribed, reducing the dose to 10 mg daily (for 5 days). Post-traumatic neuropathy can be treated with low doses of antidepressants and antiepileptic drugs.

Currently, the results of clinical studies confirming the feasibility and success of using corticosteroids or Nosteroids for traumatic neuropathies related to the procedure for installing dental implants have not yet been obtained.

Surgical restoration of the damaged trigeminal nerve

There are clear reasons that justify the need to microsurgically restore the damaged trigeminal nerve and Contractual Factors that determine the prognosis of this manipulation. Ziccardi I Zuniga has compiled a list of the following reasons that justify the patient's referral to a microsurgical institution: sensitivity disorders that last more than 3 months and disrupt the patient's normal vital activity, confirmation of the fact of a nerve cut, an improvement in the symptoms of hypostesia, the development of pain after implantation. After carrying out a microsurgical correction, the success of such a correction is influenced by a number of factors: the waiting time after implantation, the type and size of the lesion, the degree of vascularization of the lesion area, the surgeon's experience, the method of assembling and preparing the graft, the presence of tension in the area of recovery, the age and general health.

In fact, the branches of the tongue and lower alveolar nerves can be restored with microsurgery. However, the success rate of such manipulations is very variable – on average, researchers show only 50-59.4% effectiveness of such treatment, and in only two studies, the results of the intervention reached levels of 81.7% and 63.1%. In all studies conducted, the number of subjects is very insignificant, so it is methodologically impossible to compare the final results of such studies. Nevertheless, 50-60% of patients after microsurgical Correction show signs of improvement in neurological disorders. Ziccardi warns and Zuni that patients with severe senso-neural lesions should be informed that their full rehabilitation is almost impossible.

Also, many researchers suggest that the effectiveness of microsurgical treatments in cases of anesthesia, dysesthesia, and spontaneous pain is exaggerated. In summary,

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microsurgical correction can help individual patients, but the extent to which such treatment results can be predicted is uncertain. Thus, the best therapy for neurosensory diseases associated with implantation is their prevention.

Conclusion

In clinical practice, a dilemma often arises: what to do with it if the implant is successfully osteointegrated, but causes painless moderate paresthesia? After all, an explosion may not always contribute to the relief of symptoms, and the maintenance of the implant with real nerve damage to the bone can provoke the development of neuroma. The latter is formed as a result of over-treatment of the damaged nerve area and hyperplasia of adjacent tissues, and often requires subsequent surgical removal. The decision to choose a possible treatment should be made after a detailed discussion of all possible options together with the patient, and before starting rehabilitation, the patient must officially confirm his consent by filling out a special written form.

References

1. Abaeva O.P. Nauchnoe obosnovanie i puti optimizatsii realizatsii prav patsienta v Rossiyskoy Federatsii, Diss. ...d.m.n., M., 2011,- 275 s.
2. Abakarov S.I., Kurbanov O.R., Grinin V.M. Osobennosti marketingovых strategiy dlya negosudarstvennых stomatologicheskix uchrejdeniy //Stomatologiya, 2006, №4,- s.48-51
3. Abakarov S.I., Tumasyan G.S., Grinin V.M., Sorokin D.V., Safaryan M.M. Funksionirovanie i finansirovanie stomatologicheskoy slujbы – dva vzaimosvyazannых mexanizma yeyo suщestvovaniya v period rынochnых otnosheniy //Institut stomatologii, 2011, № 4(53),- S.12-13
4. Abakarov S.I., Tumasyan G.S., Grinin V.M., Sorokin D.V., Safaryan M.M. Resursnoe obespechenie vrachebnoy chislennosti stomatologicheskoy slujbы v period rынochnых otnosheniy //Institut stomatologii, 2011, № 4(53),- S.8-9
5. Abdulaeva K.A., Grinin V.M. Polovые i sotsialnые razlichiya stomatologicheskoy zabolevaemosti lis pojilogo i starcheskogo vozrasta //Klinicheskaya stomatologiya, 2012, №3,- S.50-52
6. Abdullatipov M.A. Marketingovoe issledovanie dinamiki obraщaemosti naseleniya za ortopedicheskoy stomatologicheskoy pomoщyu v krupnые chastnые meditsinskie organizatsii, Diss. ...k.m.n., M., 2011,- 137 s.
7. Agapov N.N., Kopытov A.A. Stomatologicheskiy menedjment, 2013,- 213 s. 8. Aleksandrova O.Yu., Shatalov O.A., Ryabov S.M. Organizatsionno-pravovые posledstviya izmeneniya polnomochiy v sfere oxranы zdorovya grajdan //
9. Alekseeva N.Yu., Lomakina Ye.A. O novых podxodax k upravleniyu kachestvom meditsinskix uslug v uchrejdeniyax zdravooxraneniya //Problemы upravleniya zdravooxraneniem, 2011, № 2(57),- S.14-16 359
10. Alekseeva S.O. Sistema upravleniya vnutrennimi ekonomicheskimi otnosheniyami v lechebno-profilakticheskix uchrejdeniyax, Diss. ...k.e.n., SPb, 2005,- 187 s.

11. Alyoshina O.A. Kliniko-ekspertnaya otsenka oshibok i oslojneniy v ortopedicheskoy stomatologii pri protezirovanii nes'yomnыmi protezami, Diss. ...k.m.n., N.Novgorod, 2011,- 157 s.Ekonomika zdravooxraneniya, 2011, №
12. Andreeva O. Pokazateli effektivnosti i kachestva meditsinskogo obslujivaniya naseleniya // Zdravooxranenie Ros. Federatsii. — 2002. № 5. - S.24-25
13. Andreeva S.N. Sistemnыy analiz otsenok, prinyatыx v praktike otechestvennoy ortopedicheskoy stomatologii, Diss. ...k.m.n., M., 2004,- 207 s. 14. Antonov A.N. Sotsialno-demograficheskie i motivatsionnыe aspekty udovletvoryonnosti stomatologicheskoy pomoщyu v sovremennыx usloviyax, Diss. ...k.m.n., M., 2008,- 113 s.
15. Antonova G.A., Pirogov M.V. Planirovanie meditsinskoy pomoщi, orientirovannoe na patsienta //Ekonomika zdravooxraneniya, 2008, №12,- S.18-25
16. Aparin I.S. Negosudarstvennaya meditsinskaya organizatsiya – effektivnaya model kachestvennogo platnogo meditsinskogo obslujivaniya, Diss. ...d.m.n., M., 2007,- 223 s.
17. Apresyan G.N. Nujdaemost v ortopedicheskoy stomatologicheskoy pomoщi naseleniya pojilogo i starcheskogo vozrasta i osobennosti yeyo okazaniya v usloviyax besplatnogo (lgotnogo) zubnogo protezirovaniya, Diss. ...k.m.n., M., 2005,- 95 s.

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