

## EXCITABILITY THRESHOLD IN NEURITIS OF THE BRANCHES OF THE FACIAL NERVE

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**Annotation.** The aim of the study was to assess the values of the excitability threshold and its significance in neuritis from inferior alveolar nerve damage. The study included 200 patients with post-traumatic neuritis of the lower alveolar nerve after a fracture of the lower jaw. The value of the excitability threshold before and after complex drug treatment was investigated. A significant relationship was found between the excitability threshold and damage to the inferior alveolar nerve, and it is possible to observe positive dynamics of treatment in the early stages. Our results show that in all four zones, the values of electrical excitability decreased in patients as part of complex therapy. After 6 months of treatment, with mild and moderate severity of inferior alveolar nerve damage, the indicators of electrical excitability significantly decreased ( $p \leq 0.05$ ) and did not exceed the norm in the study groups.

**Key words:** excitability threshold, "Nucleo CMF forte", mandibular fracture, inferior alveolar nerve (NAS), histological examination of the pulp.

**Relevance.** The most common manifestation of nerve neuropathy is pain, which prevails over paresthesias and becomes the dominant manifestation of this pathology [7,9,16]. Many authors consider the limitation of function as a global problem existing in medicine, which arises due to impaired bone tissue regeneration [2,3,15]. Therefore, the understanding of the pathophysiology of bone regeneration contributes to the use of various types of interventions on the fracture area, which are aimed at improving metabolic processes in bone tissue [1,8,10,11].

Traumatic osteomyelitis develops in more than half of cases in the absence of consolidation of bone fragments, due to complete crossing or crushing by bone fragments of the NAS [14]. According to foreign scientists, the lack of treatment and timely diagnosis of NAS injury also contributes to a slowdown in fracture consolidation, and in some clinical cases leads to the formation of a false joint [5,17,18]. One of the indicators of diagnostic criteria is the threshold of tissue excitability.

**Aim of the study:** to assess the values of the excitability threshold and its significance in neuritis from damage to the inferior alveolar nerve.

**Materials and methods.** In 2020-2022, 200 men aged 19 to 63 years were under observation on the basis of the Central Bank of the SGMO in Samarkand, in the Department of Oral and Maxillofacial Surgery and the Rehabilitation Room of Patients on Outpatient Treatment.

Patients were admitted to the hospital on the first day after the injury. Classifying the severity of NAN injury, we divided patients into three subgroups according to the severity of NAN injury: the first - with a mild degree of NAN injury, the second - moderate severity, the third - moderately severe and severe. All patients underwent a general clinical and laboratory

examination according to the standard: collection of anamnesis, complaints, external examination of the CAL, stress tests to determine the localization of the fracture, X-ray, CT scan, if necessary, and histological analysis of the pulp.

**Results and discussion.** Patients on admission complained of pain in the fracture area, neurological symptoms manifested in the form of paresthesia, hyper- (7%) and hypoaesthetic (93%) disorders, as well as impaired tactile sensitivity in 30.5% of cases, and impaired deep sensitivity in 3.5%. Patients' need for analgesics was assessed and pain was determined at the time of admission, on the 3rd and 10th days of treatment. According to the examination on the first day of admission, patients had an average pain of  $2.6 \pm 0.14$  points, and they could not tolerate pain because of which they received analgesics. On the 3rd day of treatment, the intensity of pain decreased to  $1.9 \pm 0.29$  points, which was accompanied by a decrease in the use of analgesics. Pain syndrome was completely relieved in 98.0% of patients by the 10th day, although neurological symptoms persisted.

With the help of the PARKELL Digitest 2 device (RagkeP, USA), data were obtained on the state of the excitability threshold of the skin in the studied areas, which are innervated by the inferior alveolar nerve on the chin and lower lip. The study was carried out at the time of the patient's admission to the hospital, on the 10th day, on the 32nd-40th day, after 6 months after the injury.

Based on these data, it can be concluded that at the time of admission in both groups, the values of skin electrical excitability in the studied zones had no statistical differences, the highest values of the indicators were determined in the 2nd and 3rd zones. In the patients of the study group, the mean values were determined at the level of  $55.0 \pm 1.5 \mu\text{A}$  and  $58.0 \pm 1.5 \mu\text{A}$ , respectively, with mild damage. In mild cases, clinical manifestations were accompanied by a feeling of "crawling goosebumps" in the area of the lower lip on the side of the injury, a decrease in skin sensitivity on the side of the injury. In moderate severity, the values of electrical excitability in zones 2 and 3 ranged from  $109.6 \pm 3.1 \mu\text{A}$  to  $121.9 \pm 3.5 \mu\text{A}$ , in severe severity - from  $159.5 \pm 4.5 \mu\text{A}$  to  $168.1 \pm 4.8 \mu\text{A}$ , which indicates greater sensitivity impairment with an increase in the severity of NAS damage. Clinical manifestations of moderate and severe damage to the inferior alveolar nerve were manifested by a complete loss of skin sensitivity in these areas (14% of patients), severe pain syndrome (88%), impaired mimic muscles (2.6%), and impaired sensitivity of the mucous membrane and teeth on the side of injury (96%). In 12.6% of patients, there were minor areas of paraesthesia of the lower lip and chin on the other side.

With a mild degree of NAN injury, the values of electrical excitability in the 1st and 4th zones of the main group of patients on the 10th day of treatment significantly decreased and amounted to  $29.4 \pm 1.4 \mu\text{A}$  and  $27.4 \pm 1.5 \mu\text{A}$ , which corresponds to the indicators of electrical excitability on the healthy side ( $p \leq 0.001$ ). In zones 2 and 3, there was a pronounced tendency to decrease in electrical excitability, which amounted to  $40.1 \pm 4.2 \mu\text{A}$  and  $42.3 \pm 4.0 \mu\text{A}$  in the study group ( $p \leq 0.005$ ). Whereas in the control group, the indicators of electrical excitability decreased, but did not reach the degree of statistical reliability and amounted to  $35.1 \pm 1.4 \mu\text{A}$  in the 1st zone,  $49.6 \pm 4.6 \mu\text{A}$  in the 2nd zone,  $50.8 \pm 4.6 \mu\text{A}$  in the 3rd zone, and  $36.2 \pm 1.6 \mu\text{A}$  in the 4th zone.

In 15% of patients in the control group, the feeling of "crawling goosebumps" remained, while in all patients of the main group, the clinical symptoms of damage to the inferior alveolar nerve were relieved.

In the main group of patients with moderate and severe damage to the NAN, there was also a significant decrease in the electrical excitability of the skin on the side of the injury on the 10th day of treatment ( $p < 0.05$ ). The values were  $51.8 \pm 2.9 \mu\text{A}$  and  $63.7 \pm 1.5 \mu\text{A}$  in the 1st and 4th zones, and  $80.3 \pm 5.1 \mu\text{A}$  and  $90.4 \pm 4.6 \mu\text{A}$ , respectively, in the 2nd and 3rd zones. In the control group, a statistically significant decrease in electrical excitability after 10 days was noted only in zone 4 ( $p < 0.005$ ).

On the 32nd-40th day of treatment with moderate severity, the highest indicators of electrical excitability were also observed in the 2nd and 3rd zones, which on average on the 32nd-40th day of treatment significantly decreased and amounted to  $40.5 \pm 3.9 \mu\text{A}$  and  $59.7 \pm 3.7 \mu\text{A}$  in the study group and higher values in the control group -  $65.1 \pm 5.4 \mu\text{A}$ ,  $85.7 \pm 5.1 \mu\text{A}$ . In the control group, the differences were also statistically significant in Zone 2. In case of severe NAN damage, the indicators of skin electrical excitability in the study areas on the 32nd-40th day of treatment in the study group were 1.3-1.4 times lower ( $p < 0.01$ ) than the values of electrical excitability of patients in the control group. In 73.2% of patients in the control group, clinical symptoms remained at the same level. Whereas, in the main group, there was a positive trend in the form of a decrease in the area of paresthesia, a decrease in pain syndrome. Clinical symptoms of inferior alveolar nerve injury in the form of numbness of the skin of the lower lip, pain on palpation of the lower lip and impaired sensitivity of the mucous membrane on the side of the injury were completely relieved in the study group and persisted in 1 patient of the control group.

With a severe degree of damage in the main group of patients, the indicators of electrical excitability in all studied areas also did not exceed the normal values ( $p \leq 0.05$ ). However, in the control group in 12 (63.1%) patients, the readings of electrical excitability were increased in zones 2 and 3 and amounted to  $45.1 \pm 3.2 \mu\text{A}$  and  $43.2 \pm 3.1 \mu\text{A}$ , respectively, which was accompanied by clinical symptoms, which manifested a feeling of numbness and "crawling goosebumps" in the 2nd and 3rd zones.

The area of paresthesia in the study and control groups was determined by the number of areas involved. At the admission of 40 patients with mild severity of the main and control groups, the area of paresthesia covered zones 2 and 3. In 16 patients, paresthesia spread to areas 2-4. 6 patients had paresthesia in all four study areas. The division of patients into the main and control groups according to the area of paresthesia was the same.

On the 10th day after admission, it was noted that the reduction of paresthesia zones was more pronounced in the patients of the main group. In the study group, there were no patients with an area of paresthesia that would cover all 4 zones. The number of zones involved was reduced to two and only covered zones 2 and 3. Whereas in the control group in one patient, the paresthesia zone did not shrink and amounted to all four zones.

On the 32nd-40th day of treatment, clinical manifestations of paresthesias of the lower lip and chin region did not appear in all patients of the control and study groups with mild severity. In only one patient in the control group, minor manifestations of paresthesia remained in zones 2 and 3.

In case of moderate damage, the area of paresthesia in 82.5% of patients in the study and control groups covered zones 1-3. Only 17.5% of patients had symptoms of paresthesias in all four areas at the time of admission.

On the 10th day after admission, in patients of moderate severity of the main and control groups, the clinical symptoms of paresthesia decreased, but the affected area remained at the same level.

Based on the determination of the electrical excitability of the skin of the lower lip and chin, on the side of the injury, it was revealed that the area of the paresthesia area in the area of the lower lip, the corner of the mouth, the skin of the chin, the gums on the side of the injury, by the 32-40th day decreased in 103 patients compared to the control group and affected only two zones - the 2nd and 3rd. Due to the effect of complex therapy on microcirculation, soft tissue edema on the side of injury in 74 patients who took part in complex therapy On the 3rd day of treatment, this drug was significantly less pronounced.

According to the results of the indicators of electrical excitability of the skin of the lower lip on the 32nd-40th day of the study, it is reliably seen that there is a decrease in indicators in all 4 areas of the study in the study group compared to the control group.

**Conclusion.** Thus, according to the measurements of electrical excitability carried out during the treatment, it can be concluded that in all four zones, the values of electrical excitability decreased in patients as part of the complex therapy.

After 6 months of treatment, with mild and moderate severity of damage to the inferior alveolar nerve, the indicators of electrical excitability significantly decreased ( $p \leq 0.05$ ) and did not exceed the normal indications in the study groups.

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