

## STATE OF ORAL HYGIENE AND PERIODONTAL TISSUES IN PATIENTS WITH FRACTURES OF THE ALVEOLAR PROCESS OF THE JAWS

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#### Abstract

The article presents the characteristics of oral hygiene and periodontal condition during the immobilization period in patients with fractures of the alveolar process of the jaws. During the immobilization period, along with the main treatment, attention should be paid to implementing a set of measures that improve oral hygiene and prevent the progression of inflammatory-destructive changes in periodontal tissues in patients with inflammatory periodontal diseases in combination with fractures of the alveolar process of the jaws.

#### Keywords

fractures of the alveolar process of the jaws, maxillofacial trauma, jaw immobilization, periodontium, oral hygiene.

**Relevance.** In recent years, alongside the overall increase in injuries, there has been a rise in the frequency of maxillofacial traumas, making the issue of maxillofacial injuries one of the most pressing concerns in oral and maxillofacial surgery. Despite advancements in treatment methods for jaw fractures, infectious and inflammatory complications often occur in the post-traumatic period. The development of these complications depends on several factors, including the presence of teeth with pathological processes in the periodontal tissues. Significant factors contributing to the development of complications include the state of the body's resistance, impaired blood circulation, and innervation in the fracture zone [1,3,9].

Among the treatment methods for fractures of the alveolar processes of the jaws (FAPJ), the most widely used is the immobilization of fragments using smooth dental splints. When splints are applied, it becomes difficult to perform professional and individual oral hygiene. With prolonged immobilization, the hygienic condition of the oral cavity deteriorates. Dental plaque microorganisms are the direct cause of inflammatory processes in the periodontium. Normally, resistance mechanisms counteract microorganisms, but as soon as they overcome this defense in any area, an infectious process develops with tissue damage.



Prolonged presence of bronze-aluminum ligatures in the cervical region of the teeth also leads to the development of an inflammatory process in the periodontal tissues, resulting in periodontitis - in fact, one of the experimental models of periodontitis involves applying a ligature to the tooth neck. In periodontal diseases, the application of dental splints leads to an exacerbation of periodontitis, which aggravates the course of the disease, and in some cases, it is impossible to apply splinting structures [2,4,6-10].

There is no data in the literature on the influence of dental splints on the condition of periodontal tissues in patients with alveolar process fractures. Many authors propose abandoning the use of dental splints in favor of alternative methods for immobilizing alveolar bone fragments [5,11-13]. However, these methods have not gained widespread acceptance, and dental splints remain the primary method of fracture immobilization in alveolar process fractures, though their impact on patients' periodontal tissues has not been studied.

**Research objective.** To study the impact of dental splints used to treat alveolar process fractures on the condition of the oral cavity and periodontal tissues.

**Materials and methods.** The work is based on the experience of treating 65 patients with alveolar process fractures of the jaws. All patients with alveolar process fractures were divided into the following groups depending on the treatment method:

Group 1 - 20 patients used smooth dental arch bars for immobilization; Group 2 - 22 patients were treated with smooth dental arch bars using "Medical Herbs" (Splat) mouthwash and CALCIY TRIACTIVE® D3 for immobilization; Group 3 - 23 patients used dental splints fixed with composite filling materials for immobilization.

In our work, when studying oral hygiene status, we assessed the Fedorov-Volodkina Oral Hygiene Index (FVOHI), while the intensity and prevalence of inflammatory processes in the periodontal tissues were determined using the PMA index proposed by scientists Massler and Schour, as modified by Parma.

Examination of patients with FAPJ and the control group was conducted 3 times during the course of treatment: before immobilization (upon admission to the department), on the 14th day of immobilization, and on the day of removal of immobilizing structures.

A study of the FVOHI, the state and prevalence of inflammatory processes (PMA) in the periodontal tissues was conducted in patients of all three groups. The control group included 16 generally healthy individuals without dental diseases, aged 18 to 40 years. All patients with FAPJ in groups 1 and 3 were recommended a standard oral hygiene regimen using furacillin solution, while patients in group 2

were recommended the "Medical Herbs" (Splat) mouthwash.

**Research results.** As shown in Table 1, upon admission to the department, patients with JAPF before immobilization had no statistically significant differences in the average values of the Fedorov-Volodkina hygiene index, with the obtained values ranging from  $1.9\pm0.09$  to  $2.2\pm0.13$  points. When comparing the study results with the control group, the oral hygiene status in patients with FAPJ was significantly worse (p<0.05).

During the initial examination upon admission to the clinic, all patients were assessed for gingival inflammation. The results showed that in all patients with FAPJ, the index values were more pronounced than in the control group. PI indicators did not show clear differences between the groups. However, compared to the control group, slight differences were observed (Table 1).

Studying the state of FVOHI during the course of treatment revealed that in patients of groups 2 and 3 with FAPJ, when examined on the 14th day of immobilization, the increase in FVOHI was less significant than in patients of group 1 with FAPJ. Changes in indicators were as follows: in the first group from 2.2 $\pm$ 0.13 to 3.0 $\pm$ 0.18 points (p<0.001 at t=3.6), in the second group from 2.0 $\pm$ 0.08 to 2.3 $\pm$ 0.09 points (p<0.01 at t=2.5), in the 3rd group from 2.2 $\pm$ 0.05 to 2.6 $\pm$ 0.06 points (p<0.01 at t=2.5).

Table 1

Comparative	analysis	of	dental	indices	dynamics	during	various		
immobilization methods in patients with FAPJ									

Index	Stage No	1st group 20)	2nd group 22)	3rd group 23)	Control (n=16)	
OHI hts)	1	2.2±0.13	2.0±0.08	1.9±0.09	1 75 10 0	
	2	3.0±0.18	2.3±0.09	2.4±0.08	1.75±0.0	
	3	3.9±0.19	2.6±0.09	2.5±0.07		
PMA (%)	I	25.3±2.39	22.2±1.24	27.2±1.49		
	2	35.8±2.65	27.3±1.61	30.7±1.31	17.0±1.1	
	3	45.1±2.65	35.5±1.55	39.3±1.68		
PI (points)	1	0.6±0.04	0.6±0.06	0.5±0.04	0.5±0.03	
	7	1.1±0.02	0.7±0.03	0.6±0.04		
	ß	1.4±0.04	0.8±0.07	0.9±0.05		

PI examination on the 14th day of immobilization in patients of all groups showed further deterioration and amounted to  $1.1\pm0.02$  points in patients of the 1st group with FAPJ,  $0.7\pm0.03$  in the 2nd group, and  $0.6\pm0.04$  points in the 3rd group.

During the examination of patients with FAPJ for the removal of immobilizing structures, it was established that the level of oral hygiene further deteriorated in patients with FAPJ across all groups. Comparison of the hygiene status during the third examination showed that the most unsatisfactory hygiene was observed in patients of the 1st group with FAPJ, whose immobilization was carried out using smooth dental arch bars -  $3.9\pm0.19$  versus  $2.6\pm0.09$  (2nd group),  $2.5\pm0.08$  (3rd group) (p<0.01).

Analysis of Periodontal Index (PI) results on the day of removal of the immobilizing structures also showed a shift towards deterioration in all groups of patients compared to the initial data. At the same time, higher differences were observed in patients of group  $1 - 1.4 \pm 0.04$  versus  $0.6 \pm 0.04$  points (p<0.01).



# Diagram 1. Comparative analysis of the dynamics of the Periodontal Index (PI, A.L. Russell) with various methods of mandibular immobilization in patients with FAPJ

Studying the severity of inflammation in the periodontal tissues during the course of treatment using various immobilization methods showed that inflammation increases throughout the treatment and reaches its peak in all groups (on the 21st day of immobilization). At the same time, the results at the final stage of the examination showed the lowest percentage values of PMA (Papillary Marginal Attachment) index and were established in patients of groups 2 and 3 -  $38.5\pm1.55$  and  $36.3\pm1.38\%$ , respectively (p<0.05).



Diagram 2. Dynamics of PMA index with various immobilization methods

Analysis of changes in oral hygiene level, periodontal tissue condition, and gingival inflammation severity relative to baseline values (in %) demonstrated the advantages of methods used in groups 2 and 3, as well as immobilization with bracket splints using "Medical Herbs" (Splat) mouthwash and vitamin D (2nd group) over the traditional method of immobilization with smooth bracket splints (1st group).





Analysis of the results obtained during the FVOHI study in the 1st group on the 14th day of immobilization in patients with FAPJ showed an increase of 40%, while in the 2nd and 3rd groups, the FVOHI values increased by 18% and 26% respectively. On the 21st day, the increase in FVOHI values reached 74%, 37%, and 46%. The dynamics of the PMA index followed a similar pattern. In the 1st group, the PMA index on the 14th day of immobilization increased by 42% from the initial baseline value at the primary examination. In patient groups with FAPJ 2 and 3, it increased by 32% and 37%. On the day of removal of immobilizing structures, the



increase in PMA index values in groups 1, 2, and 3 was 76%, 57%, and 49% respectively, compared to the initial baseline values of the index during the primary examination of patients with FAPJ.

**Conclusion.** Analysis of the obtained results allows us to recommend the use of an oral hygiene regimen using the "Medical Herbs" (Splat) mouthwash and CALCIY TRIACTIVE® D3 in patients with FAPJ. This regimen leads to improved hygiene and reduction of inflammation in patients with FAPJ when immobilized using smooth arch bar splints.

Thus, it can be concluded that the use of immobilization methods that help preserve the anatomical and functional integrity of the periodontal complex tissues reduces the risk of inflammatory processes, which, in turn, affects the quality and speed of fragment consolidation during FAPJ treatment.

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