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Original article

PERIODONTAL STATUS IN PATIENTS WITH MANDIBULAR FRACTURES

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ABSTRACT

Purpose: The aim of the present study was to assess the gingival and periodontal status of patients with maxillofacial trauma and to determine the need for periodontal treatment after removal of the intramaxillary fixation.

Material and methods: The study included 36 patients with a fracture of the lower jaw. After the clinical and radiological examination of the patients, treatment was performed on a case-by-case basis. 30 days after fixation and removal of the wire ligatures of the patients, the oral-hygienic and periodontal status was assessed using the following indices: simplified oral hygiene index, gingival bleeding index, community periodontal index of treatment needs and evaluation of oral malodour.

Results: The most common cause of fractures is a traffic accident, followed by domestic injuries. The level of oral hygiene immediately after removal of the wire ligatures and intermaxillary fixation varied between relatively good and poor, with a greater number of patients having poor hygiene (OHI-S ≥5). The periodontal status of the patients, measured by CPITN, also showed a statistically significant level of clinically established periodontal destruction. Halitosis was detected in all patients.

Conclusions: The course of the healing process in the alveolar bone and the functional rehabilitation of patients with mandibular fractures depends not only on the type of surgical treatment for immobilization of the fragments but also on the maintenance of optimal oral hygiene.

Keywords: fixation, gingival and periodontal status, halitosis, healing process,

INTRODUCTION

The main principle of treatment of fractures in the maxilla facial area is the reposition, fixation and immobilization of bone fragments in order to restore the occlusion and temporomandibular joint movement. Mandibular fractures are treated by intramaxillary fixation (IMF) or osteosynthesis - with or without intramaxillary fixation. The use of arches with periodontal ligatures was the most widely used method of choice, with wire ligatures passed around each tooth to fix the arches. Possible complications after surgical treatment include disocclusion, infected osteosynthesis material, hypo sensibility of lips and chin, and temporomandibular dysfunction [1]. However, IMF with arches and ligatures can also cause gingival and periodontal damage, difficulty in maintaining adequate oral hygiene by the patient, mucosal ulcerations, and risk of orthodontic displacement of the front teeth with poor adaptation and inadequate ligation. Osteosynthesis and connection of fragments with mini-screws or mini-plates currently is the method of choice with many advantages and fewer post-operative complications.

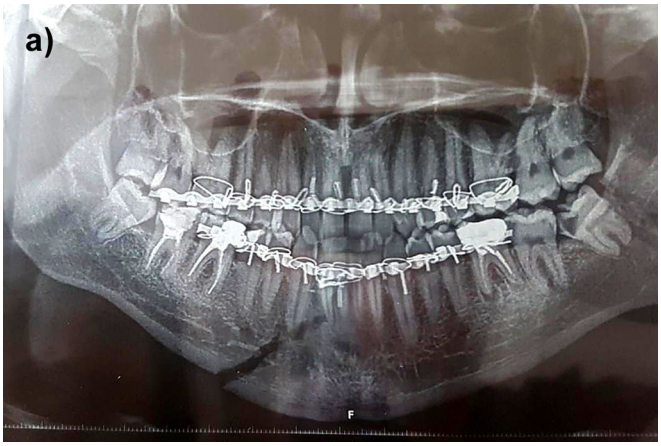
Complications that can be observed inpatients with IMF are a result of dental plaque accumulation on plaque retentive arches and wires and, consequently – initiation or progression of pre-existing periodontal disease. In some cases, only gingival inflammation is observed, which is easily reversible. In the vast percentage of cases, however, the development of a generalized inflammatory process is observed, which is due both to the impossibility of adequate oral hygiene and to the local trauma from the plates and wire ligatures. Some patients subsequently do not seek periodontal treatment, and inflammatory-destructive changes in the periodontium may continue progressively, or pre-existing disease is exacerbated, with severe resorption of the alveolar bone,which leads to tooth loss and impaired masticatory function and aesthetics. The fracture severity and pre-existing medical and periodontal problems are associated with increased risk for further post-operative complications. [2]. Some studies have shown that wires and splints cause no permanent changes in the teeth or periodontal tissues or if there are any – they disappear totally once the trauma and plaque retentive materials are removed [3,4]. Inflammatory changes in marginal periodontal tissues are less common in patients treated with osteosynthesis [5, 6]. Embrasure wire technique offers better treatment outcomes with a better periodontal status of patients compared to patients treated by the Erich arch bar [7]. Comparative studies demonstrated that the occurrence of post-operative complications, including those related to the periodontal condition, are related to the severity of the fracture rather than to the type of treatment and methods used [8, 9].

The aim of the present study was to evaluate the effect of arches and wires on the gingival and periodontal status of patients with mandibular fractures and to determine the need for periodontal treatment after removal of the intramaxillary fixation.

MATERIAL AND METHODS

The study included 36 patients admitted to the Clinic of Oral and Maxillofacial Surgery, University Hospital "St. George", MU - Plovdiv with a fracture of the mandible (Fig. 1. and 1a.).

Fig. 1a, b. Patient with a mandibular fracture on the right, immediately after splinting.



After clinical and radiographic examination of the patients, the treatment of each specific case was planned. Patients were divided into 2 groups according to the treatment approach. Closed repositioning and IMF (group 1) were performed in 19 patients in the first group. In 17 patients in the second group under general anesthesia, open repositioning of the fragments and osteosynthesis was performed.

30-days after removal of the arches and wire ligatures in both groups (Fig. 2.), an assessment of the oral hygiene and periodontal status of the patients was performed using the following indices:

- Simplified oral hygiene index (OHI-S) [10];
- Gingivalbleedingindex(GBI) [11];
- Community periodontal index for treatment needs (CPITN) [12]

Fig. 2. Periodontal status of patients immediately after removal of arches and wires.

Greene - Vermillion simplified oral hygiene index evaluates the amount of plaque on the tooth surfaces of teeth 16, 11, 26 and 31 - facial and teeth 36 and 46 - lingual. The presence of plaque is evaluated with values from 0 to 3, depending on its quantity and distribution on the tooth surface. In the absence of any of these teeth, the plaque on the adjacent tooth is reported, but from the same tooth group. The calculus index, which is part of OHI-S, is calculated in the same way. The index number for each patient is obtained by dividing the total of all reported index values by the number of surfaces reported. OHI-S can vary within the following limits and accordingly determines the level of oral hygiene:

0.0 – 1.2 – very good oral hygiene;
1.3 – 3.0 – relatively good oral hygiene;
3.0 – 6.0 – poororalhygiene.

The bleeding index is measured after careful probing the sulcus/pocket with a periodontal probe around each tooth. After 10 seconds, the presence or absence of gingival bleeding is reported. If bleeding is detected, it is marked with a "+". the number of positive sites is calculated, which is divided by the total number of examined teeth in the mouth and multiplied by 100.

The public periodontal index for the needs for treatment is reported with a special probe, taking into account certain parameters around 10 teeth: 17, 16, 11, 26, 27, 47, 46, 31, 36, 37. The criteria for placing the relevant codes and needs of treatment are the following:

Code	Criterion	Treatment
0	Healthy periodontium	There is no need for treatment (TN0)
1	Bleeding during probing	Improving oral hygiene (TN1)
2	Presence of over-and crowned tartar	Clinical oral hygiene (TN2)
3	Periodontal pockets with probing depth 4 - 5 mm	Non-surgical periodontal treatment (TN3)
4	Periodontal pockets with drilling depth ≥ 6 mm	Complex periodontal treatment (TN4)
x	Lack of teeth in the respective sextant or presence of 1 tooth	

Oral halitosis was evaluated subjectively - in each patient - using the dichotomous "yes" or "no" criteria.

Statistical analysis. The Statistical Package for Social Sciences (16-0 for Windows) was used. Mean values and standard deviations for oral hygiene index, gingival bleeding and periodontal status with treatment needs are used to assess the condition. The differences in the parameters between the two groups were evaluated with ANOVA'. The level of statistical significance was set at P <0.05.

RESULTS

The majority of patients with mandibular fractures included in the study were men – 29, and only 7 were female patients. The most common cause of fractures was a traffic accident, followed by domestic injuries.

All patients had significant plaque deposits supra- and subgingivally, signs of inflammation in marginal and interdental gingiva, which was swollen, red, detached from the tooth surface, easily bleeding. The presence of periodontal pockets and clinical attachment loss was also observed.

Mean values of oral plaque and calculus, bleeding on probing, and CPITN in both groups are presented in table 1.

Table. 1. Mean values of OHI-S, GBI and CPITN

	OHI-S (± SD)	GBI	CPITN (±SD)
Group 1 n=19	4.47 (0.9)	93%	3.78 (0.50)
Group 2 n=17	4.13 (1.1)	95%	3.41 (0.44)
	P<0.001	P<0.001	P<0.001

The level of oral hygiene, assessed by OHI-S, immediately after removal of the wire ligatures and intermaxillary fixation, varied between relatively good and poor, with a larger number of patients having poor hygiene (OHI-S ≥5). The bleeding index was also very high in both groups, with no statistically significant difference between the groups.

The periodontal status of the patients reported by CPITN also showed a statistically significant level of clinically established periodontal destruction. 10 patients in group 1 had code TN3 and pocket probing depth of 4-5 mm; 9 patients were with deep periodontal pockets of more than 6 mm. Patients in group 2 treated with osteosynthesis seemed to present comparable clinical status in terms of plaque accumulation, bleeding on probing, pocket depth and attachment loss. All patients in both groups (100%) had halitosis with varying degrees.

DISCUSSION

The indices used to assess oral hygiene and periodontal status of patients after intermaxillary fixation of mandibular fractures are widely accepted and objectively document the periodontal status of patients. The amount of accumulated plaque on the tooth surfaces immediately after removal of the ligatures is significant and expected. Increased inflammatory response, presence of bleeding on probing, periodontal pockets and attachment loss in both groups can be attributed to the difficulty in maintaining oral hygiene and to splints acting as an iatrogenic plaque-retentive factor. Our results demonstrating increased plaque levels and inflammation confirm the results reported in other papers [14, 15, 16]. It is quite possible that arches and ligatures not only initiate or aggravate pre-existing gingivitis or periodontitis, but they could play a role as direct trauma to marginal gingiva. However, the periodontal parameters and tooth mobility could disappear totally once the trauma of the fixation devices to marginal gingiva is removed [3, 13].

Oral hygiene is essential for the prevention of inflammatory-destructive periodontal disease in patients with mandibular fractures. Adequate oral hygiene is also important for the healing process in the area of bone fragments, not only for the removal of food debris and plaque from wire ligatures and arches. Another significant benefit is the prevention of opportunistic infection and the provision of conditions for a rapid healing process in the soft tissues and synostosis of bone fragments.

Oral hygiene is performed daily by cleaning the splints of food debris by rinsing and rubbing the vestibule with antiseptic solutions. The most effective are antiseptics with the active ingredient chlorhexidine (0.2% - 0.12%). Different gels containing chlorhexidine in different concentrations are also available, which could be applied to the gums and teeth for longer plaque inhibi-

tion. Special training for the correct brushing technique is required, despite the obvious limitations in opening the mouth and the presence of ligatures. Our study objectifies and confirms the detrimental effect of poor oral hygiene in patients with intermaxillary fixation. A special approach to fracture patients, special training to maintain optimal oral hygiene and referral for specialized periodontal treatment is needed to adequately maintain the periodontium and stop the progressive loss of attachment and alveolar bone.

CONCLUSIONS

The course of the healing process in the alveolar bone and the functional rehabilitation of patients with mandibular fractures depends not only on the type of surgical treatment for immobilization of the fragments but also on the maintenance of optimal oral hygiene. It is necessary to monitor it dynamically during the fixation and to take active measures for training and controlling the patients in order to minimize the inflammatory and destructive processes in periodontal tissues.

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