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# Dental Status and Microbiocenosis of the Oral Mucosa Of Children with Congenital Defects of The Maxillofacial Region in Remote Periods

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**Abstract:** The aim of the study was to identify the features dental status and the state of the microflora of the oral mucosa of children with congenital clefts of the lip and/or palate in the late postoperative periods. 10 patients with congenital pathology of the maxillofacial region were examined in the postoperative period (from 2 to 15 years after surgery). In patients with congenital clefts of the lip and/or palate in the postoperative period, high intensity of caries, unsatisfactory level of hygiene, damage to periodontal tissues, orthodontic pathology were noted. Qualitative and quantitative analysis of the microflora of the oral mucosa indicates the state of dysbacteriosis of the oral cavity.

**Keywords:** Congenital clefts lips and palate, dental status, oral hygiene indices, microflora of the oral mucosa, dental caries; oral health; oral microbiota; orthodontic treatment.

**Introduction:** A cleft in the lip and/or palate (CLP) is the most common congenital facial deformity that significantly affects the structure and function of the oral cavity, resulting in modifi-cations to one's facial features [1–4]. Individuals with CLP may have serious functional problems with sucking, swallowing, chewing, speaking, breathing, and social integration, and require

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comprehensive and long-term rehabilitation beginning in infancy and through out adulthood [5–7]. Orthodontic treatment plays a crucial role in the multidisciplinary care of these patients [8,9]. However, it is important to recognize that both the presence of malocclusion and the use of orthodontic appliances can modify the local oral environment, affecting the condition of periodontal tissues, dental hard tissues, composition and features of saliva, as well as oral microbiota [4,10–12].

Moreover, orthodontic appliances contribute to increased plaque accumulation and the quantity of exfoliated epithelial cells around the brackets and may hinder effective self-cleaning of teeth, thus impacting the condition of gingival tissues and dental structures [12].

Increased dental plaque accumulation may contribute to changes in the species composition and number of bacteria detected [7,13]. Consequently, individuals with CLP may face an elevated risk of infectious oral diseases, such as caries and periodontal problems/diseases [12]. The presence of orthodontic appliances can promote the colonization of cariogenic bacteria, such as Streptococcus mutans (SM) and the late colonizers Lactobacillus (LB), exacerbating the susceptibility to dental caries in CLP patients undergoing orthodontic treatment [14]. In patients with CLP, apart from the risk related to use of the orthodontic appliances, there are additional factors responsible for poor oral health and difficulties in maintaining adequate plaque control. These include the cleft deformity and anatomical changes in the maxillary segments, as well as a common fear of teeth brushing in the cleft area. Also significant is the loss of lip elasticity around the cleft scar making access to the oral cavity difficult, drying of the mucosa and teeth in the cleft area due to lip insufficiency, and prolonged oral cleansing time favoring the growth of

acidophilic bacteria [12,14,15]. In the available literature, there are few data on the assessment of the oral microbiota in patients with congenital facial defects, such as cleft lip and/or palate. In addition, existing papers differ in terms of, for example, study groups and outcome measures [4,7,14–16].

Therefore, the primary objective of this systematic review was to meticulously examine and consolidate the current scientific evidence pertaining to the oral microflora in children affected by cleft lip and/or palate. The consolidation of this scientific evidence will not only summarize the existing scientific evidence but also offer valuable insights into the microbial composition of the oral cavity in this population. This synthesis of information will play a key role in advancing our understanding of microbial dynamics and potential implications for oral health management in children with CLP.

**Relevance:** The World Health Organization notes high incidence of births of children with congenital cleft lip and palate in the world — 0.6-1.6 cases per 1000 newborns. In Russia, the incidence rate ranges from 3.5 to 5 thousand [3]. The anatomical features of congenital clefts of the lip and palate complicate the processes of feeding, speech development, hearing. They also negatively affect the social life and self-perception of the child. The cleft affects the continuity of the alveolar arch, thereby disrupting the shape and number of teeth, eruption and maxillofacial growth. Factors such as scarring of tissue in the cleft area and crowding of teeth contribute to the accumulation of plaque. In addition, the radicular lingual groove, which is found in patients with clefts, creates a pathological pocket, which disrupts the connection between the periodontal tissues and cementum and allows bacteria to multiply, which cannot be removed from the pocket [6]. Oral hygiene in such patients is greatly complicated by the fear of brushing the child's teeth. The presence of

plaque is a substrate for cariogenic microflora, which secretes acids during its vital activity. Acids cause the formation of carious cavities. Thus, children with congenital clefts of the lip and/or palate have a high incidence of caries and its complications. With congenital clefts of the lip and/or palate, due to unnatural oronasal communication, the microflora of the nasal and oral cavities mixes [11]. In this regard, a high frequency of pathogenic microflora is noted, which leads to a disruption of the microbial landscape and a decrease in local immunity. It is also known that surgical elimination of the cleft does not ensure the normalization of the microflora, so it is extremely important to monitor patients at a later date after surgery [13].

**Aim of study:** Identification of features of dental status and condition microflora of the oral mucosa of children with congenital clefts of the lip and/or palate in the late postoperative period.

**Materials and methods:** The study was conducted at the North-Caucasian Scientific and Practical Center of Maxillofacial, Plastic Surgery and Dentistry "Si-Med". To determine the dental status, 10 patients with congenital pathology of the maxillofacial region were examined in the postoperative period (from 2 to 15 years after surgery). The children were divided into two groups depending on the surgical stage: Group 1 - 5 children after primary cheilorhinoplasty (4 boys, 1 girl aged 2 to 11 years), Group 2 - 5 children after secondary cheilorhinoplasty (3 boys, 2 girls aged 8 to 15 years). All patients were assessed for caries intensity, oral hygiene, periodontal tissue condition, presence of dentoalveolar anomalies, and orthodontic status. To determine the intensity of dental caries in 3-year-old children, the KPU index was used, and in 6-year-old children, the KPU+kp index was used. The hygienic condition of the oral cavity was assessed using the simplified Green Vermillion oral hygiene index, and the condition of

the periodontium was assessed using the KPI (comprehensive periodontal index).

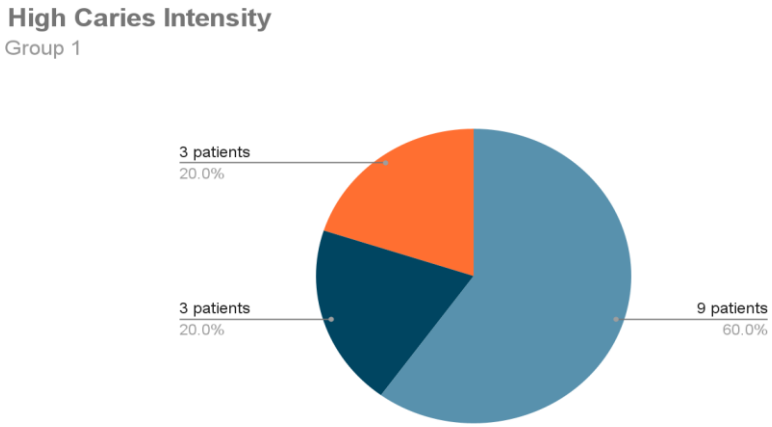
To determine the facultative anaerobic microflora of the oral mucosa (from the mucous membrane of the cheeks and the edges of the clefts), smears were taken from patients. The bacteria were isolated from the material under study and identified using generally accepted methods of bacteriological research and mass spectrometry (Mass spectrometer microflex «BRUKER DALTONIK GmbH»). Statistical processing was performed using standard methods.

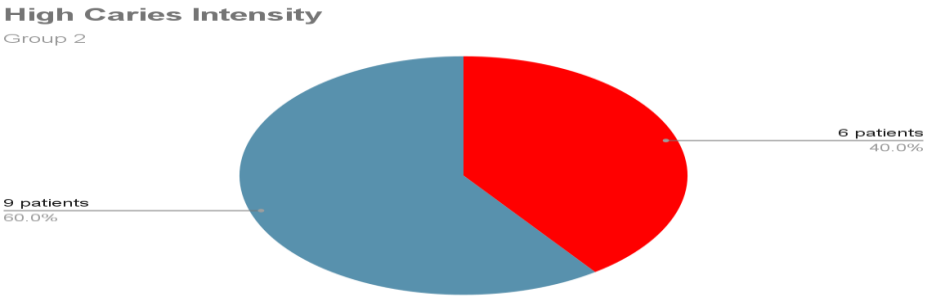
**Results and discussions.** During an objective examination of patients high intensity of caries was detected. In the first group, a low level of intensity was noted in 60% (9 patients), a high level of intensity in 20% (3 patient), and a very high level of intensity in 20% (3 patient). In the second group, a high level of caries intensity was noted in 40% (6 patients), very high intensity level – 60% (9 patients). In children with congenital clefts of the lip and/or palate, unsatisfactory hygiene level prevails, in the first group: unsatisfactory hygiene level – 60% (9 patients), satisfactory – 40% (6 patients). In the second group: unsatisfactory level in 100% (15 patients).

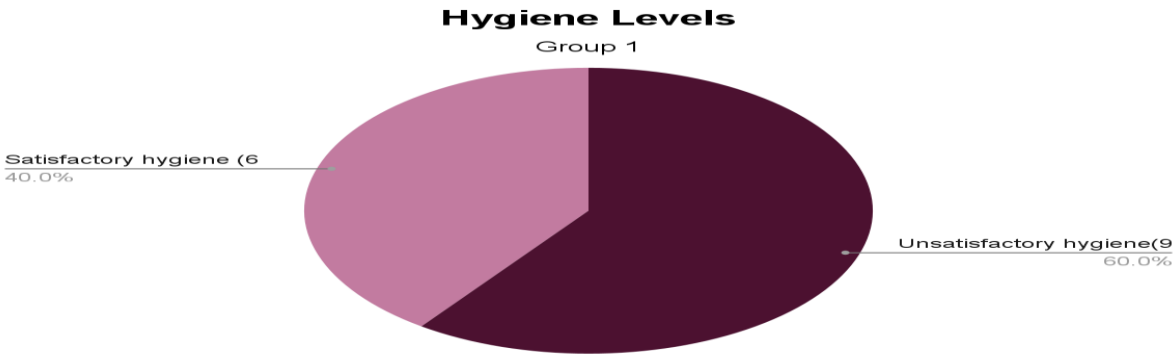
Mild periodontal damage in the first group was noted in 60% (9 patients), intact periodontium – 40% (6 patients). In the second group, mild periodontal damage was noted in 90% ( 12 patients), intact periodontium in one patient. The patients had occlusion anomalies – mesial bite, reverse overlap, crowding of teeth.

During the microbiological examination of the oral mucosa, an increased number of representatives of the saprophytic flora and a high frequency of detection of Staphylococcus aureus strains (in the first group in one patient, in the second in four children) were revealed, and in one patient after primary

cheilorhinoplasty, yeast-like fungi Candida albicans were isolated in excess of the norm, indicating dysbiotic processes.

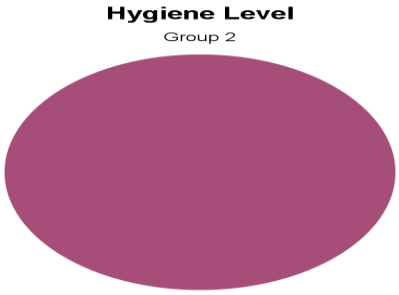


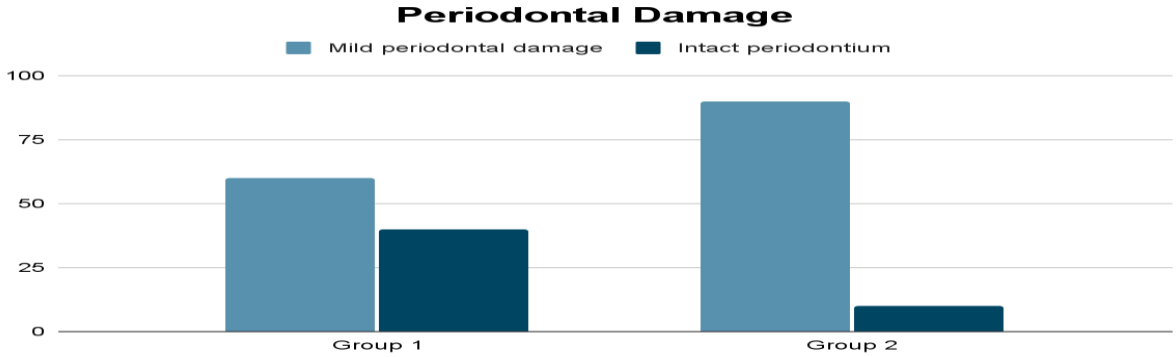



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**Occlusion Anomalies:** Both groups had **mesial bite**, **reverse overlap**, and **crowding of teeth**, which are common in children with clefts. **Occlusion anomalies:** often lead to poor oral hygiene, as crowded teeth are harder to clean, and they may also contribute to the development of dental caries and periodontal damage.

**Microbiological Findings:** Increased number of **saprophytic flora** and a high frequency of **Staphylococcus aureus** strains:

**First group**: 1 patient

**Second group**: 4 patients

**Candida albicans** detected in **one patient** after primary cheilorhinoplasty, indicating dysbiotic processes.

**Discussion:** The presence of **Staphylococcus aureus** in a high number of patients, especially in the second group, could be indicative of oral mucosal dysbiosis, where the normal microbial balance is disrupted, increasing the risk of

infections and worsening the oral health conditions. **Candida albicans** detection in one patient suggests that dysbiosis or an imbalance in the oral microbiome could also be contributing to the overall poor oral health in these children.

**Conclusions:** In patients with congenital cleft lip and/or palate, In the postoperative period, high intensity of caries, unsatisfactory level of hygiene, damage to periodontal tissues, orthodontic pathology were noted. Qualitative and quantitative analysis of the microflora of the oral mucosa indicates a state of dysbacteriosis of the oral cavity. Thus, patients with cleft lip and/or palate and in the postoperative period need a comprehensive approach, multi-stage long-term rehabilitation with the participation of related specialists (pediatric dentists, orthodontists, orthopedists, ENT doctors, speech therapists).

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