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Implications of oral flora and dental hygiene in post-surgical healing of oral diseases

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ABSTRACT: This research paper aims to study the microbial load in the healing process of certain diseases by comparing the microscopic appearance of the oral flora before and after several days after surgery. During this study, patients with gingival enlargement, periodontal disease, and those requiring extractions were examined. The collection of pathological products was performed after submission and signing of consent, history, and questionnaire. Smears were taken, with the biological products collected, and stained according to the Gram technique. In the present work, the aim was to highlight the differences between oral flora before and after surgical treatment and its implications in healing.

KEYWORDS: Oral Flora, Dental Hygiene, Post-Surgical Healing, Oral Diseases.

I. INTRODUCTION

The oral microflora is diverse and is represented by viruses, mycoplasmas, bacteria as well as occasional protozoa [1].

Diversity is given by the fact that the oral cavity presents a wide variety of habitats that provide a nutrient source [2].

The genetic diversity of microorganisms inhabiting the oral cavity plays a significant role in understanding oral health and disease mechanisms [3].

The oxygen concentration, pH, and nutrient sources present in the biofilm help the growth of broad-spectrum microorganisms. Under these conditions, no one species is particularly advantaged, and many species can coexist [4].

Bacteria in the oral cavity possess diverse genetic compositions that impact oral health. Their genetic makeup influences factors like biofilm formation, virulence, antibiotic resistance, and metabolic pathways, contributing significantly to oral diseases such as dental caries, periodontal diseases, and even systemic conditions like cardiovascular diseases or diabetes. Studying their genetics aids in understanding their behavior, interactions, and developing targeted strategies for oral health management and treatment [3, 5].

Plaque accumulation in teeth is the result of a balance between adhesion, growth as well as removal of microorganisms [6, 7].

Plaque development in terms of biomass will continue until the critical size is reached, after which reorganization and structural development will continue without a change in plaque size [7].

Dental plaque seen by electron microscopy looks like compressed layers of different morphological cell types. Regions of palisade can be seen where filamentous bacteria, as well as shells, are distributed parallel and at right angles to the enamel [8].

Periodontal disease develops after a continuous attack of microorganisms on the supporting tissue of the tooth [9].

Periodontal disease is common in developed countries and is the number one cause of tooth loss. In periodontal disease, the junctional epithelium at the base of the gingival sulcus migrates downwards leading to the formation of the periodontal pocket [10]. These changes are partly influenced by the direct action of microorganisms, but mostly indirectly due to the inflammatory response of the host in connection with plaque accumulation [11].

The main types of periodontal disease are gingivitis, chronic periodontitis, necrotic form, and aggressive periodontitis [12, 13]. Chronic and aggressive periodontitis can be localized or generalized [14].

II. MATERIAL AND METHODS

Selection of the patient group

A group of 15 patients was chosen for the study, including 9 women (60%) and 6 men (40%),

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aged between 24 and 65 years, who gave their consent and completed the questionnaire attached to the consent form. The data requested through the questionnaire were: initials, background, age, reason for presentation, quality of hygiene, and addictive habits (smoking). The information was centralized through a word table.

Materials

- Eyeglasses and mask for protection
- Gloves for examination
- Sterile consultation kit
- Exploratory probe
- Topical anaesthesia
- Syringe for anaesthesia
- Sterile cotton wool pads
- Degreased sterile slides
- Periodontal sponges
- Extraction forceps
- Elevator
- Scissors
- Suture needle
- Portac forceps
- Saline
- 5 ml syringe
- Gram staining kit
- Optical microscope with x100 immersion objective
- Cedar oil
- Bunsen bulb
- Camera from Iphone se 2020 phone

Method

For each smear, samples were collected with an exploratory probe from the: gingival sulcus, periodontal pocket, and the vicinity of teeth with indications for extraction. The pathological product was applied to the slide in concentric movements in as thin a layer as possible. The product was then dried leaving the smear on the table.

The next step was fixation, which was achieved by passing the blade 3 times through the flame facing away from the pathological product. The smear was checked by touching it to the dorsal face of the hand. The maximum temperature during flaming must not exceed 56 °C.

Once the slides have been fixed, they are placed in a holder and transported to the Microbiology Department of the Faculty of Dental Medicine of the "Carol Davila" University of Medicine and Pharmacy in Bucharest.

The Gram technique was used for staining.

Next, the x100 immersion objective was used, after previously applying a drop of cedar oil to the slide. The slide was fixed on the microscope stage and the x100 objective was lowered until it contacted the slide. The fields to be photographed were clarified with the help of the microvisa, after which their detailed analysis and interpretation followed.

III. RESULTS AND DISCUSSION

The highest proportion of the studied group is women 60%, which shows that women are more concerned about visiting the dental office.

Most of the patients are aged 30-50 years, representing 53.33%.

The majority of patients examined (66.66%), come from urban areas.

Patients from rural areas have a lower smoking prevalence, 40%, compared to urban patients where the smoking prevalence is higher, 70%.

The quality of oral hygiene in our study is relatively lower in the rural population compared to the urban population.

Following the examination of smears under an immersion objective light microscope, 10 successive fields were examined following a zig-zag movement.

The majority of the patients, suffer from hyperplastic gingivitis and the rest suffer from chronic deep marginal periodontitis.

Prevalence of microorganisms in periodontitis before treatment indicated the presence of Gram-negative bacilli well as Gram-positive bacilli, spindle-shaped bacilli, numerous PMN, haemocytes Gram-positive cocci and Gram-negative cocci, and few epithelial cells.

The main microorganisms present in hyperplastic gingivitis were epithelial cells and erythrocytes, numerous PMN, spindle-shaped bacilli, Gram-positive cocci, and rare Gram-negative cocci.

The main microorganisms observed following interventions in periodontitis patients showed a high prevalence of Gram-positive cocci in most patients, rare Gram-negative cocci, fusiform bacilli, and PMNs. In most cases, a shift from a pre-intervention Gram-negative microbial load to a Gram-positive flora was observed.

The prevalence of microorganisms in patients with gingivitis after gingivectomy showed the presence of Gram-positive cocci and epithelial cells, rare Gram-negative bacilli, and fusobacteria.

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In most cases, a shift from a pre-operative Gram-negative microbial load to a Gram-positive flora was observed.

This transformation of the microbiota balance suggests a distinct reconfiguration of the microbial environment in response to therapeutic intervention [15].

This change can influence the course of the healing process and requires specific approaches to maintain microbial balance and manage the consequences of this transformation on oral health [15, 16].

IV. CONCLUSION

Before surgery both patients with periodontitis and hyperplastic gingivitis showed an increased number of Gram-negative flora.

In particular, spindle-shaped bacilli species were observed in increased quantities.

The increased number of red blood cells and PMNs confirms once again the presence of inflammation and the body's immune response.

After the treatment was administered, a change from a Gram-negative-rich to a Gram-positive-rich flora was observed, with a decrease in erythrocytes, and PMNs.

On the other hand, an increase in the number of Gram-positive cocci was observed after the intervention in both periodontitis and hyperplastic gingivitis.

Fusiform bacilli were observed extremely rarely.

Microscopy has become a useful tool for the dentist in assessing the quality of the workmanship and post-intervention monitoring.

The intricate relationship between oral flora and the endothelium holds pivotal implications in post-surgical healing following oral disease interventions.

The interplay of oral microbiota with endothelial cells profoundly influences the local microenvironment, impacting inflammatory responses, tissue repair, and vascular integrity crucial for successful post-surgical healing.

Understanding and managing this intricate interplay could offer innovative avenues for enhancing surgical outcomes, minimizing complications, and promoting accelerated healing in oral disease interventions.

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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Statement of informed consent

Informed consent was obtained from the patients included in the study.

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