



Main reason of the origin of combined disorders endodont and parodont supporting teeth in the system of functioning fixed designs

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Abstract

AIM. To determine the etiological factors responsible for the development and progression of combined endodontic-periodontal lesions in abutment teeth supporting functioning fixed prosthetic restorations.

MATERIALS AND METHODS. A total of 88 patients with combined endodontic-periodontal involvement of abutment teeth under functioning fixed prosthetic constructions were clinically examined. The etiological structure of these complex lesions was assessed through a comprehensive approach that included clinical, paraclinical, and statistical methods of investigation.

RESULTS. Analysis revealed several predisposing factors strongly associated with combined endodontic-periodontal lesions beneath fixed prostheses. Deep periodontal pockets exceeding 5 mm, together with chronic destructive periapical processes and advanced alveolar bone resorption, were the most critical contributors. In most cases, lesions were classified as granulomatous periodontitis with a diameter greater than 5 mm. These were accompanied by disturbances in periodontal microcirculation, further accelerating tissue breakdown. The identification of such factors underscores their practical relevance for clinical decision-making in prosthodontics.

CONCLUSIONS. Combined endodontic-periodontal lesions are characterized by diffuse inflammatory destruction of alveolar bone tissue in the projection area of fixed prosthetic constructions. The pathological process is accompanied by a mixed type of resorption involving both interproximal and interradicular septa of teeth serving as abutments.

Keywords: endo-perio lesions, parodontal diseases, parodontitis, endodontic, chronic periodontitis

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Основные причины возникновения сочетанного поражения эндодонта и пародонта опорных зубов в системе функционирующей несъемной конструкции

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Резюме

ЦЕЛЬ. Выявить этиологические факторы формирования и прогрессирования комбинированных эндодонто-пародонтальных поражений в опорных зубах под функционирующими несъемными ортопедическими конструкциями.

МАТЕРИАЛЫ И МЕТОДЫ. Клиническому обследованию подвергнуты 88 пациентов с сочетанными эндодонто-пародонтальными поражениями опорных зубов под функционирующими несъемными ортопедическими конструкциями. Этиологическая структура комплексного поражения эндодонта

и пародонта в системе несъемного протезирования определялась с использованием комбинации клинических, параклинических и статистических методов исследования.

РЕЗУЛЬТАТЫ. Выявлены ключевые предрасполагающие факторы комбинированных эндодонто-пародонтальных поражений под функционирующими несъемными протезами. К таким факторам относятся пародонтальные карманы с глубиной, превышающей 5 мм, а также хронические деструктивные процессы в периапикальной области на фоне значительной резорбции костной ткани. Характерно, что очаги поражения классифицируются как гранулирующий периодонтит, имеют диаметр более 5 мм и сопровождаются нарушениями гемомикроциркуляции в тканях пародонта. Выявленные этиологические факторы возникновения сочетанной эндодонто-пародонтальной патологии в условиях несъемного протезирования представляют практическую ценность для клинической стоматологии.

ВЫВОДЫ. Комбинированные эндодонто-пародонтальные поражения характеризуются диффузной воспалительной деструкцией костной ткани альвеолярных отростков в проекции несъемной ортопедической конструкции. Патологический процесс сопровождается смешанным типом резорбции как межзубных, так и межкорневых перегородок зубов, выполняющих опорную функцию.

Ключевые слова: эндодонто-пародонтальные поражения, заболевания пародонта, пародонтит, эндодонтия, хронический периодонтит

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INTRODUCTION

Combined pathology of endodontic and periodontal structures is described in the contemporary literature by the term *endodontic-periodontal lesion* [1–3]. The long-term prognosis for tooth retention in such cases is highly uncertain, which drives the widespread use of tooth extraction as the primary therapeutic approach for these conditions among dental practitioners [4–7]. According to early studies, endodontic-periodontal lesions accounted for more than 50.0% of tooth extractions in adult patients [8–12]. Numerous international publications [13–15] detail the clinical presentation, diagnostic criteria, classification frameworks, and therapeutic strategies for endodontic-periodontal syndrome.

Despite the available scientific evidence, the etiological factors contributing to the onset and progression of endodontic-periodontal lesions in abutment teeth supporting functioning fixed prosthetic constructions remain insufficiently investigated. This knowledge gap hinders the development of effective preventive measures and evidence-based algorithms for forecasting the long-term performance of prosthetic restorations in this patient cohort.

AIM

To identify the etiological factors involved in the development and progression of combined endodontic-periodontal lesions in abutment teeth supporting functioning fixed prosthetic constructions.

MATERIALS AND METHODS

A clinical study aimed at achieving the stated objective included 88 patients aged 20 to 40 years presenting with combined endodontic-periodontal lesions of abutment teeth supporting functioning fixed prosthetic restorations. The methodology used to identify risk factors for endodontic-periodontal involvement of abutment

elements in fixed constructions comprised a comprehensive diagnostic protocol. At the initial stage, patient complaints and medical histories were collected, including general and dental anamnesis. Clinical manifestations of the endodontic-periradicular process and factors provoking its exacerbation were clarified. Dental status assessment was performed using standardized periodontal indices. Radiographic methods were applied to obtain a primary evaluation of the condition of endodontic and periodontal tissues in teeth serving as abutments. This approach enabled identification of the form of chronic periodontitis and assessment of inflammatory bone resorption patterns in both interdental and interradsular areas of the alveolar processes of both jaws.

The integrated diagnostic algorithm included systematic monitoring of a range of clinical parameters in the area of the fixed prosthetic structure. As part of the examination, the following were recorded: intensity of marginal gingival bleeding, papillary-marginal-alveolar index, oral hygiene level according to the Silness-Löe and Fedorov-Volodkina indices, gingival recession severity, periodontal condition assessed via the Russel and Ramfjord indices, periodontal pocket depth, and pathological tooth mobility according to Miller's classification. As an additional diagnostic criterion, bone density characteristics were evaluated based on radiographic imaging. The Stahi-Morris gingival recession index, combined with radiographic indices describing alveolar bone resorption, was used to quantify irreversible periodontal changes. Interrelationships among the studied parameters were analyzed through correlation-regression modeling and contingency table construction. Clinical relevance of various dental markers was determined using a heterogeneous sequential procedure that included calculation of diagnostic coefficients and the informational value of each evaluated indicator.

Table 1. Number of Endodontically Treated Abutment Teeth within Functioning Fixed Prosthetic Constructions**Таблица 1.** Количество эндодонтически леченых опорных зубов в системе функционирующей несъемной конструкции

Jaw	Teeth / Age			Young age	Middle age	Total
Upper	Front teeth	endodontically treated teeth	абс.	11	13	24
			%	4.58	5.42	10.0
	Premolars	endodontically treated teeth	абс.	19	20	39
			%	7.92	8.33	16.2
	Molars	endodontically treated teeth	абс.	27	31	58
			%	11.3	12.9	24.2
Lower	Front teeth	endodontically treated teeth	абс.	6	7	13
			%	2.50	2.92	5.42
	Premolars	endodontically treated teeth	абс.	20	25	45
			%	8.33	10.42	18.8
	Molars	endodontically treated teeth	абс.	29	32	61
			%	12.1	13.3	25.4
Total		endodontically treated teeth	абс.	112	128	240
			%	46.7	53.3	100.0

The research findings on risk factors for endodontic-periodontal lesions in patients with fixed prosthetic constructions are presented as mean values with standard error of the mean. Statistical analysis of intergroup differences was performed using the student's *t*-test for parametric data. A *p*-value of 0.05 was adopted as the threshold for statistical significance.

RESULTS

The first stage of the research focused on determining the quantitative distribution of endodontically treated teeth functioning as abutments within existing fixed prosthetic constructions. According to the obtained data, in the maxilla of young and middle-aged adults, the proportion of endodontically treated anterior teeth was 4.58% and 5.42%, respectively, averaging 10.0%. In the same region, the quantitative share of endodontically treated premolars was 7.92%, 8.33%, and 16.2%, while in the molar area these values amounted to 11.3%, 12.9%, and 24.2%, respectively (Table 1).

As shown in Table 1, the values for the lower jaw were 2.50% and 2.92% for the frontally oriented tooth groups, with an average of 5.42%; 8.33%, 10.42%, and 18.8% for the premolars; and 12.1%, 13.3%, and 25.4% for the molars of the lower jaw.

Examination of patients with combined endodontic-periodontal lesions revealed inflammatory destruction of the alveolar bone structure. The pathological process was characterized by a mixed type of resorption affecting both the interproximal and interraderic septa. The next stage of the study aimed to determine the influence of the degree of periapical osteodestruction at the apices of the supporting teeth on the severity of inflammatory changes in the periodontal complex. Correlation analysis demonstrated a statistically significant direct

relationship between the extent of destructive changes in the periradicular area of the supporting teeth and the indicators of inflammatory activity in the periodontal tissues (Table 2).

The study of baseline dental status indicators in the observed patients revealed the following. The initial plaque index among patients with endodontic-periodontal lesions under functioning fixed prosthetic constructions averaged 2.4 ± 0.2 points. The mean values of the calculus index and the combined hygiene index were 2.7 ± 0.1 points and 2.6 ± 0.2 units, respectively.

Table 2. Indicative dental status parameters associated with the progression of endodontic-periodontal lesions in supporting teeth within a functioning fixed prosthetic system

Таблица 2. Индикационные показатели стоматологического статуса, связанных с прогрессированием эндодонто-пародонтальных поражений опорных зубов, в системе функционирующей несъемной конструкции

Indicative parameter	Value of the indicative parameter ($M \pm m$)
Plaque index (score)	2.4 ± 0.2
Calculus index (score)	2.7 ± 0.1
Combined hygiene index	2.6 ± 0.2
Gingival bleeding index (degree)	2.7 ± 0.3
Gingival recession index (%)	68.9 ± 2.8
Russell's periodontal index	5.4 ± 0.4
Ramfjord's periodontal index	5.0 ± 0.2

Periodontal status was assessed using the sulcus bleeding index (SBI, according to Muhlemann, %) to record hemorrhagic manifestations in the interdental papillae after gentle probing. This index is an effective tool for monitoring the dynamics of inflammatory processes in periodontal tissues. Measurements were performed selectively, focusing on the quadrant containing the functioning fixed prosthetic construction. Analysis of baseline values revealed a statistically significant ($p < 0.01$) increase in sulcus bleeding in the area of fixed prostheses, with an average bleeding score of 2.7 ± 0.3 .

In patients with a fixed prosthetic construction, the gingival recession index at the projection of abutment teeth was $68.9 \pm 2.8\%$. Analysis of the Russell and Ramfjord periodontal indices showed corresponding values of 5.4 ± 0.4 and 5.0 ± 0.2 for the relevant diagnostic parameters.

The presence of chronic granulomatous periodontitis within the system of fixed prosthetic constructions among patients with endodontic-periodontal lesions of abutment teeth was generally accompanied by an increased severity of chronic localized periodontitis in the area of the functioning prosthesis. Among patients with combined endodontic-periodontal lesions of abutment teeth under fixed prosthetic constructions, chronic localized periodontitis of moderate severity was predominant (72.7% of cases), whereas the severe form of the disease was diagnosed in 21.6% of examined individuals. Statistical analysis using Pearson's chi-square test demonstrated a high χ^2 value with a confidence probability of $p < 0.001$. These results indicate a statistically significant correlation between the extent of granulomatous periapical bone resorption at the apices of abutment teeth and the intensity of inflammatory-destructive changes in the periodontal complex.

The study findings show that in patients with periapical bone resorption, there is a strong correlation between the severity of chronic localized periodontitis in the area of a functioning fixed prosthetic construction and the presence of chronic granulomatous periodontitis of the abutment teeth. This parameter demonstrates a strong interrelationship between these two key components of the endodontic-periodontal syndrome (Table 3).

As indicated by the data in the table, among the examined individuals, a mild degree of chronic focal periodontitis in the area of the functioning fixed prosthesis was recorded in 5.69% of cases in the absence of periradicular granulomatous bone resorption of the abutment teeth. A moderate degree of inflammatory process was identified in 89.5% of cases in the presence of chronic granulomatous periodontitis. In cases of moderate chronic focal periodontitis, periradicular granulomatous bone resorption was diagnosed in 38.6% of cases, while in the remaining 34.1% no periapical resorption of the abutment teeth was visualized within the system of the functioning fixed prosthesis. A severe form of chronic focal periodontitis was observed among patients with periradicular granulomatous bone resorption (4.55%), whereas this indicator was 17.0% in the absence of chronic granulomatous periodontitis.

Table 3. Correlation between the severity of chronic localized periodontitis and the presence of granulomatous-type periapical bone resorption in patients with functioning fixed prosthetic constructions

Таблица 3. Корреляция между степенью тяжести хронического очагового пародонтита и наличием периапикальной резорбции костной ткани гранулирующего типа у пациентов с функционирующими несъемными ортопедическими конструкциями

Severity of CLP (Chronic Localized Periodontitis)	Chronic granulomatous periodontitis		Total
	present	absent	
Mild	0	5 (5.68%)	5 (5.69%)
Moderate	34 (38.6%)	30 (34.1%)	64 (72.7%)
Severe	4 (4.55%)	15 (17.0%)	19 (21.6%)
Total	38 (43.2%)	50 (56.8%)	88 (100%)

Table 4. Relationship between the severity of chronic focal periodontitis and the extent of periapical bone destruction in abutment teeth

Таблица 4. Взаимосвязь между интенсивностью хронического очагового пародонтита и объемом деструкции в периапикальной зоне опорных зубов

Severity of CLP (Chronic Localized Periodontitis)	Periapical destruction dimensions		Total
	< 5 mm	> 5 mm	
Mild	6 (6.82%)	1 (1.14%)	7 (7.90%)
Moderate	33 (37.5%)	30 (34.1%)	63 (71.6%)
Severe	9 (10.2%)	9 (10.2%)	18 (20.5%)
Total	48 (54.5%)	40 (45.4%)	88 (100%)

Analysis of the obtained data indicates a statistically significant correlation between the extent of periapical bone destruction in the abutment teeth and the severity of chronic focal periodontitis in the area of the functioning fixed prosthesis (Table 4).

The data in Table 4 indicate that the degree of osteodestructive changes in the periapical region of abutment teeth is a significant factor determining the severity of periodontal inflammation.

DISCUSSION

With an increase in the dimensions of periapical destruction of abutment teeth, the severity of chronic focal periodontitis in the area of the functioning fixed prosthesis significantly rises. In patients with radiographically detected periapical destruction of less than 5 mm, the mild severity of chronic focal periodontitis in the prosthesis area was 6.82%, while moderate and severe forms accounted for 37.5% and 10.2%, respectively. For periapical resorption of a granulomatous

nature exceeding 5 mm, the severity of chronic focal periodontitis was 1.14% (mild), 34.1% (moderate), and 10.2% (severe).

Comprehensive analysis of clinical-indicative and radiographic parameters in the region of fixed prosthetic constructions revealed impaired microcirculation both in the periapical area of abutment teeth and within the structural elements of the periodontal complex. More pronounced periapical osteodestructive processes disrupt tissue homeostasis, impair self-regulation of metabolic processes in the periodontium, and intensify inflammatory reactions around prosthetic restorations.

A deficit in microcirculatory supply predictably reduces tissue resistance in this area, promoting the progression of inflammatory changes in the periodontium and diminishing the regenerative potential of destructively altered regions of abutment teeth. These pathophysiological mechanisms also significantly limit the effectiveness of therapeutic interventions in the area of functioning fixed prostheses. This established relationship should be considered not only as an etiological factor in the development of endodontic-periodontal

lesions but also when developing preventive and therapeutic protocols for patients with endo-periodontal pathology and chronic focal periodontitis in the region of fixed prosthetic constructions.

CONCLUSION

The comprehensive clinical, radiographic, and statistical study conducted made it possible to identify the key risk factors for the development of combined endodontic-periodontal pathology in abutment teeth. Predisposing factors include periodontal pockets exceeding 5 mm in depth, as well as chronic periapical pathological changes in abutment teeth occurring against the background of pronounced inflammatory bone resorption.

Particular significance is attributed to foci of granulomatous periodontitis with periapical destructive changes larger than 5 mm in diameter, which develop under conditions of compromised microcirculatory supply to the periodontal tissues. Among the parameters studied, the most significant influence on the severity of chronic focal periodontitis in the area of a functioning fixed prosthesis was exerted by the degree of periapical bone resorption at the apices of abutment teeth.

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