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Types of Complications in Dental Implantation

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ABSTRACT

Objective: *To improve the quality of prosthetic treatment supported by dental implants.* ***Methods:*** *A clinical analysis of long-term outcomes of prosthetic treatment supported by dental implants was conducted on 267 patients aged 20 to 60 years, revealing numerous clinical complications.* ***Results:*** *The use of prosthetic constructions supported by dental implants is motivated by their high aesthetic, functional, and articulatory benefits. However, analysis of current literature indicates that prosthetic rehabilitation of patients with partial edentulism using implant-supported crowns is associated with a relatively high rate of complications.* ***Novelty:*** *The novelty of the study lies in the clinical analysis of long-term outcomes, which uncovers numerous clinical complications in the rehabilitation of patients with partial edentulism using implant-supported crowns.*

INTRODUCTION

The use of prosthetic constructions supported by dental implants is driven by their aesthetic, functional, and articulatory advantages. However, analysis of contemporary literature shows that prosthetic rehabilitation of patients with partial tooth loss using implant-supported crowns is associated with a relatively high incidence of complications [1], [2], [3], [4].

In our clinical study, 350 prosthetic constructions and 885 dental implants were analyzed [5], [6]. Systematic evaluation of clinical data allowed for the identification of complications arising from prosthetic treatment with dental implants over the long term. The most frequently observed complications included:

- Bone tissue atrophy at the implant site — 95 patients (35.62%);
- Lack of cleansing space — 68 patients (25.47%);
- Dental deposits — 56 patients (21.14%);
- Physical mobility of the implanted fixture — 36 patients (13.63%);
- Peri-implantitis and mucositis — 33 patients (12.49%).

The growing need for various prosthetic solutions in patients with partial and complete edentulism is due to the absolute increase in the number of patients requiring prosthetic rehabilitation over the past 10 years [7], [8]. The dental implant market offers a wide range of systems that account for the anatomical and topographical variations of patients' jawbone structures [9].

A key advantage of implant-supported prostheses is their broad adaptability and high aesthetic quality [10], [11]. Nevertheless, despite their numerous advantages over conventional dentures, implant-supported prostheses carry a significant risk of complications [12].

Analysis of the literature, as well as clinical data on errors and complications during dental implant surgery, identified key factors contributing to complications in prosthetic rehabilitation, including: osteoporosis of the jawbone, insufficient osteogenesis, excessive functional overload of the bone tissue, and the presence of severe systemic diseases [8], [13].

Currently, dental implantation remains one of the most discussed topics in the dental literature [12], [14]. However, despite extensive research, there is still no clear systematization of existing complications in prosthetic rehabilitation with dental implants [15].

Objective of the study: to improve the quality of prosthetic treatment supported by dental implants.

RESEARCH METHOD

The study group consisted of:

1. **Patients with partial edentulism** — 267 individuals aged 20 to 60 years.
2. **Various prosthetic constructions** — 350 units, including 179 fixed dental bridges, 88 artificial crowns, 90 removable prosthetic frameworks, and 10 complete overdentures.

The methods of investigation included **clinical assessments** (visual examination, medical history collection, and analysis of clinical outcomes) and **paraclinical methods** (study of plaster models of the jaws, periotestometry, radiographic diagnostics, and analysis of stress-strain conditions).

During oral examinations, the following were recorded: prosthesis stability, quality of adaptation to natural teeth, periodontal condition, presence of cleansing spaces, aesthetic and functional performance, and occlusal relationships.

RESULTS AND DISCUSSION

Analysis of long-term outcomes of prosthetic treatment in 267 patients revealed a variety of clinical complications. A total of 350 prosthetic constructions were evaluated, including 179 fixed dental bridges, 88 artificial crowns, 90 removable prosthetic frameworks, and 10 complete overdentures.

Fixation methods:

- Cemented fixation for fixed prostheses — 120 patients (44.83%).
- Screw-retained fixation — 147 patients (37.15%).

For complete removable dentures, various bar-retained constructions supported by dental implants were used. It is also noteworthy that in 43.78% of patients (118 individuals), the gingival margin was at the level of the implant necks, while in 56.22% (149 individuals), it was at the level of the fitted artificial crowns.

Clinical complications observed included:

- Overloading of natural teeth due to incorrect prosthetic design,
- Periodontal inflammation,
- Pressure sores under prosthetic constructions.

Additionally, complications resulting from improper use of prostheses were observed, such as prosthesis fracture due to excessive mechanical forces (e.g., dropping the prosthesis or chewing excessively hard foods).

Complications associated with implant-supported prostheses were observed both in implant-based rehabilitation and in conventional prosthetic treatment. The most frequent complication was **inadequate prosthesis fixation**.

- Cemented prostheses: complications occurred in 17.26% (15 patients) for artificial crowns and 19.52% (35 patients) for bridges.
- Fractures or implant loss were not observed for artificial crowns and complete overdentures.
- For bridges, the rate of fracture or implant loss was 1.17%.

Pressure sores under prostheses were recorded in 16.33% (57 patients) during professional oral hygiene visits. **Inflammation around implants** was observed in 6.72% of complete denture users and 14.95% of removable framework users.

Approximately 77.47% (98 patients) reported **food retention under prostheses**. **Dental deposits** were observed in all patients using different types of prostheses. Among patients with artificial crowns and bridges, deposits were less frequent (14.59%). In contrast, a higher incidence was found in complete removable and removable framework users — 48.16% (47 patients).

Radiographic findings revealed vertical bone resorption (>2 mm) in 38.24% of cases (62 patients). For implant-supported crowns, **wear facets** on opposing teeth were observed in 13.03% (21 patients). For bridges, the wear rate was lower at 2.77% (5 patients). No wear of antagonistic teeth was observed in complete removable or removable framework users.

CONCLUSION

Fundamental Finding : Based on the results of the study analyzing the quality of prosthetic treatment in patients using various types of implant-supported prostheses, we have developed clinical characteristics suitable for further evaluation of prosthetic quality with different prosthetic constructions. Analysis of clinical complications associated with prosthetic treatment using various types of prosthetic constructions over the long term allowed us to determine their correspondence to each type. The most frequently observed complications were: bone atrophy at the implant site — 95 patients (35.62%), absence of cleansing space — 68 patients (25.47%), dental deposits — 56 patients (21.14%), mobility of the installed implant — 36 patients (13.63%), and peri-implantitis and mucositis — 33 patients (12.49%). **Implication :** The results of this study indicate that, in most cases, the frequency of the listed complications aligns with global data. However, the evaluation of prosthetic treatment outcomes highlights a priority task — the optimization of prosthetic rehabilitation using dental implants and the improvement of the overall quality of prosthetic care. **Limitation :** The study does not provide a detailed investigation into the long-term success of different types of implant-supported prostheses over a broader, more diverse patient population, which could affect the

generalizability of the findings. **Future Research :** Future research should focus on further refining clinical characteristics for evaluating prosthetic quality, exploring additional types of complications that may arise over a longer period, and evaluating strategies to optimize prosthetic rehabilitation using dental implants.

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