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Analysis of Influencing Factors of Oral Infection in Patients with Dentition Defects After Oral Implant Restoration

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Abstract: *Objective:* To analyze the related influencing factors of oral infection in patients with dentition defects after oral implant restoration, and to provide targeted reference for clinical infection prevention. *Methods:* 120 patients with dentition defects who underwent oral implant restoration were selected as the research subjects. They were divided into infected group and non-infected group according to whether oral infection occurred after surgery. The general information, oral health status, surgery-related indicators and postoperative care of the two groups of patients were compared, and multi-factor Logistic regression was used to analyze the independent influencing factors of infection. *Results:* Among 120 patients, 18 cases suffered from oral infection after surgery, and the infection rate was 15.00%. Univariate analysis showed that patients who were aged ≥ 60 years old, had poor oral hygiene status, were complicated by diabetes, had ≥ 2 implants, had surgery time ≥ 60 minutes, and had no standardized postoperative care had a higher incidence of infection ($p < 0.05$). Multivariate logistic regression analysis showed that age ≥ 60 years old, poor oral hygiene, diabetes, and operation time ≥ 60 minutes were independent risk factors for postoperative oral infection ($p < 0.05$). *Conclusion:* The occurrence of infection after oral implant restoration in patients with dentition defects is affected by many factors. Clinical intervention measures need to be targeted at the above risk factors to reduce the incidence of infection and improve the restoration effect.

Keywords: Dentition defect; Oral implant restoration; Oral infection; Influencing factors; Risk factors

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1. Introduction

Oral implant restoration has become the primary treatment method for clinical treatment of dentition defects due to its ideal restoration of chewing function, outstanding aesthetic effect and considerable service life [1,2]. This treatment method is an invasive operation. Once oral infection occurs after surgery, it will not only interfere with the osseointegration process between the implant and the alveolar bone, causing the restoration treatment to fail, but also induce complications such as gingivitis and peri-implantitis, aggravating the patient's physical and mental pain and increasing clinical medical costs.

In recent years, oral implant technology has become more and more widely used in clinical practice, and issues related to postoperative infection have gradually attracted the attention of clinical workers. Identifying various influencing factors of infection is the key to formulating effective prevention programs [3,4]. Although there are many relevant clinical research reports on the influencing factors of infection after implant restoration, the conclusions drawn are often divergent and there is a lack of comprehensive and systematic inductive analysis. Based on the above situation, this study selected patients with dentition defects who received oral implant restoration treatment to conduct a retrospective analysis to explore the relevant influencing factors that cause postoperative oral infection, and provide a reliable theoretical basis for further optimizing clinical treatment and nursing measures and reducing the risk of postoperative infection.

2. Materials and methods

2.1. General information

A total of 120 patients with dentition defects who underwent oral implant restoration received in our hospital from January 2023 to December 2023 were selected as the research subjects. According to whether oral infection occurred after surgery, they were divided into infection group (18 cases) and non-infection group (102 cases). In the infected group, there were 10 males and 8 females, aged 42 to 75 years old, with an average age of (58.62 ± 6.34) years; in the uninfected group, there were 56 males and 46 females, aged 35 to 72 years old, with an average age of (52.38 ± 5.86) years. Comparing the basic information of the two groups of patients, the difference was not statistically significant ($p > 0.05$) and was comparable.

2.1.1. Inclusion criteria

(1) Meet the diagnostic criteria for dentition defects and undergo oral implant restoration;
(2) Have clear consciousness and can cooperate with clinical observation;
(3) Complete clinical data

2.1.2. Exclusion criteria

(1) Combined with severe heart, liver, kidney and other organ diseases;
(2) Presence of oral malignant tumors;
(3) Pre-operative oral infection.

2.2. Method

The clinical data of the two groups of patients were collected, including general information (gender, age, body mass index), oral health status (oral hygiene status, periodontitis history), basic diseases (diabetes, hypertension), surgery-related indicators (number of implants, operation time, implant type) and postoperative care (whether oral cleaning was standardized, whether medication was prescribed by the doctor). The oral hygiene status is evaluated based on the soft plaque index and dental plaque index. If both indexes are ≥ 2, the hygiene status is poor, otherwise it is considered good. The diagnostic criteria for diabetes are fasting blood glucose ≥ 7.0 mmol/L or 2 h postprandial blood glucose ≥ 11.1 mmol/L.

2.3. Infection determination criteria

After surgery, one of the following conditions is determined to be an oral infection:

(1) Redness, pain, pus overflow in the gums around the implant, and local skin temperature increase;
(2) Ulcers and erosion in the oral mucosa, accompanied by pain;
(3) Routine blood examination shows that the white blood cell count is $> 10 \times 10^9$/L and the proportion of neutrophils is > 75%;
(4) Pathogenic bacteria are cultured from the secretions.

2.4. Statistical methods

Data were analyzed using SPSS24.0. *t*-test for measurement data; χ^2 test for count data. Multifactor logistic regression was used to analyze independent influencing factors. $p < 0.05$ represents significant difference.

3. Results

3.1. Occurrence of postoperative oral infections

Among 120 patients with dentition defects who underwent oral implant restoration, 18 cases suffered from oral infection after surgery, and the infection incidence rate was 15.00%. Symptoms of infection mostly appear 3 to 7 days after surgery, and are mainly manifested as red and swollen gums around the implant, pus discharge, and oral mucosal ulcers. The secretion culture results mainly show *Staphylococcus aureus* and anaerobic bacteria.

3.2. Single factor analysis of postoperative oral infection

Univariate analysis showed that patients aged ≥ 60 years old, with poor oral hygiene status, diabetes, the number of implants ≥ 2, operation time ≥ 60 minutes, and without standardized postoperative care had a higher incidence of infection, and the difference was statistically significant ($p < 0.05$); gender, body mass index, history of hypertension, and implant type had no significant impact on the incidence of infection ($p > 0.05$). See **Table 1** for details.

Table 1. Univariate analysis of postoperative oral infection [n (%)]

Factors	Total number of cases	Infection group (n = 18)	Uninfected group (n = 102)	χ^2 value	*p* value
Gender				0.003	0.959
Male	66	10 (15.15)	56 (84.85)		
Female	54	8 (14.81)	46 (85.19)		
Age				3.933	0.047
< 60 years old	78	8 (10.26)	70 (89.74)		
≥ 60 years old	42	10 (23.81)	32 (76.19)		
Oral hygiene status				7.138	0.008
Good	85	8 (9.41)	77 (90.59)		
Poor	35	10 (28.57)	25 (71.43)		
combined with diabetes				5.577	0.018
Yes	30	9 (30.00)	21 (70.00)		
No	90	9 (10.00)	81 (90.00)		
Number of implants				3.932	0.047
1 piece	72	7 (9.72)	65 (90.28)		
≥ 2 pieces	48	11 (22.92)	37 (77.08)		
Operation time				4.706	0.030
< 60 min	80	8 (10.00)	72 (90.00)		
≥ 60 min	40	10 (25.00)	30 (75.00)		
Standard postoperative care				8.484	0.004
Yes	82	7 (8.54)	75 (91.46)		
No	38	11 (28.95)	27 (71.05)		

3.3. Multifactor logistic regression analysis of postoperative oral infection

Factors with $p < 0.05$ in the univariate analysis (age, oral hygiene status, diabetes, number of implants, operation time, postoperative standardized care) were used as independent variables, and whether oral infection occurred after surgery was used as the dependent variable to perform multi-factor logistic regression analysis. The results showed that age ≥ 60 years old, poor oral hygiene, diabetes, and operation time ≥ 60 minutes were independent risk factors for postoperative oral infection ($p < 0.05$). See **Table 2** for details.

Table 2. Multivariate logistic regression analysis of postoperative oral infection

Independent variable	Assignment method	Regression coefficient (β)	Standard error (SE)	Wald χ^2	*p* value	OR value	95% CI
Age	< 60 years old，≥ 60 years old = 1	1.286	0.542	5.782	0.016	3.624	1.256–10.458
Oral hygiene status	Good = 0, Poor = 1	1.568	0.586	7.124	0.008	4.702	1.568–14.076
Combined with diabetes	No = 0, Yes = 1	1.352	0.568	5.642	0.018	3.864	1.235–12.087
Operation time	< 60 min = 0，≥ 60 min = 1	1.425	0.576	6.128	0.013	4.168	1.345–12.876
Number of implants	1 piece = 0, ≥ 2 pieces = 1	0.864	0.521	2.786	0.095	2.378	0.896–6.321
Standard postoperative care	Yes = 0, No = 1	0.986	0.532	3.452	0.063	2.682	0.968–7.452

3.4. Comparison of postoperative recovery conditions between the two groups of patients

The implant osseointegration time of patients in the infected group was (3.86 ± 0.72) months, which was significantly longer than that of the uninfected group (2.54 ± 0.56) months. The difference was statistically significant $p < 0.05$; The repair success rate of the infected group was 77.78% (14/18), which was lower than the 96.08% (98/102) of the uninfected group. The difference was statistically significant ($p < 0.05$). See **Table 3** for details.

Table 3. Comparison of postoperative recovery conditions between the two groups of patients

Group	n	Implant osseointegration time ($\bar{x} \pm s$, months)	Repair success rate [n (%)]
Infection group	18	3.86 ± 0.72	14 (77.78)
Uninfected group	102	2.54 ± 0.56	98 (96.08)
t/χ^2	-	8.815	5.557
p value	-	0.000	0.018

4. Discussion

Infection after oral implant restoration is a key complication that affects the effectiveness of treatment. It will not only prolong the patient's recovery period and may cause the implant to fall off, but also increase medical expenses. Data from this study show that among 120 patients with dentition defects who received oral implant restoration, the rate of postoperative infection reached 15.00%. With the help of single-factor and multi-factor logistic regression analysis, it was determined that age of not less than 60 years old, poor oral hygiene conditions, combined with diabetes, and surgery lasting more than 60 minutes were independent risk factors for postoperative oral infection, pointing out targeted directions for clinical infection prevention work.

Age of not less than 60 years old has become an independent risk factor for postoperative oral infection. The reason behind the analysis may be that the body immunity of elderly patients declines and the activity of immune cells decreases,

which weakens the resistance to pathogenic microorganisms. The slow progress of postoperative wound healing can easily lead to infection. At the same time, most elderly patients are accompanied by atrophy of the oral mucosa and reduced saliva secretion. The reduced oral cleaning ability makes pathogenic microorganisms easy to breed and multiply inside the oral cavity, thereby increasing the possibility of infection [5]. Therefore, for elderly patients, it is necessary to comprehensively evaluate their body's immune function and actual oral condition before surgery, strengthen nutritional supply after surgery to enhance the body's resistance, and strengthen guidance on oral hygiene to reduce the growth of pathogenic microorganisms [6].

Poor oral hygiene is a key risk factor for postoperative infection. This result is consistent with existing clinical knowledge. There are a large number of pathogenic microorganisms in the oral cavity itself. If preoperative oral hygiene is not taken care of properly, the accumulation of dental plaque and calculus will cause an imbalance in the oral flora and increase the number of pathogenic microorganisms. Cleaning blind spots are easily formed around the implant after surgery. If the patient does not master the correct cleaning method, dental plaque will accumulate again, and pathogenic microorganisms will invade the tissue surrounding the implant and cause infection. Therefore, it is necessary to evaluate the patient's oral hygiene status before surgery, and perform basic treatments such as scaling and scaling to remove dental plaque and calculus for patients with poor hygiene conditions; after surgery, patients should be informed of oral cleaning methods in detail, guided to use dental floss, dental rinses and other tools, and their oral hygiene status should be reviewed regularly and the cleaning plan should be adjusted in a timely manner [7].

The risk of postoperative infection in patients with diabetes increases significantly. The reason is that patients with diabetes have high blood sugar levels. A high-sugar environment will provide convenient conditions for the growth and reproduction of pathogenic microorganisms, while affecting the normal function of immune cells and reducing the body's ability to resist infection. In addition, high blood sugar will interfere with the function of vascular endothelial cells, causing poor local blood circulation and delaying wound healing, further increasing the risk of infection. For patients with diabetes, blood sugar levels need to be strictly controlled before surgery. Fasting blood sugar should be controlled within 7.0 mmol/L, and blood sugar 2 hours after a meal should be controlled within 11.1 mmol/L. Surgery will be performed after blood sugar has stabilized. After surgery, blood sugar will be continuously monitored to adjust the blood sugar-lowering plan. At the same time, wound care will be strengthened to keep the area clean and dry to promote wound healing.

Surgery lasting more than 60 minutes is an independent risk factor for postoperative oral infection, because too long surgery time will increase the exposure time of oral tissues, and pathogenic microorganisms in the air and original pathogenic microorganisms in the oral cavity can easily invade the surgical wound; at the same time, long-term surgery will aggravate the degree of oral tissue damage, and the local inflammatory reaction will be aggravated, making wound healing more difficult, and the risk of infection will also increase. Therefore, clinicians need to continuously improve their surgical proficiency and optimize the surgical process to shorten the surgical time; strictly follow the aseptic operation guidelines during the surgical process, strengthen the disinfection of the surgical area, and reduce the contamination of pathogenic microorganisms.

This study also found that patients with at least 2 implants and who did not receive standardized postoperative care had a higher proportion of infections. However, these factors did not enter the multifactor logistic regression equation, which may be related to the small number of samples. When the number of implants is large, the scope of surgical trauma will be larger, and the wound healing and cleaning will be more difficult, which can easily lead to infection. Patients who do not receive standardized postoperative care will also increase the risk of infection due to failure to take medication on time and insufficient oral hygiene. Therefore, clinical measures need to be taken to address these factors. For patients with multiple implants, wound care should be strengthened and dressings should be changed regularly after surgery. Postoperative health education should be strengthened to improve patient care compliance and ensure standard medication and oral hygiene. In addition, the results of this study show that the osseointegration time of implants in the infected group is significantly longer than that in the uninfected group, and the probability of successful repair is lower than that in the uninfected group, indicating that postoperative infection will seriously affect the patient's recovery process and repair effectiveness. Therefore, clinical practice needs to develop personalized preventive measures based on the above-mentioned

risk factors: comprehensively assess the patient's age, basic diseases, oral hygiene status, etc. before surgery, and formulate targeted intervention plans for high-risk groups; improve operational proficiency during surgery to shorten the surgery time, and strictly implement aseptic operations; postoperatively strengthen blood sugar monitoring, oral cleaning guidance and nutritional supply, and regularly review to detect and deal with signs of infection in a timely manner [8].

All in all, the occurrence of infection in patients with dentition defects who receive dental implant restoration is affected by many factors such as age, oral hygiene status, diabetes, and operation time. Comprehensive intervention methods need to be adopted in clinical practice to target these risk factors, optimizing the patient's physical and oral condition before surgery, standardizing operating procedures during surgery, and strengthening postoperative care and follow-up work to reduce the rate of infection, enhance the effect of implant restoration, and improve the patient's quality of life.

About the author

Wu Yan (1976-), female, Han nationality, native of Zhangjiagang, Jiangsu, undergraduate, deputy chief physician, Zhangjiagang Aoyang Hospital, research direction: dental and alveolar surgery, oral restoration, oral implantation.

Disclosure statement

The author declares no conflict of interest.

References

[1] Zhang X, Liu H, 2025, The Effect of Digital Guide-Guided Dental Implant Restoration in the Treatment of Patients with Dentition Defects. Chinese Folk Medicine, 37(16): 39–42.

[2] Jin G, 2025, Analysis of Influencing Factors of Oral Infection in Patients with Dentition Defects after Oral Implant Restoration. Doctors, 10(14): 68–71.

[3] Liu H, 2025, Analysis of the Impact of Oral Implant Restoration on Chewing Function and Complications in Patients with Dentition Defects. Chinese Modern Drug Application, 19(11): 67–70.

[4] Xia J, 2025, Analysis of the Impact of Oral Implant Restoration on Inflammatory Factors and Oral Function in Patients with Chronic Periodontitis and Dentition Defects. Electronic Journal of Modern Medicine and Health Research, 9(10): 4–6.

[5] He B, Wu Z, Yao L, et al., 2025, Effect of High-Precision 3D Integrated Digital Implant Guide on the Oral Implant Restoration Effect, Occlusal Relationship and Chewing Function of Patients with Malocclusion and Dentition Defects. Hainan Medicine, 36(7): 986–991.

[6] Qiao M, Zheng X, Li C, 2025, Analysis of the Occurrence of Peri-Implant Disease and Its Influencing Factors in Patients with Dental Implant Restoration. Reflexology and Rehabilitation Medicine, 6(6): 50–52 + 56.

[7] Li Y, Liang Y, Chen R, et al., 2025, The Impact of 6S Refined Management Combined with PDCA Cycle Care on the Restorative Effect and Psychological Toughness of Patients with Dentition Defects Repaired by Oral Implants. Smart Health, 11(4): 110–113.

[8] Liu L, Zhang M, Xi X, et al., 2024, Analysis of the Characteristics of Pathogenic Bacteria and Related Risk Factors for Oral Infections Complicated by Oral Implant Restoration in Patients with Dentition Defects. Chinese Journal of Pathogen Biology, 19(4): 459–462 + 467.