

# Clinical Retrospective Study of Pterygomaxillary Implant Combined with Anterior Implant in the Repair of Atrophic Edentulous Maxilla

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**Abstract:** Objective: To retrospectively analyze the therapeutic effect of pterygomaxillary implant combined with anterior implant in the repair of atrophic maxillary edentulous jaw. Methods: The clinical data of 26 patients with atrophic edentulous maxilla who received pterygomaxillary implants combined with anterior implants from January 2019 to December 2020 were analyzed retrospectively. All patients were followed up for  $\geq 1$  year. The retention of anterior implants (105) and pterygomaxillary implants (45) were compared. Patients' satisfaction with deep and middle periodontal examination (MBPD) and plaque (PLI). Results: The anterior implant retention rate was 97.14%, which was close to 93.33% in pterygomaxillary area ( $P > 0.05$ ); The levels of PD, PLI, mesial MBL and distal MBL of anterior implants were similar to those of pterygomaxillary implants ( $P > 0.05$ ); Patients' satisfaction with treatment was 92.31%. Conclusion: In the treatment of patients with posterior atrophic edentulous maxilla, the pterygomaxillary implant and the anterior implant supported complete arch fixed denture can bear the weight immediately, the short-term clinical effect is acceptable, and the patient satisfaction is high. It is a predictable and feasible repair method.

**Keywords:** Atrophic Maxillary Edentulous Jaw; Pterygomaxillary Implant; Anterior Implant

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## Introduction

Atrophic maxillary edentulous jaw is a common type of implant repair in oral cavity. The main treatment of the disease is the restoration of complete arch denture supported by multiple implants, and the implant retention rate is high. However, due to the insufficient maxillary volume and maxillary sinus gasification, the process of posterior tooth restoration in the traditional restoration process is easy to be significantly limited, affecting the process of implant restoration<sup>[1]</sup>. Implant repair in pterygomaxillary area refers to passing the implant through the pterygoid process of sphenoid bone to strengthen the bone support of implant and support the posterior part of maxilla<sup>[2]</sup>. Combined with the anterior implant, it can eliminate the long cantilever effect and inhibit the bone increment. It can be considered as the treatment scheme of posterior atrophic maxillary edentulous. However, whether this treatment scheme can reduce the loss of marginal bone and improve the periodontal state of the implant is still lack of research. Therefore, this study retrospectively analyzed the clinical data of 26 patients with atrophic maxillary edentulous jaw from January 2019 to December 2020, and analyzed the therapeutic value of pterygomaxillary implant combined with anterior implant repair.

## 1. Data and methods

### 1.1 General information

The clinical data of 26 patients with atrophic maxillary edentulous jaw in our hospital from January 2019 to December 2020, including 16 males and 10 females, aged 45-74 years, with an average of  $(58.33 \pm 4.20)$  years. A total of 150 implants were implanted, including anterior implants (105) and pterygomaxillary implants (45). Inclusion criteria: ① potential edentulous jaw, or maxillary edentulous jaw, posterior maxillary atrophy, and reduction of vertical bone mass ( $< 8\text{mm}$ ); ② Implant 1 ~ 2 pterygomaxillary implants with terminal torque  $> 30\text{n} \cdot \text{cm}$ ; ③ Follow up time  $\geq 1$  year; Exclusion criteria: ① combined with metabolic diseases such as diabetes and hyperthyroidism; ② There are mechanical movement habits of teeth

such as clenching teeth and molars;③ Poor oral hygiene habits.

## 1.2 Method

(1) Implant system: the pterygomaxillary implant system is Nobel Biocare active system. The anterior implant system is based on the pterygomaxillary implant and also includes the company's replace system;(2) Preoperative preparation: take cone beam CT, print the patient's 3D maxillary model, and determine the implant site with drill needle;Routine anti infection treatment before operation;(3) Surgical treatment: local anesthesia on the buccal and palatal sides of the distal maxillary tubercle and mucoperiosteal membrane, remove the remaining teeth without retention value, and clean the extraction socket;Incise along the palatal side of alveolar ridge until the contralateral maxillary tubercle is far in the middle;Two pterygomaxillary implants + four anterior implants were designed. When planting in pterygomaxillary region, a periosteal stripper was placed 10mm in front of the maxillary suture of pterygoid process. After the implantation site was determined in combination with the preoperative design implant scheme, holes were prepared step by step; The drill needle gradually passes through the pyramidal process of palatine bone through the proximal middle, posterior and posterior upper directions until it reaches the pterygoid process of sphenoid bone; In the process of pterygomaxillary implantation, the implant bed was prepared according to the patient's anatomy, the appropriate type of implant was implanted, the composite abutment was connected, and the soft tissue was sutured; (4) Repair: cone beam CT confirms the implant position, takes the mold beside the chair, takes the mold in the mouth and screws it into the abutment level, connects the mold taking columns with stainless steel wire, takes the mold with conventional silicone rubber and makes the wax dike with gypsum perfusion model, and carries out the immediate repair of the prosthesis after confirming the occlusal relationship of the patient, and tries to wear and adjust it in the mouth; Under the influence of the maxillary arch end of the implant in the pterygomaxillary area, the whole arch temporary denture can avoid the long cantilever arm.

## 1.3 Observation index

(1) The patients were followed up for 1 year to compare the retention of implants in pterygomaxillary area and anterior part; (2) The periodontal index and marginal bone resorption of pterygomaxillary region and anterior implant were compared, including probing depth (PD), plaque index (PLI), proximal middle and distal marginal bone resorption (MBL); (2) The treatment satisfaction of patients (including tooth function and aesthetics) is divided into very satisfied, general satisfied and dissatisfied. Satisfaction = (very satisfied + general satisfied) / cases×100%.

## 1.4 Statistical method

The ( $\bar{X} \pm s$ ) and (%) represent measurement and counting data, and T and C2 tests;  $P < 0.05$  means the difference is statistically significant;The data statistical calculation process is completed by SPSS 24.0 software.

## 2. Result

### 2.1 Implant retention

The anterior implant retention rate was 97.14% (102 / 105), which was close to 93.33% (42 / 45) in pterygomaxillary area ( $C2 = 1.190, P = 0.275 > 0.05$ ).

### 2.2 Periodontal index and marginal bone resorption of pterygomaxillary area and anterior implant

The levels of PD, PLI, mesial MBL and distal MBL of anterior implants were similar to those of implants in pterygomaxillary area ( $P > 0.05$ ), as shown in Table 1.

Table 1 periodontal index and marginal bone resorption of pterygomaxillary area and anterior implant ( $\bar{X} \pm s$ )

	<i>n</i>	PD (mm)	PLI	MBL	MBL
Implant location	<i>N</i>	PD (mm)	Pli	Near middle MBL	Far middle MBL
front	105	2.14±0.62	0.99±0.21	0.62±0.19	0.61±0.30
		±0.62	±0.21	±0.19	±0.30
Pterygomaxillary region	45	2.28±0.50	1.02±0.23	0.63±0.18	0.65±0.15
		±0.50	±0.23	±0.18	±0.15
<i>t</i>		1.339	0.779	0.300	0.849
<i>T</i>					
<i>P</i>		0.183	0.437	0.765	0.397
<i>P</i>					

## 2.3 Treatment satisfaction

After treatment, the patients were very satisfied in 10 cases (38.46%), generally satisfied in 14 cases (53.85%) and dissatisfied in 2 cases (7.69%), and the satisfaction was 92.31% (24 / 46).

## 3. discuss

In this study, these patients were treated with anterior fixed implant combined with pterygomaxillary implant, and all patients were followed up for  $\geq 1$  year. The analysis of the research results showed that the implant retention rates in the anterior and pterygomaxillary regions were similar. The analysis reason was that the implant retention rate was related to the fixed length, bone mass support, surrounding soft tissue support and other reasons, although there was still a lack of special implant in the pterygomaxillary region, However, the implant selected in this study is relatively long (15 or 18mm), which can pass through the pterygoid process of sphenoid bone during fixation to provide ideal bone support for implant fixation, so its implant retention rate is relatively ideal [3-4].

The results show that the level of periodontal tissue in the anterior and pterygomaxillary areas is similar, and there is no significant increase. The reason is that although the implant site in the pterygomaxillary area is relatively deep and daily cleaning is difficult, strengthening the guidance of patients' daily oral hygiene and cleaning can reduce the inflammatory reaction process of dental plaque on the periodontal tissue of the implant, so as to reduce the impact of inflammatory reaction of periodontal tissue on the stability of the implant, To provide soft tissue support for improving implant retention. The results showed that the marginal bone resorption of implants in the two regions was similar, suggesting that the implantation in pterygomaxillary region did not significantly increase the marginal bone resorption. The research results show that patients' treatment satisfaction is relatively high, which is related to the fact that the two implant schemes can better meet the needs of patients [5].

To sum up, in the treatment of patients with posterior atrophic maxillary edentulous jaw, the pterygomaxillary implant and the anterior implant supported complete arch fixed denture are loaded immediately, the short-term clinical effect is acceptable, and the patient satisfaction is high. It is a predictable and feasible repair method.

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