

# Analysis of Factors Affecting the Stability of Complete Denture

Wuliang Wang, Xiliang Yang, Wei Zheng, Ruiying Liang\*

School of North China University of Science and Technology, Tangshan 063000, China

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## Abstract

**At present, due to the popularity of dental implants, people pay less attention to complete dentures. However, due to the impact of patients' physical conditions, economic conditions and an aging population, complete dentures still have a huge market. Among them, the retention and stability of complete denture is the basis and key point to obtain good restoration effect. This paper summarizes the jaw position, the position of the teeth, the position of the upper and lower dental arch and the shape of the polished surface.**

## Keywords

**Complete Denture; Stability; Jaw Position Relationship; Tooth Arrangement; Polished Surface.**

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## 1. Introduction

Edentulous jaw means that there are no natural teeth or roots on the whole dental arch[1].The treatment of edentulous jaw includes Complete denture and implant complete denture.The retention and stability of Complete denture is the basis of good restoration effect. In order to achieve the retention and stability of complete dentures, it is necessary to accurately attach the denture base to the mucous membrane so that the space between the two is as small as possible. Secondly, there should be an edge seal to ensure that the edge of the base extends to the buccal groove and the edge of the base is smooth[2].Changhong Hu [3] believes that if you have good support and stability, you will have good retention, and retention and stability complement each other.HuumonenS et al. [4] studied 326 edentulous patients aged from 60 to 78 years old and found that there was a significant correlation between low satisfaction with dentures and poor stability of dentures.Stomatologists around the world have been looking for better techniques and ways to increase the stability of complete dentures[5,6,7,8,9].

## 2. Influence Factor

### 2.1 Correct Jaw Position Relationship

In the process of making complete denture, it is necessary to determine the vertical , horizontal and hinge axis relationship[11].Yasui [12] found that determining the correct vertical distance can increase the stability of dentures.Clinicians need to be proficient in many methods, including pre-extraction recording method, rest jaw position reference method, facial shape observation method, X-ray cephalometry, phonetics and other methods, through joint application, mutual verification to determine the correct vertical distance[13]. Kattadiyil MT et al[14] have found that physicians' proficiency in clinical experience and specific techniques are essential to the accuracy of recording neutral relationships.Sabarigirinathan et al[15]found that compared with other methods of recording horizontal jaw position, intraoral Gothic dental arch drawing is the most accurate and repeatable method.A correct relationship helps to maintain the physiological and anatomical health of the tissue. When the position of the teeth is consistent with the neutral relationship, it provides stability for the complete denture and protects the health of the remaining oral and maxillofacial tissue[16].The hinge

axis relationship can reflect the position of the maxilla relative to the temporomandibular joint or condyle through the facial arch on the occlusal frame[11].MQ Wang[17] found that about 39% of people believe that not using a facial arch may reduce the quality of complete dentures, and 94% believe that there is a difference in quality between dentures made with adjustable braces and dentures made with simple braces.Li Wang[18] thought that the facial arch transfer can individualize the position relationship between the maxilla and the bilateral condyle on the frame, simulate the functional movement of the upper and lower jaw, and reduce the amount of adjustment according to the complete denture made by it.Olthoff[19]thought that the face-bow transfer system can restore an optimal relationship, but the operation process is too time-consuming and troublesome.

## 2.2 Tooth Arrangement

At present, the common tooth arrangement theories of complete dentures include mechanical mechanics and neutral tooth arrangement[20].Mechanical tooth arrangement advocates that the artificial teeth should be arranged to the alveolar crest position, so that in the process of tooth functional movement, the resultant force acts on the lowest point, reduces the lateral force, and maintains the stability of the denture, but its position may affect the movement of the labial, buccal and lingual muscles and destroy the stability of the denture.According to the glossary of dental restoration terms[21], the neutral zone refers to the potential space between the buccal and lingual muscles in the mouth, in which the strength of the buccal and lingual muscles is balanced.Neutral zone tooth arrangement advocates that artificial teeth should be arranged in the position of natural teeth, when the oral and maxillofacial muscles and nerves are balanced to enhance the stability of dentures.Huifang Liu [22] found that when repairing edentulous alveolar ridge, it was found that the effect of alveolar crest arrangement was better than that of neutral zone, and the area of soft alveolar ridge was not significantly enlarged.Xiujie Fu et al[23] found that the neutral zone tooth arrangement method can achieve a good effect in the treatment of patients with severe alveolar ridge resorption.KhamisM[24] found that the width of the neutral zone was the smallest in the occlusal plane, and the width of the neutral zone increased with the increase of the occlusal vertical distance, and vice versa.According to the study of Fahmy and Kharat [25], the comfort and speech performance of neutral denture is better than that of mechanical denture, while mechanical denture shows better masticatory effect.In long-term edentulous patients, lingual lateral displacement may occur in the neutral area related to the alveolar crest, making it difficult to determine the position of the teeth[26].

## 2.3 The Positional Relationship between the Maxillary and Maxillary Arch

The position relationship of edentulous dental arch includes horizontal relationship and vertical relationship[1].The absorption direction of the edentulous maxilla is inward and backward, and the buccal and lingual bone absorption is similar in the mandibular canine and the first premolar area, and the buccal bone absorption is less than the lingual bone absorption behind the edentulous maxilla, and the labial bone absorption is larger than the lingual bone absorption in front[27].Mandibular alveolar bone height is an important factor affecting the stability of complete denture[28].When the occlusal force solves the alveolar ridge, if the height of the alveolar ridge in the anterior area is lower than that in the posterior area, the stability of the denture is poor. If the occlusal force deviates to the buccal side of the alveolar ridge, the displacement of the denture is increased and the stability is reduced. When the condition of alveolar ridge is poor, the stability of denture depends more on the height of alveolar ridge in premolar area [29].Choose the corresponding fit type according to the position relationship between the alveolar crest, make the tooth force close to the alveolar ridge top, and increase the stability of the denture[30].

## 2.4 The Shape of Polished Surface

The shape of the polished surface of the denture is the shape of the patient's neutral zone, and its good shape is conducive to the horizontal stability of the denture. Through functional plastic surgery, the complete denture can determine the shape of the polished surface of the base coordinated with the oral and maxillofacial muscle tissue, which can increase the muscle retention[31].The tissue regulator

was coated on the tissue surface of the temporary denture, and the patients adjusted themselves to get a functional impression that they felt comfortable and matched during the functional movement[3]. In clinic, the polished surface shape of the base of normal complete denture can not be obtained by impression technology, so it is necessary to develop new technology to get its shape. Cagna[32] pointed out that in the process of recording the patient's jaw position, we can use the plastic jaw material. During the active functional movement of the patient, including chewing, eating, laughing, swallowing and other movements, the jaw can achieve the shape of the polished surface of the base in accordance with the buccal and lingual muscle mucosa of the patient, and the complete denture made under the second condition can increase the stability of the denture.

## 2.5 Summary

In the process of making complete denture, its support, retention and stability complement each other and are indispensable. While achieving stability, it will also promote the support and retention of complete dentures. We need to obtain the correct jaw position relationship, reasonable tooth arrangement position, personalized occlusal type, ideal base polished surface shape and correct operation flow of complete denture through corresponding equipment, materials and technology. to obtain a pair of complete denture which accords with the patient's beauty and restores the patient's oral and maxillofacial function.

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