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Original Research Article.

Evaluation of the Acceptability of Acrylic Plate Maxillary Major Connector And Metal Plate Maxillary Major Connector in a Removable Partial Denture: A Comparative Study

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ABSTRACT

Background: Major connector is that part of the Removable partial denture to which all other structures of the denture are connected either directly or indirectly. Displacement of the denture is prevented by cross arch stabilisation by the major connector. It also provides support and rigidity to the denture by distribution of functional forces to all the structures, teeth and mucosa in case of maxillary denture.

Aim of the Study: To comparatively evaluate the acceptability of acrylic plate major connector and metal plate major connector in a removable partial denture.

Materials and Methods: For the study, we selected 20 patients reporting to the outpatient department of the department. Patients were randomly grouped into two groups, Group 1 and 2, each group having 10 patients each. The major connectors in study that is metal palatal plate and acrylic plate, both were fabricated. Patients of Group 1 were instructed to use denture with metal plate for first 10 days and denture with acrylic plate for next 10 days. In contrast to this, group 2 patients were instructed to use denture with acrylic plate for first 10 days and denture with metal plate for next 10 days. After completion of 20 days, both groups were asked to report to the department for follow up.

Results: The mean age of the patients in group 1 was 44.61 years and group 2 was 42.21 years. Difficulty in chewing was observed by 3 patients with metal plate and 2 patients with acrylic plate. Difficulty in swallowing was observed by 1 patient each with metal plate and acrylic plate. Difficulty in speaking was observed by 1 patient with metal plate and 5 patients with acrylic plate. Difficulty at rest was reported by 5 patients with metal plate and 4 patients with acrylic plate. The comparison between both groups with respect to difficulty in speaking was statistically significant.

Conclusion: Metal plate maxillary major connector is more acceptable as compared to acrylic plate maxillary major connector.

Keywords: Acrylic Plate, Major Connector, Maxillary, Metal Plate.

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INTRODUCTION

Major connector is that part of the Removable partial denture to which all other structures of the denture are connected either directly or indirectly. Displacement of the denture is prevented by cross arch stabilisation by the major connector. It also provides support and rigidity to the denture by distribution of functional forces to all the structures, teeth and mucosa in case of maxillary denture.[1,2] Additional function of a major connector is to provide indirect retention to the denture. Retention is provided by contact of major connector to guide surfaces and palatal mucosa in case of maxillary dentures. The choice of connector lies between a plate, a bar or a combination of bars, which may cross the palate in various positions. Plates usually offer more palatal coverage than bars.[3,4] Although there are controversies about what constitutes the dimensions of plates and bars in the upper arch, the difference is clear-cut in the lower arch. A maxillary major connector type which one investigator calls a broad bar may be referred to as a strap, that is, a modified palatal plate by another. Also, the choice of the shape and location of major connectors is greater in the upper jaw because of the larger area available for coverage offered by the hard palate.[5]

Though the relative advantages of metallic and acrylic resin dentures are well known, it is not clear which one will prefer. Several authorities have reported that acrylic resin may be preferred over the thinner metal base for aesthetic reasons.[6] It has also been documented that dentures made entirely in acrylic resin are used in situations where the life of the denture is expected to

be short or where alterations or relines will be needed. Furthermore, several studies have concluded that dentures made of heat-cured acrylic resin were the most retentive and thus the most preferred.[7] Hence, the present study was planned to comparatively evaluate the acceptability of acrylic plate major connector and metal plate major connector in a removable partial denture.

MATERIALS AND METHODS

The present study was conducted in the Department of Prosthodontics of the dental institution. The ethical clearance for the study was approved from the ethical committee of the institute. For the study, we selected 20 patients reporting to the outpatient department of the department.

Inclusion Criteria

- Patients with Kennedy class II edentulous ridge.
- Patients had no history of wearing denture before the study

Exclusion Criteria

- Patients with advanced periodontal conditions especially for abutment.
- The abutment teeth restored with crown or amalgam restoration below gingival level.

Patients were randomly grouped into two groups, Group 1 and 2, each group having 10 patients each. The major connectors in study that is metal palatal plate and acrylic plate, both were fabricated. Patients of Group 1 were instructed to use denture with metal plate for first 10 days and denture with acrylic plate for next 10 days. In contrast to this, group 2 patients were instructed to use denture with acrylic plate for first 10 days and denture with metal plate for next 10 days. After completion of 20 days, both groups were asked to report to the department for follow up. During follow-up visit, patients were given a questionnaire and asked to complete it.

The statistical analysis of the data was done using SPSS version 20.0 program for windows. Chi-square test and Student's t-test were used to check the statistical significance of the data. A p-value <0.05 was predefined to be statistically significant.

RESULTS

A total of 20 patients participated in the study. Patients were randomly grouped into Group 1 and 2. The number of patients in both groups were 10. The mean age of the patients in group 1 was 44.61 years and group 2 was 42.21 years. The number of male patients in Group 1 was 6 and in Group 2 was 7 [Table 1]. Table 2 shows various difficulties experienced by patients with metal plate and acrylic plate. Difficulty in chewing was observed by 3 patients with metal plate and 2 patients with acrylic plate. Difficulty in swallowing was observed by 1 patient each with metal plate and acrylic plate. Difficulty in speaking was observed by 1 patient with metal plate and 5 patients with acrylic plate. Difficulty at rest was reported by 5 patients with metal plate and 4 patients with acrylic plate. The comparison between both groups with respect to difficulty in speaking was statistically significant. The comparison of other variables was non-significant.

Table 1: Demographic data of the patients of both the groups

Variables	Group 1	Group 2
No. of patients	10	10
Mean age (years)	44.61	42.21
Male/ female	6/4	7/3

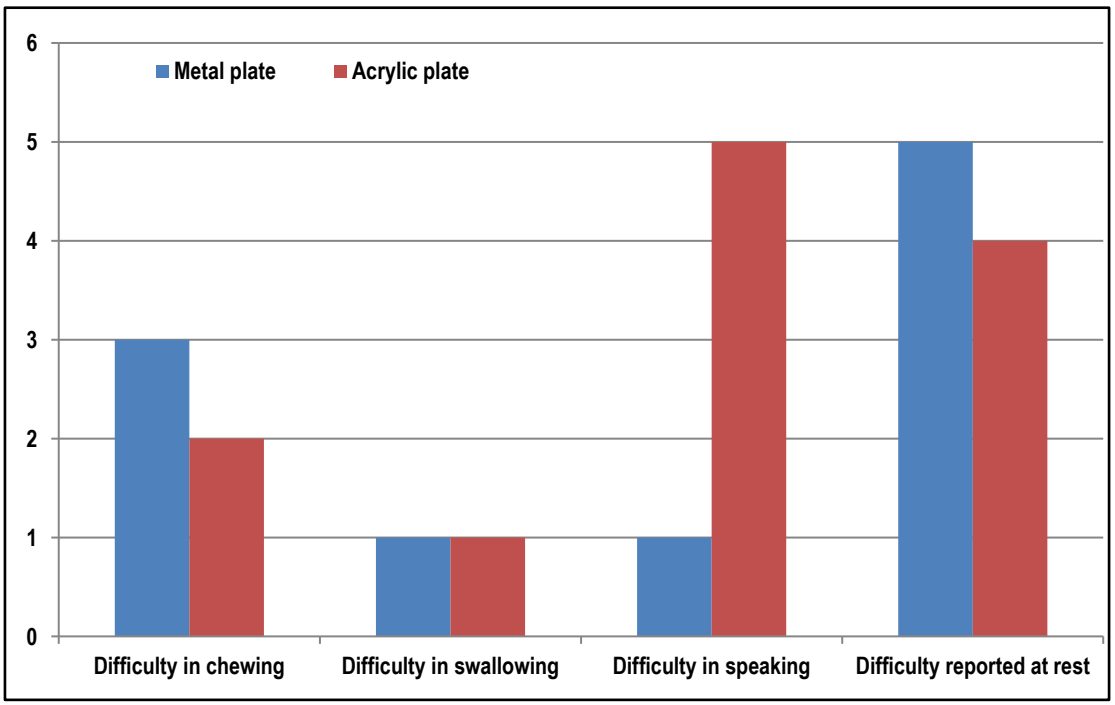

Fig 1: Showing various difficulties experienced by patients with metal plate and acrylic plate

Table 2: Various difficulties experienced by patients with metal plate and acrylic plate

Difficulties experienced by patients	No. of patients		p-value
	Metal plate	Acrylic plate	
Difficulty in chewing	3	2	0.7
Difficulty in swallowing	1	1	0.2
Difficulty in speaking	1	5	0.02**
Difficulty reported at rest	5	4	0.4

** Significant (p<0.05)

DISCUSSION

In the present study, we comparatively evaluated the patient acceptance of metal plate maxillary major connector and acrylic maxillary major connector. We observed that in case of most of the variables, the number of patients who reported the difficulties while using the major connectors were comparable for both the groups except for difficulty in speaking. The results demonstrated that difficulty in speaking was observed by more number of patients using acrylic plate major connector. Similar studies were conducted by other authors also and the results are consistent to the present study. Can G et al conducted a study to evaluate major connector designs for mandibular removable partial dentures. In the study, two mandibular removable partial dentures, one with a lingual bar and the other with a lingual plate as the major connector were constructed for 7 men and 9 women patients who had mandibular Kennedy class I edentulous area. Patients used each type of prosthesis for one month. At the end of this period, speaking, chewing and comfort of partial dentures were evaluated according to the patient's subjective impression. In general, patients adapted best to major connectors that covered soft tissues least were better. As a result, generally patients preferred lingual bar type denture. Pienkos TE et al performed a research to determine the minimum major connector dimensions of 1 mandibular and 2 maxillary major connectors that would provide adequate functional strength. Sixty chromium-cobalt alloy (Vitallium) RDP frameworks were fabricated. The major connector designs were: a mandibular lingual bar, a maxillary palatal strap, and a maxillary anterior-posterior (A-P) palatal strap. Four groups of 5 frameworks with diminishing dimensions were fabricated for each major connector design. The lingual bar was tested at 4, 3, 2.5, and 2 mm in height, occlusogingivally, and 1.6 mm in thickness; the palatal strap at 8, 6, 4, and 2 mm, anteroposteriorly; and the A-P palatal strap at 10 x 6, 8 x 4, 6 x 2.5, and 4 x 2 mm, anteroposteriorly. All maxillary frameworks were 0.65 mm in thickness. The frameworks were of a Kennedy Class II Mod I design with 3 widely separated vertical reference points to measure deformation. Two tests were conducted to evaluate the functional strength for each framework. The first test was masticatory simulation, or torsional force. The second test was a drop test from a height of 3 feet. Permanent deformation was then determined after each test. A statistically significant difference in permanent deformation was found for the palatal strap design among the 4 different dimensions for the compressive test and the drop test. The authors concluded that it is safe to reduce the dimensions of some major connectors under normal loads. The reduced size of the connectors places the removable partial denture at increased risk for deformation when dropped from a height.[8,9] Ozkan P et al investigated the deformation of four major connectors for maxillary Kennedy Class I removable partial dentures. The designs were palatal plate, U-shaped plate, palatal strap, and anteroposterior bar. The deformation properties of major connectors were comparatively analyzed by two methods. In the photogrammetric part, a stereometric camera, Avipan-100 glass films, and an analytic apparatus were used. A computerized hydraulic machine was programmed to load the eight test dentures at 4-Hz frequency under a vertical load of 100 kg and a maximum of 300,000 cycles. The fluorescence penetrant liquid inspection test was used to detect the surface microcracks. The anteroposterior bar showed the least deformation. The other connectors, ranked in increasing order for the amount of deformation, were the U-shaped plate, the palatal strap, and the palatal plate. There were no microcracks in the U-shaped plate and the anteroposterior bar designs. The authors concluded that anteroposterior bar major connectors showed the least deformation among the maxillary major connector types tested. Microscopic cracks were seen in major connectors showing the highest degree of deformation and located at the depth of the hard palate. Ben-Ur Z et al investigated which design and cross-sectional shape of major connectors most favourably influenced rigidity and flexibility. Five designs for maxillary removable partial denture major connectors and 5 lingual bar major connectors of different cross-sectional forms were cast in chrome cobalt alloy on a master cast. Points M and P, which represented the position of the first premolar and second molar teeth were positioned 20 mm apart on the casting. Vertical and horizontal forces were applied to each point while the opposite side was gripped in an Instron testing machine. A force-deflection curve was obtained for each loading point. Mean stiffness values were obtained for loading in compression and torsion. Values for torsional loading simulating vertical forces were lower when compared with values obtained for compression loading that simulated horizontal occlusal forces. Differences in stiffness were greater in mandibular major connectors loaded at M and P. The half pear-shaped cross section was the stiffest. The authors concluded that in the maxillary arch, the most rigid major connector was the anteroposterior palatal bar combination placed on different horizontal and vertical planes. The most flexible was the U-shaped design. In the mandibular arch, the most important factor in achieving rigidity was the cross-sectional shape of the major connector. The half pear-shaped cross section proved to be the most rigid.[10,11]

CONCLUSION

From the above results, we conclude that metal plate maxillary major connector is more acceptable as compared to acrylic plate maxillary major connector.

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