

Subjective assessment of lingual bar and plate as major connectors in removable partial dentures

Subiektywna ocena językowego łuku i płyty jako głównych łączników w częściowych protezach ruchomych

Tunde Joshua Ogunrinde¹, Oluwole Olukunle Dosumu¹,
Olufemi Peter Shaba²

¹ Department of Restorative Dentistry, University of Ibadan / University College Hospital, Ibadan, Nigeria
Zakład Stomatologii Zachowawczej, Uniwersytet w Ibadan / Szpital Uniwersytecki, Ibadan, Nigeria
Head: Prof. I.F. Adewole / Prof. T. Alonge

² Department of Restorative Dentistry, Faculty of Dental Sciences, University of Lagos, Nigeria
Zakład Stomatologii Zachowawczej, Wydział Stomatologiczny, Uniwersytet w Lagos, Nigeria
Head: Prof. G.T. Arotiba

Abstract

Introduction. Removable partial denture (RPD) is the most common option for replacing missing teeth in Nigeria principally because of the relatively low cost. Although there is a huge bulk of literature about the design of RPDs, only few studies paid attention to the patient's subjective reaction to dentures with different connector designs. **Aim of the study.** To assess the subjective reaction of patients in a Nigerian teaching hospital to the wearing of RPDs with lingual bar and plate major connectors. **Material and method.** Fifteen patients with mandibular partially edentulous arches aged 28 to 60 years participated in the study. Two metal dentures with different connector designs (lingual plate and lingual bar) were fabricated for each patient and each denture was worn for two weeks. The patients were then recalled and assessed subjectively using a structured questionnaire that asked about the dentures interference with speech, mastication, swallowing and at rest. **Results.** Majority of the patients reported that the denture with lingual bar interfered less with speech (73.33%), mastication (40%) and at rest (40%). **Conclusion.** The result of this study showed that denture with lingual bar was subjectively more acceptable than denture with plate among the studied population.

Streszczenie

Wstęp. Częściowa proteza ruchoma jest najczęściej wybieraną opcją do zastąpienia brakującego uzębienia w Nigerii, głównie z powodu stosunkowo niskiej ceny. Pomimo ogromu literatury fachowej o konstrukcjach takich protez, zaledwie kilka badań skupiło się na subiektywnej reakcji pacjenta na protezy z różnymi kształtami łączników. **Cel pracy.** Ocena subiektywnej reakcji pacjentów w nigeryjskim szpitalu klinicznym na noszenie protez częściowych z łukiem lub płytą językową jako głównymi łącznikami. **Materiał i metoda.** Piętnastu pacjentów z częściowym bezzębiem żuchwy w wieku od 28 do 60 lat wzięło udział w badaniu. Dwa typy protez z różnymi łącznikami (łuk i płyta językowa) zostały przygotowane dla każdego pacjenta i każda proteza była noszona przez dwa tygodnie. Po tym okresie poproszono pacjentów o ich subiektywną ocenę za pomocą kwestionariusza, który weryfikował wpływ protezy na mowę, żucie, połykanie i podczas braku aktywności. **Wyniki.** Większość pacjentów zgłaszała, że proteza z łukiem językowym w mniejszym stopniu zaburzała mowę (73,33%), żucie (40%) i okres spoczynku (40%). **Wniosek.** Badanie dowiodło, że w danej populacji proteza z łukiem językowym była subiektywnie bardziej akceptowalna niż proteza z płytą.

KEYWORDS:

subjective reactions, major connectors, Removable Partial Denture

HASŁA INDEKSOWE:

reakcje subiektywne, łączniki główne, częściowe protezy ruchome

Introduction

Removable partial denture (RPD) is the most common option of tooth replacement in Nigeria because of the relatively low cost, none invasiveness and reversibility of the option. A very important component of mandibular RPD is the major connector which are usually designed as lingual plate or bar.¹ A lingual plate major connector covers part of the lingual surface of the teeth and the periodontium while the lingual bar leaves the teeth and periodontium free.² Other types of mandibular major connector are cingulum bar, labial bar and *Kennedy* connector.^{2,3}

While there is a huge bulk of literature³⁻⁶ about the design of removable partial denture, only few studies paid attention to the patient's subjective assessment of the design features. A study by *Campbell*⁷ among the Western population showed that the lingual bar denture was subjectively preferred to lingual plate denture by a 3:1 ratio, and this was supported by *Can* and *Ozmen* finding that patients preferred mandibular major connector that covers less tissue surface.⁸ However, *Hansen* and *Campbell*⁹ reported a predominant preference (80%) for lingual plate dentures when compared with dentures with sublingual bar major connectors.

At the commencement of this study, no literature was cited on subjective reactions to the effect of major connector design on mandibular RPDs from Nigeria. As much as it is necessary to follow meticulous design principles in construction of removable partial dentures, the importance of patient acceptance of the prosthesis can not be ignored. This study was therefore, designed to assess patients' subjective reactions to the wearing of removable partial dentures with lingual bar and plate major connectors.

Patients and method

This prospective clinical study was conducted at the prosthetic out-patient clinic of a Nigerian teaching Hospital. Ethical approval was obtained from the combined University/teaching Hospital ethical review committee and written consent to examine and carry out the study was obtained

from each participating patient before the commencement of the study.

Fifteen patients excluding three patients that dropped out after the try-in of the metal frame-work participated fully in the study. These consisted of consecutive patients with partially edentulous mandibular arches that had never worn denture and consented to participate.

After a thorough explanation of the study to the patients, each patient was randomly assigned to a group (group A or B). The patients in both groups had scaling and polishing of the teeth and two dentures with a different connector design; lingual plate and lingual bar were fabricated for each patient. Post delivery instructions were given verbally and in writing at point of insertion of the dentures. Dentures with lingual bars were fitted and worn for the first two weeks by patients in group A. The patients were then recalled and the dentures with lingual plate fitted and worn for the next two weeks, while those in-group B used the dentures with metal plate for the first two weeks then the dentures with lingual bar for the next two weeks. However, within the two weeks of wearing each denture, each patient was reviewed after 24 hours, then after three days and adjustment made on the denture when necessary.

The patients were recalled after using each denture for two weeks and a self-administered questionnaire adapted from a previous study¹⁰ was administered for the subjective assessment of the dentures. The questionnaire asked the patients to indicate if any of the dentures interfered with speech, mastication, swallowing or disturbed at rest. It also assesses which of the dentures interfered less if there were interferences. In addition, the demographic data of each patient was recorded in the questionnaire.

Data analysis was done using the Statistical Packages of Social Sciences (SPSS) version 16. Analysis included calculation of percentage, range and mean values. Chi-square was used to test for relationship between patient gender, age, and dentures interference with oral functions such as speech, mastication and swallowing. Level of significance was set at $p \leq 0.05$.

Table 1. Patients' subjective assessment of dentures interfering with oral functions

Question	Yes	No	Not sure	Total
Did any of the connectors interfered with speech?	13 (86.7%)	2 (13.3%)	0 (0%)	15 (100%)
Did any of the connectors interfered with chewing?	8 (53.3%)	7 (46.7%)	0 (0%)	15 (100%)
Did any of the connectors interfered with swallowing	0 (0%)	15 (100%)	0 (0%)	15 (100%)
Did any of the connectors interfered with rest?	8(53.3%)	6(40%)	1(6.7%)	15(100%)

Table 2. Subjective assessment of dentures that interfered less with oral functions

Question	Lingual bar	Lingual plate	None/ Not sure	Total	P value
Which of the connectors interfered less with speech?	11 (73.3%)	2 (13.3%)	2 (13.3%)	15 (100%)	
Which of the connectors interfered less with mastication?	6 (40%)	2 (13.3%)	7 (46.7%)	15 (100)	
Which of the connectors interfered less with swallowing?	0 (0%)	0 (0%)	15 (100%)	15 (100)	
Which of the connectors interfered less at rest?	6 (40%)	2 (13.3%)	7 (46.7%)	15 (100)	

Table 3. Relationship between gender and denture interference with oral functions

Question	Gender	Lingual bar	Lingual plate	None or not sure	Total	P Value
Which of the connectors interfered less with speech?	Male	6 (85.7%)	0 (0%)	1 (14.3%)	7 (100%q)	0.362
	Female	5 (62.5%)	2 (25%)	1 (12.5%)	8 (100%)	
Which of the connectors interfered less with mastication	Male	4 (57.1%)	0 (0%)	3 (42.9%)	7 (100%)	0.352
	Female	3 (37.5%)	2 (25%)	3 (37.5%)	8 (100%)	
Which of the connectors interfered less at rest?	Male	3 (42.9%)	0 (0%)	4 (57.1%)	7 (100%)	0.352
	Female	3 (37.5%)	2 (25%)	3 (37.5%)	8 (100%)	

Results

Fifteen patients participated fully in the study, seven males and eight females. The age range of the study group was 28 to 60 years. The mean age was 41.2 years with a standard deviation of 10.4 years.

Majority of the patients reported that both dentures interfered with speech (86.7%), chewing (53.3%) and were not comfortable at rest (53.3%). All the patients however, claimed there was no

interference with swallowing with both dentures (Table 1).

Majority of the patients reported that the denture with lingual bar major connector interfered less with speech (73.3%), chewing (40%) and cause less discomfort at rest (40%), while only few patients stated that denture with lingual plate interfered less with speech (13.3%), chewing (13.3%) and less discomfort at rest (13.3%) (Table 2). However, there was no statistical significant difference

Table 4. Relationship between age and denture interference with oral functions

Question	Age group	Lingual bar	Lingual plate	None or not sure	Total	P Value
Which of the connectors interfered less with speech?	≤ 40 years	9 (100%)	0 (0%)	0 (0%)	9 (100%)	0.017
	≥ 40 years	2 (33.3%)	2 (33.3%)	2 (33.3%)	6 (100%)	
Which of the connectors interfered less with mastication	≤ 40 years	6 (66.7%)	1 (11.1%)	2 (22.2%)	9 (100%)	0.150
	≥ 40 years	1 (16.7%)	1 (16.7%)	4 (66.7%)	6 (100%)	
Which of the connectors interfered less with rest?	≤ 40 years	3 (42.9%)	0 (0%)	4 (57.1%)	7 (100%)	0.316
	≥ 40 years	3 (37.5%)	2 (25%)	3 (37.5%)	8 (100%)	

Table 5. Relationship between gender, age group and patients' preferred denture

Gender/Age group	Which of the dentures do you preferred?			P Value
	Lingual bar	Lingual plate	Total	
Male	6 (85.7%)	1 (14.30%)	7 (100%)	0.919
Female	7 (87.5%)	1 (12.5%)	8 (100%)	
≤ 40 years	9 (100%)	0 (0%)	9 (100%)	0.063
≥ 40 years	4 (66.7%)	2 (33.3%)	6 (100%)	

in patients reaction to the lingual bar and plate dentures concerning interference to oral functions (p= 0.363).

Majority of the male and female participants reported less interference with lingual bar dentures during speech (85.7% and 62.5%), mastication (57.1% and 37.5%), and at rest (42.9% and 37.5%). However, there were no significant differences between gender and report of less interference by lingual bar and plate dentures during speech, mastication and at rest (p = 0.362, p = 0.352, and p = 0.352 respectively) (Table 3).

Table 4 shows that all the respondents aged ≤ 40 years reported that the lingual bar interfered less with speech and there was a significant differences between age group and report of less interference by lingual bar denture during speech (p = 0.017). However there were no significant relationship between age group and report of less interference

by lingual bar denture during mastication and at rest (p= 0.150 and 0.316 respectively).

All the patients aged ≤ 40 years (100%) preferred lingual bar dentures to lingual plate while 4 out of 6 patients aged >40 years preferred lingual bar dentures. However there was no statistical significant relationship between age and preference for mandibular major connectors (p = 0.063). Also there was no statistical significant relationship between gender and preference for mandibular major connector (p = 0.919) (Table 5).

Discussion

In this study, greater proportion of the patients 11 (73.3%) stated that the denture with lingual bar interfered less with speaking. The reason for more speech alteration with the lingual plate may be due to wide coverage of the lingual tissues by

the plate compared to lingual bar. These findings agree with the report of previous studies^{8,11} that mandibular major connector that covers less area will cause less speech disturbance. Contrary to the finding in this study, *Campbell*⁷ in his subjective assessment of patient after insertion of upper and lower dentures reported little or no effect on speech intelligibility by variation in mandibular connector design. However, he noted speech alteration in maxillary major connector that covers the anterior palatal region.

Eight (53.3%) patients in this study stated that the dentures interfered with chewing, and six (40%) out of the eight patients reported less interference with lingual bar when compared with the lingual plate denture. The more interference by the lingual plate denture with chewing observed in this study may be due to food collection associated with lingual plate denture. *Campbell*⁷ stated that collection of food debris around and under the denture framework was considered as interference with chewing by some patients, thus a major connector that collects less food debris during this activity may be regarded as less disturbing. Possible interference from the occlusal rest design, bracing arm of occlusally approaching clasp and artificial teeth were critically considered and removed during insertion of the removable partial dentures.

There was no interference with swallowing from any of the dentures in this study. This is in agreement with *Campbell*'s findings that mandibular major connectors had little or no effect on swallowing.⁷ *Wagner* and *Traweek*¹⁰ however observed that some of their subjects with mandibular major connectors experienced interference with swallowing and majority of these patients described lingual bar as having least effect on swallowing.

Furthermore, eight (53%) of the patients indicated that the mandibular major connectors disturbed while at rest, however, 6 (40%) of the

patients described the denture with metal bar connector as the least disturbing during normal rest. This result is similar to a previous study¹⁰ in which majority of their patients experience the least interference during rest with the lingual bar denture.

Thirteen (86.7%) patients treated in this study preferred a denture with lingual bar while two (13.3%) preferred the denture with lingual plate. Several authors,^{7,8,12} have reported the high acceptability of lingual bar major connector. *Levere* and *Krol*¹² discussed the use of the mandibular lingual bar as the connector of choice for patients with partial edentulous mandibular arch. *Wagner* et al¹⁰ and *Campbell*⁷ found that comfort in swallowing, speech, mastication or at rest for the patient was increased with lingual bar major connector denture.

There was a statistically significant relationship between age group and denture interference with speech, the younger age group indicating that the lingual bar interfere less with speech. This may be due to the fact that the younger age group is more concern with the articulation of speech than the older age group.

As for the weakness of this study, the short-term assessment with few subjects might raise a question on the outcome as an indication for a longer period of usage and general preference for removable partial denture. A long term study among larger population might help to overcome the limitation; however, such study will be costly and less visible because of poor compliance with review appointments among patients in this environment.

Conclusion

This study showed that lingual bar major connector was subjectively more acceptable than the lingual plate. Majority of the patients reacted more favourably to the lingual bar than to the lingual plate.

References

1. *Henderson D, Gainessville F*: Major connectors for mandibular removable partial dentures: Design and function. *J Prosthet Dent* 1973; 30: 532-548.
2. *MacGregor AR*: Fenn, Liddelow and Gimson clinical dental prosthetics. 3rd ed. London. Butterworths. 1982; 218-222.
3. *Miller EL, Grasso JE*: Removable partial prosthodontics 1st ed. Baltimore. The Williams and Wilkins Co. 1972; 171-189.
4. *Laird WRE, Lammie GA*: Osborne and Lammie's partial denture. 5th ed. London Blackwell Scientist publication. 1986; 51-72 and 273-278.
5. *Davenport JC, Basker RM, Health JR, Ralph JP, Glantz PO*: Connectors. *Br Dent J* 2001; 190: 184-191.
6. *Walter JD*: Partial denture technique; 5-Connectors. *Br Dent J* 1980; 148: 133-136.
7. *Campbell LD*: Subjective reactions to major connector design for removable partial dentures. *J Prosthet Dent* 1973; 37: 507-510.
8. *Can G, Ozmen G*: Subjective evaluation of major connector designs for mandibular removable partial dentures. *Ankara Univ Hekin fak Derg* 1989; 16: 59-63.
9. *Hansen CA, Campbell DJ*: Clinical comparison of two mandibular major connector designs: the sublingual bar and the lingual plate. *J Prosthet Dent* 1985; 54: 805-809.
10. *Wagner A.G, Traweek FC*: Comparison of major connectors for removable partial dentures. *J Prosthet Dent* 1982; 47: 242-245.
11. *Bond EK, Lawson WA*: Speech and its relation to dentistry I. Speech and speech defects. *Dent Pract Dent Rec* 1986; 19: 75-82.
12. *Lavere MA, Krol JA*: Selection of a major connector for the distal extension bases removable partial denture. *Br Dent J* 1973; 30: 102-114.

Address: University of Ibadan/University College Hospital,
Queen Elizabeth road, Oritamefa, Ibadan
Tel.: 08174607569, 08174608018
e-mail: tunde_ogunrinde2001@yahoo.com

Received: 27th February 2015

Accepted: 1st May 2015