

Partial edentulism and treatment options

Parsiyel dişsizlik ve tedavi seçenekleri

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SUMMARY

Aim: The purpose of this study was to determine the prevalence of various types of partial edentulism, and type of prosthetic restorations most commonly chosen to treat the patients.

Materials and Methods: A retrospective evaluation was conducted in Department of Prosthodontics, Dental School of Yeditepe, Turkey, by examining the digital record system of the faculty. The patients were selected randomized and the inclusion criteria were; patients who had partial edentulism at least on their one jaw, who had panoramic radiographs, whose treatment had been finished, and who had no treatment. Age, gender, Kennedy classification and treatment options were recorded. Descriptive statistical methods and Chi-square test were used to analyze data. An alpha level of 0.05 was used for all statistical analyses.

Results: There were 345 patients (147 males, 198 females) with the mean age of 50.88 ± 14.09 years. Kennedy III was the most common in the maxilla (71.1%) and in the mandible (55.9%). Partial edentulism was most frequently managed by fixed partial dentures in the maxilla (57.9%) and in the mandible (41.7%). Implant treatment was applied to 13-14% of the patients.

Conclusions: Dental implants were the least common treatment option for partial edentulism. Fixed partial dentures were the most common treatment for Kennedy III and IV, whereas removable partial dentures were the most common for Kennedy I and II.

Key words: Partial edentulism, classification, treatment option, prevalence, implant.

ÖZET

Amaç: Bu çalışmanın amacı, farklı kısmi dişsizlik tiplerinin belirlenmesi ve bu dişsizliklerin protetik tedavi seçeneklerinin incelenmesidir.

Gereç ve Yöntem: Yeditepe Üniversitesi Dişhekimliği Fakültesi Protetik Diş Tedavisi Anabilim Dalı'nda, dijital kayıt sistemi incelenerek retrospektif bir değerlendirme yapıldı.

Hastalar kayıt sisteminden randomize olarak seçildi ve çalışmaya şu kriterlere göre dahil edildi; en az bir çenesinde kısmi dişsizliğe sahip olmak, panoramik radyografi çekirmiş olmak, protetik tedavisi tamamlanmış ya da tedavi yaptırmadan ayrılmış olmak. Hastaların yaşı, cinsiyeti, kısmi dişsizlik (Kennedy) sınıflaması ve tedavi seçenekleri kaydedildi. Elde edilen verilerin istatistiksel analizinde tanımlayıcı yöntemler ve Ki-Kare testi kullanıldı. Anlamlılık $p < 0,05$ düzeyinde değerlendirildi.

Bulgular: Çalışmaya yaş ortalaması $50,88 \pm 14,09$ olan 345 hasta (147 erkek, 198 kadın) dahil edildi. Kennedy III dişsizliğin, üst çenede (%71,1) ve alt çenede (%55,9) en sık görülen dişsizlik tipi olduğu belirlendi. Kısmi dişsizliğin üst çenede (%57,9) ve alt çenede (%41,7) sıklıkla sabit protezlerle tedavi edildiği gözlemlendi. Hastaların yalnızca %13-14'üne im-

plant tedavisi uygulandı.

Sonuç: Dental implantlar, kısmi dişsizlikte en az tercih edilen tedavi seçeneğiydi. Sabit protezler Kennedy III ve IV için en yaygın tedavi yöntemi iken, hareketli bölümlü protezler Kennedy I ve II için en yaygın tedavi seçeneğiydi.

Anahtar kelimeler: Kısmi dişsizlik, sınıflama, tedavi seçeneği, sıklık, implant.

INTRODUCTION

Tooth loss caused by recurrent caries, traumatic incidents, certain congenital anomalies, endodontic complications, or periodontal diseases may result in the reduced masticatory efficiency and esthetics.¹ Prosthodontic rehabilitation is indicated to restore function, esthetics and phonetics, and to replace missing teeth.² Among the prosthetic options for partial edentulism, missing teeth and supporting oral tissues are replaced with fixed partial dentures (FPDs), removable partial dentures (RPDs), overdentures, and implant prosthesis.^{3,4} Any tooth replacement should be performed by a detailed evaluation of the existing dental situation and functional condition of the patient. Besides, the risks, benefits and costs of the selected treatment modality should be discussed with the patients.⁵

There are many partial edentulism classification methods, however, Kennedy's classification is the most widely accepted method to classify the partially edentulous arches.^{6,7} There are four main types in Kennedy classification; Class I (bilateral edentulous areas located posterior to the remaining natural teeth), Class II (a unilateral edentulous area located posterior to the remaining natural teeth), Class III (a unilateral edentulous area with natural teeth remaining both anterior and posterior to it), and Class IV (a single bilateral edentulous area located anterior to the remaining natural teeth).⁸⁻¹⁰

The frequency of various classes of partial edentulism and restoration types may reflect the aspects of the population on dental health prioritizations.⁶ Although several studies have been performed in different parts of the world on the prevalence of various classes of partial edentulism, classes of RPDs, and/or restoration types,^{3,6,7,9,11-13} there are no data available on both frequency of Kennedy classification and their treatment options in a subpopulation in Turkey. Therefore, the aim of this study was (i) to investigate the prevalence of partial edentulism classes, and (ii) to identify the prosthetic treatment options, such as overdenture, removable partial denture, fixed partial denture, implant or no restoration, for patients attending the Yeditepe University Faculty of Dentistry, Istanbul, Turkey.

MATERIALS AND METHODS

This retrospective evaluation was conducted in a Turkish subpopulation, consisting of a sample of patients attending to Department of Prosthodontics, Faculty of Dentistry, Yeditepe University, Istanbul, Turkey from January 2008 to December 2010. The retrospective evaluation was performed by examining the digital record system of the faculty which involved all patient files. The laboratory record system of the prosthetic department was also evaluated. The patients were selected randomized and the inclusion criteria were; patients who had partial edentulism at least on their one jaw, who had panoramic radiographs, whose treatment had been finished, and who had no treatment. Age, gender, Kennedy classification, treatment options and treatment clinic type were recorded. Third molar teeth were not included to the classification. SPSS for Windows 15.0 (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis. Descriptive statistical methods and Chi-square test were used to analyze data. An alpha level of 0.05 was used for all statistical analyses.

RESULTS

There were 345 patients (147 males, 198 females) with the mean age of 50.88 ± 14.09 years. The patients were treated in undergraduate student clinic (38.8%), postgraduate student clinic (9%) and specialist clinic (45.2%). Seven percent of patients had no treatment. There were 690 jaws; 41 were edentulous, 122 were fully dentate and 527 were partially edentulous. The most frequent type of partial edentulism was Kennedy III, in both the maxilla (71.1%) and the mandible (55.8%). Kennedy IV was the least prevalent type (2.8% in the maxilla, 0.7% in the mandible) (Table 1).

Table 1: Distribution of Kennedy classification

Arches	KI	KII	KIII	KIV	Total
Maxilla	25 (10.1%)	39 (15.8%)	175 (71.1%)	7 (2.8%)	246
Mandible	66 (23.4%)	56 (19.9%)	157 (55.8%)	2 (0.7%)	281
Total	91	95	332	9	527

Table 2 shows the distribution of prosthetic treatment type according to Kennedy classification in maxilla. RPDs were more prevalent in Kennedy I and II patients (68% and 51.3%, respectively), while FPDs were more prevalent in Kennedy III and IV patients (76% and 57%, respectively).

Table 2: Distribution of treatment type according to Kennedy classification in maxilla

	FPD	RPD	Implant	No treatment	Total
KI	0	17 (68%)	58 (20%)	3 (12%)	25
KII	6 (15.4%)	20 (51.3%)	10 (25.6%)	3 (7.7%)	39
KIII	133 (76%)	6 (3.4%)	19 (10.9%)	17 (9.7%)	175
KIV	4 (57%)	1 (14.5%)	2 (28.5%)	0	7

Table 3 shows the distribution of prosthetic treatment type according to Kennedy classification in mandible. RPDs were more prevalent in Kennedy I and II patients (80.5% and 44.7%, respectively), while FPDs were more prevalent in Kennedy III patients (69.4%).

Table 3: Distribution of treatment type according to Kennedy classification in mandible

Maxilla								
	Age groups						Gender	
	20-29	30-39	40-49	50-59	60-69	70+	Male	Female
KI	0	1(4%)	2(8%)	6(24%)	14(56%)	2(8%)	8(32%)	17(68%)
KII	0	1(2.6%)	9(23%)	10(25.6%)	12(30.8%)	7(18%)	14(36%)	25(64%)
KIII	11(6.3%)	42(24%)	44(25.2%)	49(28%)	23(13.2%)	6(3.3%)	76(43.5%)	99(56.5%)
KIV	1(14.3%)	0	3(42.9%)	2(28.5%)	0	1(14.3%)	3(42.9%)	4(57.1%)
p	0.001**						0.700	

Chi-square test ** p<0.01

Only 1 overdenture was constructed in a Kennedy I class in mandible.

According to Table 4, a significant difference was found between the age groups and Kennedy classifications in maxilla (p<0.01).

Table 4: The effect of age and gender on Kennedy classification in maxilla

Maxilla								
	Age groups						Gender	
	20-29	30-39	40-49	50-59	60-69	70+	Male	Female
KI	0	1(4%)	2(8%)	6(24%)	14(56%)	2(8%)	8(32%)	17(68%)
KII	0	1(2.6%)	9(23%)	10(25.6%)	12(30.8%)	7(18%)	14(36%)	25(64%)
KIII	11(6.3%)	42(24%)	44(25.2%)	49(28%)	23(13.2%)	6(3.3%)	76(43.5%)	99(56.5%)
KIV	1(14.3%)	0	3(42.9%)	2(28.5%)	0	1(14.3%)	3(42.9%)	4(57.1%)
p	0.001**						0.700	

Chi-square test ** p<0.01

Kennedy I was the most prevalent type in 60-69 age groups (56%). However, there was no significant difference between the gender and Kennedy classifications. There was a significant difference between the age groups, gender and Kennedy classifications in mandible (Table 5). Females had more Kennedy II jaws than males (p<0.05).

Table 5: The effect of age and gender on Kennedy classification in mandible

Mandible								
	Age groups						Gender	
	20-29	30-39	40-49	50-59	60-69	70+	Male	Female
KI	0	2(3%)	9(13.7%)	22(33.3%)	23(34.8%)	10(15.2%)	29(44%)	37(56%)
KII	2(3.5%)	7(12.5%)	11(19.7%)	13(23.2%)	12(21.4%)	11(19.7%)	15(27%)	41(73%)
KIII	8(5%)	41(26.2%)	51(32.6%)	34(21.6%)	17(10.8%)	6(3.8%)	69(44%)	88(56%)
KIV	0	0	0	0	1(50%)	1(50%)	2(100%)	0
p	0.001**						0.021*	

Chi-square test ** p<0.01 * p<0.05

DISCUSSION

The aim of this epidemiological study was to evaluate the types of partial edentulism and to determine the prosthetic rehabilitation of each type in a group of patients in Istanbul between 2008 and 2010. Kennedy classification which is the most widely used system was preferred to fulfill this purpose.¹⁴ This is a logical method of classification that permits the immediate visualization of the partially edentulous arches.⁸ In this study, the classifications were recorded after the other dental treatments such as periodontal, endodontic and surgical treatments were completed, just before the prosthetic stage. Patients whose prosthetic treatments had been finished or who had no any prosthetic treatment were recorded. According to results, the most frequent type of partial edentulism was Kennedy III, and the least prevalent type was Kennedy IV in both the maxilla and the mandible. This observation can be explained by lower extraction rate in anterior teeth probably because they are relatively resistant to caries, more accessible for complicated endodontic and restorative treatments, and their extraction may be delayed due to esthetic reasons.¹⁵ This was also true for the studies from other countries such as Jordan, Nigeria, Saudi Arabia and Kazakhstan.^{3,11-13} However, this result was in contrast to studies conducted in Turkey,⁹ Greece⁷ and USA,⁶ which reported that Kennedy I and II were the most prevalent type of edentulism. The prevalence of partial edentulism varies in different countries or regions, related to differences in socioeconomic status, educational levels, and patient perspectives toward dental health.³ In the present study, it can be clearly observed that RPDs were more common than the other treatment options in Kennedy I and II jaws for both maxilla and mandible. Distal-extension RPD (Kennedy I and II) has the advantage of being less expensive, less complicated and reversible.⁵ However, they may be associated with several problems related to poor stability, poor retention, esthetics, masticatory efficiency, low patient satisfaction and low oral comfort.¹⁶⁻²⁰ The main problems of RPDs are caries, resorption of the residual alveolar ridge and inflammation of the underlying mucosa, probably because of its dual-support system with different resilience.²¹ Dental implants may be an alternative treatment to RPDs.²²⁻²⁴ In this study, dental implants were less common treatment option for Kennedy I and II in both maxilla and mandible (15-20% and 25-26%, respectively). This result is in accordance with the study performed in Kazakhstan, in which dental implants were the least common treatment choice.³ The reasons for such a result may be the high cost, long treatment period, insufficient anatomical conditions and necessity of additional surgical procedures, patients' attitudes toward their dental health, or dentists' preferences. In addition, implant therapy is not financially supported by dental in-

insurance in Turkey.²⁵ These factors may hinder patients to select implant treatment.

FPDs were the most (57%) and RPDs were the least common treatment option for Kennedy IV jaws in maxilla (14.5%). This result is in contrast to a study performed in Kazakhstan, in which the RPDs were the most common treatment choice (75%).³ Patients in this study may have less tooth missing, enable to restore edentulous spaces with FPDs. In addition, FPDs were the most common treatment option for Kennedy III jaws in maxilla (76%), and this result is in accordance with the same study, in which the FPDs were the most common treatment choice (87.5%).³ FPDs supported by natural teeth provide stable occlusal conditions, high retention and better patient comfort when compared with RPDs.⁵

In cases with only one or more molar teeth missing in Kennedy II cases, treatment with small distal extension cantilevered FPDs may be an alternative reconstruction method. This treatment is relatively simple, inexpensive, not time-consuming and easy to adapt especially for the elderly patients.²⁶ In this study, 12-15% of the patients had FPDs on their Kennedy II jaws. On the other hand, 7-16% of the patients with Kennedy II jaws had no treatment. These patients may be young and they may consider to have implants in the near future, or they may be old and prefer to live with a shortened dental arch. If the patients had Kennedy II jaws for a long while, elongated antagonist teeth may avoid restoring the edentulous spaces, and the patients may be reluctant to have complicated treatments including endodontics and/or crown lengthening procedures for the elongated teeth. The ratio of the Kennedy III patients with no treatment was between 9.7% and 12%. The patients may have single tooth missing in posterior region, tilted molars or narrow spaces, imposing difficulties in constructing FPDs or implants, which may explain the choice of no treatment. Only 3.4% and 3.8% of the Kennedy III cases had RPDs, probably because of the improper periodontal situations of the abutment teeth for FPDs. This result is similar with the Charyeva's study.³

There was one patient (1.5%) who had overdenture on his Kennedy I mandible with only 2 canines. In the partially edentulous patients with few and unfavourably distributed remaining teeth, complete overdentures are indicated to improve retention of the dentures and satisfaction of the patients.⁵

According to results, it was clearly observed that Kennedy I and II types were significantly more prevalent in patients over the age of 60. Douglass and Watson stated that the needs for rehabilitation of partially edentulism will increase by 15% from 2005 to 2020 in the United States.²⁷ Although there are no available data on the predicted rates of partial edentulism in Turkey to the authors' knowledge, an extended lifetime and a large increase in

the number of elderly individuals are expected in the future. Therefore, there will be a large number of patients with partially edentulism, and rehabilitation is still necessary to meet the prosthetic needs of the society.²⁸

The limitations of the present study is that only one dental hospital is included in the study which is conducted on a group of patients, and definitely reflects the partial edentulism classification and treatment choices of only a limited group. Future studies performed in different regions of the country with higher sample size that focus on the treatment options of partial edentulism will be supportive in delivering the best information to dental health planners.

CONCLUSIONS

The choice of prosthetic treatment modality is mainly determined by the patient's expectations, needs, social aspects, economical consequences and educational level, as well as the general health status, oral functional benefits, esthetic, prognosis of the remaining teeth, risks with regard to periodontal diseases, caries progression and patient motivation to maintain oral hygiene. The clinician's knowledge related to art and science in prosthodontics, judgement abilities and appropriate insight are also curical factors in order to respond patients' demands.

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