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Evaluation of Reasons for Extraction of Permanent Teeth in Ahvaz (2010)

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ABSTRACT

The prevention of tooth loss is the ultimate goal of dental care. Identification of reasons for tooth loss should help in the establishment of adequate preventive programs. The present study aims to investigate the reasons for extraction of permanent teeth and the demographic factors (age, gender, occupational status, educational status) associated with tooth loss. This study investigates the reasons for extraction of permanent teeth in 834 patients referred to department of dental faculty of Ahvaz university of medical sciences and 6 other center (two personal dental clinics, one government dental clinic, and three dental offices) in Ahvaz during February and March 2010. The study methodology has been descriptive-analytical and the data have been collected by questionnaire and clinical examination of patients. Data have been analyzed by Chi-square test and in SPSS software. A total of 1500 extracted teeth from 834 patients showed that caries (52.6%) and periodontal disease (23.4%) have been among the main causes of tooth extraction, followed by prosthetic reasons (10.2%), patient request (10%), failure of endodontic treatment (1%), trauma (0.9%), impaction (0.7%), orthodontic reasons (0.7%) and other reasons (0.4%). The most extracted tooth has been first molar of the lower jaw (396 extractions). Extraction due to caries has been commonly observed in all age groups under fifty years old, whereas periodontal disease has been predominant in the groups over fifty years old. No statistically significant difference was found between two genders in their mentioned causes for extraction, with periodontal disease and patient request being the main reasons for teeth extraction. The frequency of the extracted teeth has been inversely related with improvement of educational status of the patients. In addition, it has been observed that significant different pattern of tooth loss was seen when patients were classified according to the occupational status (67.2% employed, 32.8% unemployed). Permanent teeth have been mostly extracted due to caries and periodontal disease. Prevention and care for dental caries and periodontal disease are required for all age groups, and over middle age groups, respectively. In addition, for the purpose of oral health preservation and improvement of quality of everyday life, patients should be better informed and advised to maintain an adequate oral hygiene and pay regular visits to the dentist.

Key words*:* Caries, Periodontal disease, Tooth Extraction, Ahvaz.

INTRODUCTION

State of tooth loss leads to lack of coordination and adaptation of the masticatory system that is often coupled with functional effects and beauty consequences that is perceived by patients to varying degrees. The majority of patients consider toothlessness as a disability. As the loss of all teeth to be considered similar to the loss of part of the body, its treatment involves taking a series of biomechanical problems dependent to a wide range of people's perception and tolerance, that is costly and time-consuming [1].

So far, several studies have been conducted in several countries to investigate the

causes for extraction of permanent teeth, in which caries has been the main cause for tooth extraction, and other factors such as periodontal disease, orthodontic considerations, preprosthetic treatments, radiation therapy, and trauma have been stated as the main reasons for tooth extraction [2-21].

Because of the important role of saliva in the control of oral flora and mineral content of teeth, saliva test should be performed in patients with high caries activity. At PH above 5.5, in the presence of calcium and phosphate ions, demineralization is reversed and remineralization takes place again. Fluoride ions greatly enhances the calcium and phosphate sediments causing the enamel to be re-mineralized and safer against the next caries attacks by accepting greater amounts of acid-resistant fluorapatite compound [22]. In addition, since dental pulp is protected by hard dental structure that is dentin, enamel, and cementum, and since caries causes the loss of enamel rods, dentin, and finally damaging the pulp over time if left untreated causes; it can be considered one of the tooth loss factors [22]. Statistics has shown that higher social classes are exposed to higher levels of sucrose in their diet, having the greatest amount of caries [23]. In addition, several studies have shown an increase of tooth loss among smokers [24]. Diseases and syndromes such as histiocytosis X, Papillon Lefever syndrome and malignant tumors cause loosing of teeth and eventually pull them out due to the protective bone loss around teeth [25].

In some studies, periodontal disease has been mentioned as the most common cause of tooth extraction in the anterior teeth and premolars [8, 15, 17]. In some studies, periodontal disease has been introduced as the most common cause of tooth extraction from the age of forty and higher [4, 17, 19]. While this age has varied in other studies to 45 years [17] or 50 years [2, 3, 5, 6]. The results of this study show statistically significant differences in different countries, and even thees differences can be observed within a country from a region to another region.

Knowing the extraction of permanent teeth causes and the prevalence of each of these factors in terms of age, sex, educational level, occupational groups, and economic status of the people can be used for planning and policy making of the adequacy review of dental care, prevention programs, determining how to allocate the available resources to better effect, and delaying the tooth loss. Due to the limited number of such studies in Iran and lack of information in this context in Ahvaz, this study aims to investigate the cause of the extraction of permanent teeth in Ahvaz.

MATERIALS AND METHODS

The present study is a cross-sectional descriptive epidemiological study that evaluates the causes of the extraction of permanent teeth in Ahvaz. In this study, patients referred to a social welfare center, Faculty of Dentistry of Jundishapur University of Medical Sciences, two private clinics, and three public dental offices have been investigated on the reasons for tooth extraction.

Stratified sampling has been used to choose the centers and the samples, and statistical tests of chi-square test and T-test have been used based on central and dispersion parameters. The statistical data has been described by tables and charts. At least 100 samples and in total 1500 samples have been collected from each of these centers. For data collection, a checklist including demographic data (age, sex, educational level, employment status), the tooth number and the reason for the tooth extraction according to the patient's treating dentist has been prepared.

For patients who had more than one extracted tooth, a separate questionnaire has been completed for each of the teeth. Only the wisdom teeth in occlusion have been entered in the study and pericoronitis and impaction of the wisdom teeth have been excluded. The collected data has been analyzed using SPSS 15 software. The relationship between variables has been analyzed using Chi-square test. In addition, $P < 0.05$ has been considered a significant difference.

RESULTS

834 patients 1,500 cases of tooth extraction participated in this study (an average of 1.8 teeth per person). Frequency distribution of

referred patients by age and gender is shown in Table 1.

As it can be seen, male patients were fewer than female patients, while their average extraction of teeth has been higher.

In the frequency distribution of the dental groups (molars, premolars, canines, incisors) mandibular first molar, and then maxillary first molar have been the most teeth extracted, and mandibular canine has been the least tooth extracted by 30 cases (see Table 2).

No significant difference has been observed in evaluating the relationship between the reasons for tooth extraction and sex in men and women. But caries and periodontal disease in both genders have been the most common causes of tooth extraction (Table 3).

In the distribution of the causes of tooth extraction in the total sample, caries has been the most common reason for tooth extraction and other causes in order of frequency have been: Periodontal disease, prosthetic reasons, the patient's request, endodontic treatment failure, trauma, orthodontic reasons, impaction (Table 4).

By other division of the reasons for tooth extraction in terms of age, caries and periodontal disease have been the first and second reasons for tooth extraction in ages less than 50 years old. While in ages over 50, periodontal disease and dental caries have been the first and the second leading cause of tooth extraction.

Reasons for tooth extraction between different age groups have been separately investigated based on the most common cause of tooth extraction for each age group. In addition, the highest frequency of the tooth extraction have been

Table 1: Frequency distribution of patients by age and gender

Age group		Gender		
		Male	**Female**	**Total**
20-Dec	Number	30	29	59
	Age group (%)	50.80%	49.20%	100%
	Total population (%)	7.40%	6.70%	7.10%
21-30	Number	66	66	132
	Age group (%)	50.00%	50.00%	100%
	Total population (%)	16.40%	15.30%	15.80%
31-40	Number	74	95	169
	Age group (%)	43.80%	56.20%	100%
	Total population (%)	18.40%	22.00%	20.30%
41-50	Number	90	73	163
	Age group (%)	52.20%	44.80%	100%
	Total population (%)	22.30%	16.90%	19.50%
51-60	Number	75	77	152
	Age group (%)	49.30%	50.70%	100%
	Total population (%)	18.60%	17.90%	18.20%
>60	Number	68	91	159
	Age group (%)	42.80%	57.20%	100%
	Total population (%)	16.90%	21.10%	19.10%
Gender	Number	403	431	834
	Total population (%)	48.30%	51.70%	100%
	Total percent (%)	100%	100%	100%

in age groups of 41-50 and 31-40 years old, respectively (Table 5).

Periodontal disease increases with age increase. In the meantime, from 40 years old and higher, this upward process has had an significant ascending increase. While in the case of caries, this process showed a significant decrease from 40 years old and higher.

In investigating the relationship between the frequency of tooth extraction with patients'

Table 2: Frequency distribution of the causes of tooth extraction based on the jaws

			Caries	Endodontic treatment failure	Periodontal	Patient request	Orthodontics	Prosthesis	Trauma	Impaction	Other reasons	Total
Maxillary	Incisor		34	0	71	11	0	21	6	0	2	145
			23.4 %	0%	49.0%	7.6%	0%	14.5%	4.1%	0%	1.4%	9.6%
	Premolar		154	8	33	20	5	29	0	0	0	249
			61.8 %	3.2%	13.3%	8.0%	2.0%	11.6%	0%	0%	0%	16.6%
	Muller		182	0	77	30	0	22	1	1	3	316
			57.6 %	0%	24.4%	9.5%	0%	7.0%	0.3%	0.3%	0.9%	21.0%
	Canine		22	0	10	4	0	11	1	6	0	54
			40.7 %	0%	18.5%	7.4%	0%	20.4%	1.9%	11.1%	0%	3.6%
	Total		392	8	191	65	5	83	8	7	5	764
			51.3 %	1.0%	25.0%	8.5%	0.7%	10.9%	1.0%	0.9%	0.7%	
Mandible	Incisor		29	0	68	5	1	19	5	0	1	128
			22.7 %	0%	53.1%	3.9%	0.8%	14.8%	3.9%	0%	0.8%	8.5%
	Premolar		98	3	30	31	5	13	0	2	0	182
			53.8 %	1.6%	16.5%	17.0%	2.7%	7.1%	0%	1.1%	0%	12.1%
	Muller		259	4	51	46	0	35	0	1	0	396
			65.4 %	1.0%	12.9%	11.6%	0%	8.8%	0%	0.3%	0%	26.4%
	Canine		11	0	12	3	0	3	0	1	0	30
			36.7 %	0%	40.0%	10.0%	0%	10.0%	0%	3.3%	0%	2.0%
	Total		397	7	161	85	6	70	5	4	1	736
			53.9 %	1.0%	21.9%	11.5%	0.8%	9.5%	0.7%	0.5%	0.1%	100%

education, most people have been the patients with high school degree, followed by the patients diploma and higher education diplomas (Table 6).

Caries, periodontal disease, and prosthetic reasons have been the most common reasons for tooth extraction in patients with high school education, respectively. In the patients with diploma and higher, caries, periodontal disease, and the patient's request have been the main reasons for tooth extraction (Table 7).

Statistically, no significant difference has been observed between the causes of tooth extraction and the education (pvalue> 0.05).

In evaluating the reasons for tooth extraction in connection with the employment status of patients, a higher percentage of patients have been unemployed (Table 8).

In addition, the relationship between the main reasons for tooth extraction such as caries and periodontal disease have been investigated

Table 3: Frequency distribution of the causes of tooth extraction based on the gender of patients

The cause of tooth extraction		Gender		
		Male	**Female**	**Total**
Caries	Number of patients	437	352	789
	Gender (%)	55.40%	44.60%	100%
	Cause (%)	51.60%	53.90%	52.60%
Endodontic treatment failure	Number of patients	7	8	15
	Gender (%)	46.70%	53.30%	100%
	Cause (%)	0.80%	1.20%	1%
Periodontal disease	Number of patients	194	158	352
	Gender (%)	55.10%	44.90%	100%
	Cause (%)	22.90%	24.20%	23.50%
Patient request	Number of patients	97	53	150
	Gender (%)	64.70%	35.30%	100%
	Cause (%)	11.50%	8.10%	10.00%
Orthodontics	Number of patients	3	8	11
	Gender (%)	27.30%	72.70%	100%
	Cause (%)	0.40%	1.20%	0.70%
Prosthetic reasons	Number of patients	94	59	153
	Gender (%)	61.40%	38.60%	100%
	Cause (%)	11.10%	9.00%	10.20%
Trauma	Number of patients	5	5	13
	Gender (%)	38.50%	61.50%	100%
	Cause (%)	0.60%	1.20%	0.90%
Impaction	Number of patients	7	4	11
	Gender (%)	63.60%	36.40%	100%
	Cause (%)	0.80%	0.60%	0.70%
Other factors	Number of patients	3	3	6
	Gender (%)	50.00%	50.00%	100%
	Cause (%)	0.40%	0.50%	0.40%
Total	Number of patients	847	653	1500
	Gender (%)	56.50%	43.50%	100%
	Cause (%)	100%	100%	100%

Table 4: Frequency distribution of causes of tooth extraction based on the age group

		age						
		12--20	**21-30**	**31-40**	**41-50**	**51-60**	**>60**	**Total**
Caries	Number of tooth extracted	57	144	219	226	93	50	789
	Total cause of caries (%)	7.20%	7.20%	27.80%	28.60%	11.80%	6.30%	100%
	Age group (%)	59.40%	67.60%	72.80%	60.60%	33.90%	20.60%	52.60%
Endodontic treatment failure	Number of tooth extracted	1	6	4	2	2	0	15
	Total cause of endodontic treatment failure (%)	6.70%	40.00%	26.70%	13.30%	13.30%	0%	100%
	Age group (%)	1.00%	2.80%	1.30%	0.50%	0.70%	0%	1.00%
Periodontal disease	Number of tooth extracted	3	14	21	76	100	138	352
	Total cause of periodontal (%)	0.90%	4.00%	6.00%	21.60%	28.40%	39.20%	100%
	Age group (%)	3.10%	6.60%	7.00%	20.40%	36.50%	56.80%	23.50%
Patient request	Number of tooth extracted	16	28	52	41	4	9	150
	Total cause of patient request (%)	10.70%	18.70%	34.70%	27.30%	2.70%	6.00%	100%
	Age group (%)	16.70%	13.10%	17.30%	11.00%	1.50%	3.70%	10.00%
Orthodontics	Number of tooth extracted	4	7	0	0	0	0	11
	Total cause of orthodontics (%)	36.40%	63.60%	0%	0%	0%	0%	100%
	Age group (%)	4.20%	3.30%	0%	0%	0%	0%	0.70%
Prosthesis	Number of tooth extracted	4	1	1	27	74	46	153
	Total cause of prosthesis (%)	2.60%	7.00%	7.00%	17.60%	48.40%	30.10%	100%
	Age group (%)	4.20%	0.50%	0.30%	7.20%	27.00%	18.90%	10.20%
Trauma	Number of tooth extracted	6	7	0	0	0	0	13
	Total cause of trauma (%)	46.20%	53.80%	0%	0%	0%	0%	100%
	Age group (%)	6.30%	3.30%	0%	0%	0%	0%	0.90%
Impaction	Number of tooth extracted	5	4	1	0	1	0	11
	Total cause of impaction (%)	45.50%	36.40%	9.10%	0%	9.10%	0%	100%
	Age group (%)	5.20%	1.90%	0.30%	0%	0.40%	0%	0.70%
Other factors	Number of tooth extracted	0	2	3	1	0	0	6
	Total cause of other factors (%)	0%	33.30%	50.00%	16.70%	0%	0%	100%
	Age group (%)	0%	0.90%	1.00%	0.30%	0%	0%	0.40%

between the employed and unemployed patients (Table 9).

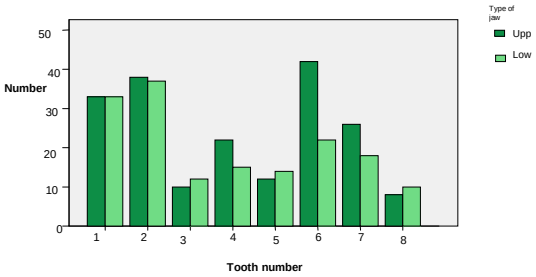
In the evaluation of frequency distribution of type of the tooth extracted due to the reason for teeth extraction, molars have been the most extracted teeth. From 712 extracted molars, caries and periodontal disease have been the most common reasons for teeth extraction. In premolars, caries and periodontal disease have been the main reasons for teeth extraction. From 84 extracted canines, caries and periodontal disease have been the most common reasons for teeth extraction. From 273 extracted incisors, caries and periodontal disease have been the first and the second reasons for teeth extraction, respectively. In the separate evaluation of each of type of tooth, the most common reason for teeth extraction have been caries of molars and the periodontal disease of the incisors (Table 2).

Table 5: Distribution of number of patients based on age group and number of tooth extracted in each age group

Age	Number of patients	Percent (%)	Number of tooth extracted	Percent (%)
12-20	59	7.1	96	6.4
21-30	139	15.8	213	14.2
31-40	169	20.3	301	20.1
41-50	163	19.5	373	24.9
51-60	152	18.2	274	18.3
>60	159	19.1	243	16.2
Total	834	100	1500	100

Table 6: The relationship between tooth extraction with education

x2 test (P value<0.05)	Education		
	Diploma and higher	Middle school diploma	
	195 (23.3%)	639 (76.6%)	Total number



Frequency distribution of tooth extraction cases due to periodontal disease according to tooth number

Fig. 5: Distribution of the causes of caries and periodontal according to the type of tooth and jaw

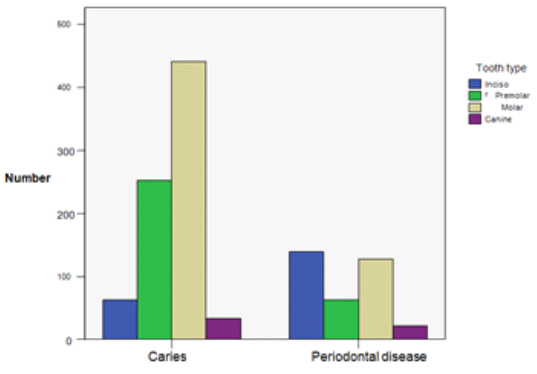


Fig. 6: Frequency of the teeth extracted due to caries and periodontal disease by the type of tooth

No statistically significant difference has been observed between the reason for tooth extraction in the mandibular left quadrant and mandibular right quadrant, as well as teeth extraction in the upper jaw with the lower jaw.

Table 7: Frequency of tooth extraction causes based on education

The cause of tooth extraction	Education		Total
	Middle school diploma	Diploma and higher	
Caries	583	206	789
Cause compared with the other subgroup (%)	73.9%	26.1%	100%
Cause within the subgroup (%)	51.7%	55.2%	52.6%
Endodontic treatment failure	10	5	15
Cause in comparison with other subgroup (%)	66.7%	33.3%	100%
Cause within the subgroup (%)	0.9%	1.3%	1.0%
Periodontal	290	62	352
Cause in comparison with other subgroup (%)	82.4%	17.6%	100%
Cause within the subgroup (%)	25.7%	16.6%	23.5%
Patient request	102	48	150
Cause in comparison with other subgroup (%)	68.0%	32.0%	100%
Cause within the subgroup (%)	9.1%	12.9%	10.0%
Orthodontics	7	4	11
Cause in comparison with Other subgroup (%)	63.6%	36.4%	100%
Cause within the subgroup (%)	0.6%	1.1%	0.7%
Prosthesis	114	39	153
Cause in comparison with Other subgroup (%)	74.5%	25.5%	100%
Cause within the subgroup (%)	10.1%	10.5%	10.2%
Trauma	8	5	13
Cause in comparison with other subgroup (%)	61.5%	38.5%	100%
Cause within the subgroup (%)	0.7%	1.3%	0.9%
Impaction	7	4	11
Cause in comparison with other subgroup (%)	63.6%	36.4%	100%
Cause within the subgroup (%)	0.6%	1.1%	0.7%
Others	6	0	6
Cause in comparison with other subgroup (%)	100%	0%	100%
Cause within the subgroup (%)	0.5%	0%	0.4%
Total based on number	1127	373	1500
Tooth extraction in comparison with other subgroup (%)	75.1%	24.9%	100%
Total (%)	100%	100%	100%

Table 8: Relationship between tooth extraction causes with occupation

P value (x2 test)<0.05	Occupational status		
	Employed	Unemployed	
	274(32.8%)	560(67.2%)	Total number

Most teeth extracted due to periodontal disease have been anterior teeth, molars, and premolars; while the most extracted teeth due to caries have been molars, premolars, and anterior teeth, respectively (Fig. 5 and 6).

The obtained results indicated that cells that the first molar and incisors has been the most extracted tooth due to caries and periodontal disease, respectively. In addition, in evaluating the reasons for extraction of permanent teeth in terms of the tooth number, the most teeth have been extracted due to caries of mandibular first molar, and the most teeth extracted due to periodontal disease have been maxillary first molar and mandibular incisors (Table 2). Among the teeth extracted due to caries, molars, premolars, and anterior teeth have had the most frequency and this order has been maintained among all age groups. In ages more than 60 years and in the ages of 60 and lower, incisors and molars have been the most teeth extracted due to periodontal disease.

DISCUSSION AND CONCLUSION

The results showed that caries and periodontal disease have been the main reasons for tooth extraction in dental offices and dentistry service centers in Ahvaz, consistent with studies conducted in Iran and other countries [2, 13, 17, 19]. Periodontal disease increases with age increase, among them the age of 40 and higher this trend has been increasing; this finding can also be observed in the previous studies in this area [2, 13, 17, 19].

In the present study, in ages 50 and below caries and periodontal disease have been the main reasons for extraction of permanent teeth, and in ages above 50 the periodontal disease became the most common cause of tooth extraction that is consistent with some studies in this area [2, 3, 5, 6, 13]. While in some other studies, periodontal disease at the age of 40 years and higher has been considered as the main cause of tooth extraction

Table 9: Frequency of tooth extraction caused by caries and periodontal disease based occupational status

	Occupational group		
	Employed	**Unemployed**	**Total**
Caries	337	452	789
Occupational group (%)	63.7%	46.5%	52.6%
Endodontic treatment failure	8	7	15
Occupational group (%)	1.5%	0.7%	1.0%
Periodontal	51	301	352
Occupational group (%)	9.6%	31.0%	23.5%
Patient request	61	89	150
Occupational group (%)	11.5%	9.2%	10.0%
Orthodontics	2	9	11
Occupational group (%)	0.4%	0.9%	0.7%
Prosthesis	58	95	153
Occupational group (%)	11.0%	9.8%	10.2%
Trauma	6	7	13
Occupational group (%)	1.1%	0.7%	0.9%
Impaction	3	8	11
Occupational group (%)	0.6%	0.8%	0.7%
Others	3	3	6
Occupational group (%)	0.6%	0.3%	0.4%
Total	529	971	1500
	100%	100%	100%

[12, 16, 17, 19]. This difference could be due to differences in implementing methods of the project and differences in methodology of the research, as well as the dentist and the patient's desire to maintain the teeth [17, 26]. It can also be due to differences in susceptibility to periodontal disease, since based on the results of the conducted studies, the destructive type of periodontal disease has been higher in some ethnic groups [27- 31]. Smoking by patients can also influence the incidence of periodontal disease [32, 33]. In addition, differences in the implementing methodology of the project can also be among the other factors influencing the study findings. For example, in the present study the prosthetics reasons include 10% of tooth extraction cases, while in the study conducted in Kuwait by AL-Shammary et al. (2004) [17], this variable has not been considered and its related items have been included in the other variables, especially the variable of periodontal diseases. In addition, the tooth extraction cases due to endodontic treatment failure has been included in cases related to periodontal diseases.

In several studies, the most anterior teeth have been the most tooth extracted due to periodontal disease [5, 10, 17, 19, 34]. One explanation could be that the mandibular anterior teeth is less susceptible to caries than other teeth, therefore these teeth remain in the people's dentition. Thus, in older ages that periodontal disease has become a more effective factor in the tooth loss, these tooth would be removed from the dentition by the disease [17, 35, 36]. In addition, the mandibular first molar has been the most extracted tooth due to caries. It could be due to the specific morphology of the teeth, as well as early growth of this tooth in the mouth, demanding more care of it [10, 19, 37, 38]. The results show the high rate of teeth extraction due to periodontal disease in men that is consistent to the research conducted in this field [10, 17, 18, 29, 32, 33, 39].

Finally, the results of this study showed that caries has been the most common reason for teeth extraction in the ages of 50 and lower, while periodontal disease has been the most common cause of tooth extraction in the ages over 50 years. In addition, there is a significant relationship between the educational level and employment status of people with the extraction of permanent teeth. So that people with higher education and employed, the level of teeth extraction is lower. First molars have been the most teeth extracted due to caries, while anterior teeth have been the most common teeth extracted due to periodontal disease.

It is suggested that due to the high prevalence rate of the extraction of the first molar teeth due to caries in the age groups of 21-30 and 31-40, the implementation of preventive programs and dental care is more recommended to preserve these teeth as the occlusion key in the patients.

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