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DENTAL ARCH DEFECTS IN PATIENTS IN NEED OF PROSTHETIC REHABILITATION: A COMPARATIVE KENNEDY CLASSIFICATION STUDY

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Abstract. This article presents the clinical and structural characteristics of dental arch defects in patients requiring orthopedic dental rehabilitation based on the Kennedy classification. The examination was performed after therapeutic and surgical oral sanitation and prior to prosthetic treatment. Patients were divided into three groups according to their living conditions: residents of "Muruvvat" care homes, individuals living under the supervision of relatives, and independently living patients. The results demonstrated that Kennedy Class I defects and their combined forms predominated in Groups 1 and 2, whereas Group 3 showed the highest prevalence of complete edentulism in both jaws. The findings confirm the significant impact of social factors on the severity of dental arch defects and highlight the necessity of an individualized approach to prosthetic treatment planning.

Keywords: dental arch defects, Kennedy classification, orthopedic rehabilitation, complete edentulism, partial edentulism, prosthetic treatment.

Introduction. Defects of the dental arches represent one of the most pressing problems in prosthetic dentistry, and their prevalence increases with advancing age. In elderly patients, partial or complete tooth loss results in impaired masticatory function, speech alterations, aesthetic deficiencies, and a decline in quality of life (Carlsson, 2006). In addition, dental-arch defects are closely associated with periodontal tissue status, oral hygiene, and the presence of systemic somatic diseases (Müller et al., 2007).

In patients requiring prosthetic rehabilitation, identifying the type and structural pattern of dental-arch defects is crucial for selecting an appropriate prosthetic design. The use of standardized classifications allows for substantiated clinical decision-making, comparative analysis across patient groups, and consistent interpretation of research outcomes (McGarry et al., 2002).

One of the most widely used classifications for assessing dental-arch defects is the Kennedy classification. It provides a functional and anatomical framework for evaluating dentition defects and systematically categorizes partial and complete edentulism (Kennedy, 1928). The Kennedy classification is valued in clinical practice for its practicality, clarity, and guidance in selecting prosthetic treatment strategies (Applegate, 1954).

Recent studies indicate that social conditions, lifestyle, and access to dental services have a substantial influence on the severity of dental-arch defects. In particular, higher rates of complete edentulism have been reported among independently living elderly patients (Petersen, Yamamoto, 2005). Therefore, investigating the clinical and structural characteristics of dental-arch defects among patients requiring prosthetic rehabilitation across different social groups is of both scientific and practical relevance.

Aim of the Study. The aim of this study was to assess the clinical and structural characteristics of dental-arch defects in patients requiring prosthetic rehabilitation using the Kennedy classification, to determine their distribution in the maxilla and mandible, and to perform a comparative analysis of differences between patient groups living under different social conditions.

Materials and Methods. This clinical observational study was conducted among patients requiring prosthetic dental care. The examination was performed at the pre-prosthetic stage after oral sanitation, including therapeutic and surgical rehabilitation procedures.

All patients were stratified into three groups according to living conditions:

Group 1 — patients residing in "Muruvvat" care homes;

Group 2 — patients living under the care of relatives;
Group 3 — patients living independently.

Dental-arch defects were evaluated using the Kennedy classification. The maxilla and mandible were analyzed separately, with the following parameters considered:

— types of partial edentulism (Classes I–IV);
— presence of modifications (additional defects);
— complete edentulism.

For each patient, defect types were recorded as absolute numbers and percentages. The data were comparatively analyzed across groups to determine distribution patterns, and the results were visualized using tables and diagrams.

Results. After oral rehabilitation by therapeutic and surgical methods, dental-arch defect types were determined during the pre-prosthetic stage. In this study, the Kennedy classification was used to assess dental-arch defects.

Table 3.16

Frequency of dental-arch defects in Group 1 patients

Type of dental-arch defect	Maxilla (n, %)	Mandible (n, %)
Class I	22 (29.7%)	21 (28.4%)
Class I, Modification 1	9 (12.2%)	8 (10.8%)
Class I, Modification 2	3 (4.05%)	1 (1.35%)
Class I, Modification 3	1 (1.35%)	2 (2.7%)
Class II	1 (1.35%)	2 (2.7%)
Class II, Modification 1	5 (6.8%)	3 (4.1%)
Class II, Modification 2	3 (4.05%)	1 (1.35%)
Class II, Modification 3	0 (0%)	2 (2.7%)
Class III	0 (0%)	1 (1.35%)
Class III, Modification 2	0 (0%)	2 (2.7%)
Class III, Modification 3	0 (0%)	1 (1.35%)
Class IV	5 (6.8%)	5 (6.8%)
Edentulous jaws	25 (33.8%)	25 (33.8%)

Following comprehensive oral rehabilitation in Group 1 patients residing in “Muruvvat” care homes, the need for prosthetic treatment was identified in 74 maxillary cases. Similarly, 74 mandibular prosthetic cases were recorded. The types and distribution of dental-arch defects detected in Group 1 are presented in Table 3.16.

In Group 1, the most common defect in the maxilla was complete edentulism, observed in 33.8% of cases. A high prevalence was also noted for Kennedy Class I defects (bilateral distal-extension defects), accounting for 29.7%.

In addition, Class I Modification 1 (12.2%) and Class II Modification 1 (6.8%) were frequently identified, representing combinations of distal-extension and additional bounded edentulous spaces. Furthermore, defects in the anterior region consistent with Kennedy Class IV were recorded in 6.8% of cases.

Overall, the predominance of complete edentulism and bilateral distal-extension defects in Group 1 indicates that these patients often require complete removable dentures or removable partial dentures with extensive denture bases. The occurrence of such defects may be related to patient age, general somatic status, and the level of oral hygiene.

Table 3.17

Frequency of dental-arch defects in Group 2 patients

Type of dental-arch defect	Maxilla (n, %)	Mandible (n, %)
Class I	20 (31.3%)	17 (24.3%)
Class I, Modification 1	9 (14.1%)	16 (22.9%)

Class I, Modification 2	1 (1.56%)	2 (2.9%)
Class I, Modification 3	1 (1.56%)	0 (0%)
Class II	4 (6.3%)	2 (2.9%)
Class II, Modification 1	1 (1.56%)	4 (5.7%)
Class II, Modification 2	1 (1.56%)	3 (4.3%)
Class II, Modification 3	0 (0%)	2 (2.9%)
Class III	0 (0%)	1 (1.4%)
Class III, Modification 1	3 (4.7%)	0 (0%)
Class IV	2 (3.12%)	2 (2.9%)
Edentulous jaws	22 (34.4%)	21 (30.0%)

In Group 2, 64 maxillary and 70 mandibular prostheses were fabricated to restore dental-arch defects. The distribution and classification of defects are presented in Table 3.17.

The data indicate that in Group 2, the most common findings in the maxilla were complete edentulism (34.4%) and Kennedy Class I defects (31.3%). The combination of bilateral distal-extension defects with additional bounded spaces (Class I, Modification 1) was identified in 14.1% of cases. Unilateral distal-extension defects (Class II) were less frequent (6.3%), and Class III with modification 1 accounted for 4.7%.

Notably, the prevalence of Kennedy Class I defects was similar in Groups 1 and 2: 29.7% and 31.3%, respectively. Although differences were modest, Group 2 demonstrated a higher frequency of Class I Modification 1 (14.1%) and Class I Modification 2 (1.56%). Overall, Group 2 showed a more diverse pattern of combined defect types.

Table 3.18

Frequency of dental-arch defects in Group 3 patients

Type of dental-arch defect	Maxilla (n, %)	Mandible (n, %)
Class I	14 (22.6%)	10 (15.2%)
Class I, Modification 1	3 (4.8%)	10 (15.2%)
Class II	3 (4.8%)	2 (3.0%)
Class II, Modification 1	4 (6.5%)	7 (10.6%)
Class II, Modification 2	3 (4.8%)	3 (4.5%)
Class III	1 (1.6%)	0 (0%)
Class III, Modification 1	0 (0%)	2 (3.0%)
Complete edentulism	34 (54.8%)	32 (48.5%)

After oral sanitation, 62 maxillary and 69 mandibular prostheses were required for independently living Group 3 patients. The distribution of dental-arch defects in Group 3 is shown in Table 3.18.

In Group 3, the most common defect in the maxilla was complete edentulism, identified in more than half of patients (54.8%). Approximately one quarter exhibited Kennedy Class I defects. Other defect types were less frequent, including Class I Modification 1 (4.8%), Class II Modification 1 (6.5%), and Class II Modification 2 (4.8%).

When comparing Groups 1 and 2, the prevalence of complete edentulism in the maxilla was nearly identical (33.8% vs. 34.4%), while in the mandible it was 33.8% in Group 1 and 30.0% in Group 2. In the maxilla, Class I defects accounted for 29.7% and 31.3%, respectively; in the mandible, 28.4% and 24.3%. Notably, in the mandible the prevalence of Class I Modification 1 defects was 10.8% in Group 1 versus 22.9% in Group 2, indicating a higher frequency of bilateral distal-extension defects with modifications in Group 2.

In comparisons between Groups 2 and 3, complete edentulism was substantially higher in Group 3 (maxilla: 54.8% vs. 34.4%; mandible: 48.5% vs. 30.0%), suggesting a markedly greater overall burden of edentulism among independently living patients.

Table 3.19

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Comparative analysis of maxillary dental-arch defects across three groups (%)

Defect type	Group 1	Group 2	Group 3
Class I	29.7	31.3	22.6
Class I, Mod 1	12.2	14.1	4.8
Class I, Mod 2	4.05	1.56	0.0
Class I, Mod 3	1.35	1.56	0.0
Class II	1.35	6.3	4.8
Class II, Mod 1	6.8	1.56	6.5
Class II, Mod 2	4.05	1.56	4.8
Class II, Mod 3	0.0	0.0	0.0
Class III	0.0	0.0	1.6
Class III, Mod 1	0.0	4.7	0.0
Class IV	6.8	3.12	0.0
Complete edentulism	33.8	34.4	54.8

Table 3.20
Comparative analysis of mandibular dental-arch defects across three groups (%)

Defect type	Group 1	Group 2	Group 3
Class I	28.4	24.3	15.2
Class I, Mod 1	10.8	22.9	15.2
Class I, Mod 2	1.35	2.9	0.0
Class I, Mod 3	2.7	0.0	0.0
Class II	2.7	2.9	3.0
Class II, Mod 1	4.1	5.7	10.6
Class II, Mod 2	1.35	4.3	4.5
Class II, Mod 3	2.7	2.9	0.0
Class III	1.35	1.4	0.0
Class III, Mod 1	0.0	0.0	3.0
Class IV	6.8	2.9	0.0
Complete edentulism	33.8	30.0	48.5

Analysis of dental-arch defects in the maxilla and mandible across the three groups demonstrated that the highest prevalence of complete edentulism was recorded in Group 3 (maxilla: 54.8%, mandible: 48.5%). This may be explained by socio-economic conditions, attitudes toward healthcare, lower oral hygiene culture, and age-related anatomical and physiological changes that contribute to earlier tooth loss. Consequently, the need for complete removable dentures with full denture bases is expected to be higher in this group.

In Groups 1 and 2, the greater diversity of defect classes—particularly the relatively high prevalence of Class I, Class I Modification 1, and Class II Modification 1—suggests that treatment planning may more often involve removable partial dentures (including clasp-retained designs) where remaining abutment teeth can provide support. Specifically, in Group 2, the high rate of mandibular Class I Modification 1 defects (22.9%) indicates a predominance of bilateral distal-extension partial edentulism; however, the presence of remaining abutment teeth makes prosthetic rehabilitation clinically more favorable.

The findings also suggest that maxillary complete edentulism and Class I defects represent key determinants in selecting prosthetic design. In the mandible, complete edentulism may be functionally more challenging due to reduced denture retention and stability, potentially requiring additional retention methods.

Furthermore, the high rate of edentulism in Group 3 indicates insufficient preventive dental care. Strengthening local prevention, early diagnosis, and follow-up (dispensary) programs, as

well as controlling major causes of tooth loss in older adults (periodontal disease, caries, and systemic conditions), remains critically important.

Therefore, as a clinical recommendation, Groups 1 and 2 require an individualized approach focused on preserving abutment teeth and restoring function, whereas in Group 3 the priority should be the fabrication of functionally and aesthetically adequate complete removable dentures.

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