Loss of Teeth in Positions Mesially Adjacent to Implant-Supported Fixed Dentures: A Retrospective Clinical Survey

Koichi Yoshino, DDS, PhD[a]/Masakazu Nishibori, DDS[b]/Masatsugu Fujiseki, DDS, PhD[b]/
Koji Ito, DDS, PhD[b]/Masahiko Kuroda, DDS, PhD[b]/Takashi Matsukubo, DDS, PhD[c]

The aim of this study was to investigate the loss of teeth in positions mesially adjacent to implant-supported fixed dentures (IFDs) after insertion of IFDs in unilateral free-end edentulous spaces in the mandible at dental clinics. There were a total of 157 adjacent teeth. Nine adjacent teeth (5.73%, 9 of 157), 9 opposing teeth (2.59%, 9 of 348), 38 posterior teeth (1.93%, 38 of 1,964), and 3 anterior teeth (0.22%, 3 of 1,380) were lost during the observation period. The percentage of lost adjacent teeth was higher than that of posterior teeth ($P = .002$). Teeth in positions adjacent to the IFDs require more attention than other remaining teeth. *Int J Prosthodont 2015;28:158–160. doi: 10.11607/ijp.3969*

Single-tooth implants may have little effect on adjacent teeth,[1–3] but there have been no reports on multiple-tooth implants to the authors' knowledge. The aim of this study was to investigate the loss of teeth in positions mesially adjacent to implant-supported fixed dentures (IFDs) after placement of IFDs in unilateral free-end edentulous spaces in the mandible at dental clinics.

Materials and Methods

Surveys were sent to 42 dentists who were members of a clinical research group. They were asked to provide information about IFD placements from the time they opened their clinics until December 31, 2009.

The collecting data were as follows:

- Implants were placed in unilateral free-end spaces with two or three missing teeth in the mandible.
- There were first molars in the left and right sides of the maxilla and contralateral to the IFD.
- There were not two or more regions with consecutive missing teeth.
- IFDs were not connected to teeth.

A total of 36 dentists responded, and patients consisting of 77 men and 80 women, 27 to 77 years old (mean: 52.8 years), were analyzed. Implants of all shapes and types were included. No blade-type implants were used.

Remaining natural teeth were categorized as adjacent teeth, opposing teeth, anterior teeth, and posterior teeth (Fig 1). Adjacent teeth were mesially adjacent to IFDs. The target teeth consisted of 34 first premolars and 123 second premolars. Opposing teeth were those opposite the IFDs that made contact with the IFDs, which were clinically checked. Anterior teeth consisted of the remaining natural anterior teeth that were neither adjacent nor opposing teeth. Posterior teeth consisted of the remaining natural posterior teeth that were neither adjacent nor opposing teeth. Third molars were excluded from the analysis. Therefore, the study looked at a total of 157 adjacent teeth, 348 opposing teeth, 1,380 anterior teeth, and 1,964 posterior teeth.

The main reasons for tooth loss were categorized as caries, periodontitis, root fracture, and other.

Statistical Analysis

The chi-square or the Fisher exact test was used to compare the percentage of teeth lost and the reasons thereof, with the level of significance set at .05. The data were analyzed using SPSS version 15.0 statistical software (SPSS).

[a]*Visiting Associate Professor, Department of Epidemiology and Public Health, Tokyo Dental College, and Practitioner, Kyushikai, Kuroda Dental Clinic, Tokyo, Japan.*
[b]*Private Practice, Kyushikai, Kuroda Dental Clinic, Tokyo, Japan.*
[c]*Professor, Department of Epidemiology and Public Health, Tokyo Dental College, Tokyo, Japan.*

Correspondence to: *Dr Koichi Yoshino, Department of Epidemiology and Public Health, Tokyo Dental College, 2-9-18 Misaki-cho, Chiyoda-ku, Tokyo 101-0061, Japan. Email: ko-yoshi@d8.dion.ne.jp*

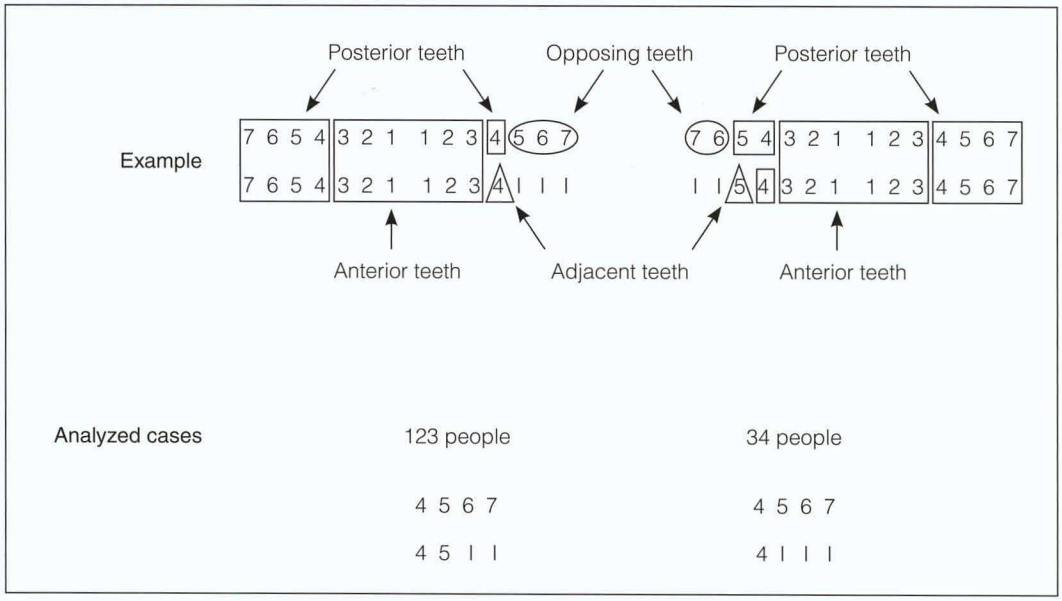

Fig 1 Teeth were divided into four groups: adjacent teeth, opposing teeth, anterior teeth, and posterior teeth. I = implant-supported fixed partial dentures.

Table 1 Number of Teeth Lost After Placement of Implant-Supported Fixed Dentures, by Tooth Type (n = 59)

		Anterior			Posterior				
Site	Group (n*)	Central incisor	Lateral incisor	Canine	First premolar	Second premolar	First molar	Second molar	Total
Maxilla									
	Other† (2,083)	2			5	5	7‡	12	31
Mandible									
	Adjacent (157)				3	6			9
	Other† (1,609)	1			2	1	11§	4	19

*Number of target teeth.
†Includes opposing, anterior, and posterior groups.
‡Includes one palatal root extraction.
§Includes three medial root extractions and one distal root extraction.

Table 2 Incidence of Tooth Loss After Placement of Implant-Supported Fixed Dentures

	No. of target teeth	No. of teeth lost	Incidence of tooth loss (%)		
Adjacent teeth	157	9	5.73	*	*
Opposing teeth	348	9	2.59		
Anterior teeth	1,380	3	0.22		
Posterior teeth	1,964	38†	1.93		

*$P < .05$.
†Includes one palatal root extraction, three medial root extractions, and one distal root extraction.

Results

The mean observation period was 76.2 months, during which 38 people lost 59 teeth (Table 1).

The lost teeth consisted of 9 adjacent teeth (5.73%, 9 of 157), 9 opposing teeth (2.59%, 9 of 348), 3 anterior teeth (0.22%, 3 of 1,380), and 38 posterior teeth (1.93%, 38 of 1,964; Table 2). The percentage of adjacent teeth lost was higher than that of anterior ($P < .001$) and posterior teeth ($P = .002$).

The percentage of teeth lost due to root fractures was higher in adjacent teeth than in posterior teeth ($P = .036$; Table 3).

Table 3 Reasons for Tooth Loss by Group

	Caries		Periodontitis		Root fractures			Other		
	n	%	n	%	n	%		n	%	Total
Adjacent teeth			1	11.1	8	88.9				9
Opposing teeth	3	33.3	3	33.3	3	33.3				9
Anterior teeth			1	33.3	2	66.7	*			3
Posterior teeth†	4	10.5	12	31.6	19	50.0		3	7.9	38
Total	7	11.9	17	28.8	32	54.2		3	5.1	59

*$P < .05$.
†Includes one palatal root extraction, three medial root extractions, and one distal root extraction.

Discussion

In this study, more adjacent teeth were lost than posterior teeth. This result was different from those reported in previous studies,[1-3] which looked at teeth adjacent to single-tooth implants. One reason for this discrepancy may be that the target cases in those studies were different from those in the current study. The authors' assumption was that the adjacent teeth had been burdened before the implants were inserted, such as by being used as abutments for removable partial dentures or fixed partial dentures. In fact, Yamazaki et al[4] reported that natural teeth serving as abutments for fixed partial dentures presented more complications than teeth adjacent to IFD-treated edentulous spaces.

In the current study, almost all adjacent teeth were lost due to root fractures (88.9%). It is well known there are tooth types that are at particularly high risk for root fracture, including first and second premolars.[5] Although not mentioned above, all of the adjacent teeth lost in this study were nonvital. Almost 50% (76 of 157) of all the adjacent teeth were nonvital. Although there were no data available on the vitality status of all teeth, this may explain the high incidence of adjacent tooth loss in this study. Yamazaki et al[4] reported that maintaining vital teeth adjacent to edentulous spaces is the key to limiting further tooth loss.

Conclusions

When IFDs are placed in unilateral free-end edentulous spaces in the mandible, teeth in positions adjacent to the IFDs require more attention than the other remaining teeth.

Acknowledgments

The authors would like to express their appreciation to Kyushikai, the clinical research organization whose members participated in this study. This study was approved by the Ethics Committee of Tokyo Dental College (Approval no. 269). This research was carried out without funding. The authors reported no conflicts of interest related to this study.

References

1. Priest G. Single-tooth implants and their role in preserving remaining teeth: A 10 year-survival study. Int J Oral Maxillofac Implants 1999;14:181–188.
2. Krennmair G, Piehslinger E, Wagner H. Status of teeth adjacent to single-tooth implants. Int J Prosthodont 2003;16:524–528.
3. Misch CE, Misch-Dietsh F, Silc J, Barboza E, Cianciola LJ, Kazor C. Posterior implant single-tooth replacement and status of adjacent teeth during a 10-year period: A retrospective report. J Periodontol 2008;79:2378–2382.
4. Yamazaki S, Arakawa H, Maekawa K, et al. A retrospective comparative 8-year study of cumulative complications in teeth adjacent to both natural and implant-supported fixed partial dentures. Int J Prosthodont 2013;26:260–264.
5. Tamse A, Fuss Z, Lustig J, Kaplavi J. An evaluation of endodontically treated vertically fractured teeth. J Endod 1999;25: 506–508.