

Clinical Study about prognosis investigation of abutment teeth and surrounding tissues using magnetic attachments

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Abstract

Magnetic attachments are universally recognized for their practical value and are being widely used as magnetic attachment dentures in clinical dentistry. However, there are still few reports on the prognostic process of abutment teeth and surrounding tissues when using these magnetic attachments. Given the expansion of more effective magnetic attachment adaptation, the necessity of objective prognostic evaluation is very evident. Therefore, in carrying out integrated and objective evaluation of abutment teeth and surrounding tissues when using magnetic attachment, we aimed to analyze the evaluation methods commonly used by collaborating research institutes.

We collected prognostic data according to standard protocol using common evaluation manuals and evaluation sheets available in collaborative research institutes.

Although the prognostic evaluation based on the evaluation sheet and protocol was very effective in considering the adaptation of the magnetic attachment, it unfortunately confirmed that objective evaluation of abutment teeth and surrounding tissues remains extremely difficult.

Introduction

Magnetic attachments are recognized for their practical value and are being widely used as magnetic attachment dentures. Although this kind of investigation has previously been reported by Hoshiai et al.^{1,2)}, there are still few reports on the prognostic process of abutment teeth and surrounding tissues when using magnetic attachments. Given the expansion of more effective magnetic attachment adaptation, the necessity of objective prognostic evaluation from various viewpoints is very evident.

Objective

The purpose of this study was to compare evaluation methods that have been created in carrying out integrated and objective evaluation of abutment teeth and surrounding tissues using magnetic attachments which are common among collaborative research institutes.

Methods of investigation

We collected prognostic data according to standard protocol using common evaluation manuals and evaluation sheets available in collaborative research institutes, and analyzed various problems of these evaluation methods.

1. The common evaluation sheet

Figure 1 shows the evaluation sheet at the time of setting magnetic attachment prosthesis.

This was created by Nagata, The Nippon Dental University, at the Clinical Evaluation Committee of the Japanese Society of Magnetic Applications in Dentistry.

On the evaluation sheet, patient information, tooth defect type, intraoral photograph, PCR value, subjective evaluation of the patient, abutment tooth, and state of residual tooth are input. As shown in Figure 2, in addition to the evaluation sheet at the time of setting, there is also an evaluation sheet

has an evaluation sheet at recall.

However, when the condition of the abutment teeth are input into the set time sheet, the state of the abutment teeth are automatically reflected on the recall sheet. If there is a change such as "tooth extraction or loss" on the abutment teeth, it is necessary to make a special effort to correct the abutment teeth information on the recall sheet.

In addition, as a precaution, "the patient identification number can be unique to each university, but in order to make it possible to refer to the list, the responsible person in each university should insure that there are no duplicate numbers."

Figure 1 : the evaluation sheet at the time of setting magnetic attachment prosthesis

Figure 2 : the evaluation sheet at recall

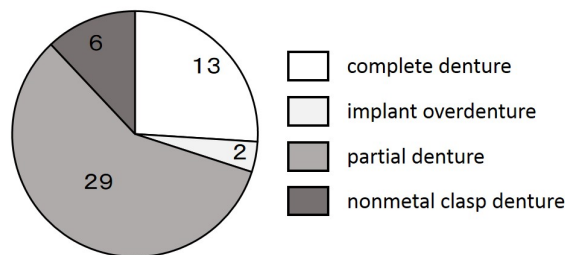
2. The subjects of the magnetic attachment prognostic investigation

The subjects of the magnetic attachment prognostic investigation are as follows:

- Patients who visited Aichi Gakuin University Hospital, Department of Prosthodontics from 2013 to 2017
- Patients who made prostheses using magnetic attachment
- Patients who are currently in recall

3. Applicable research subjects

There were 39 total applicable research subjects and among these 39 the following conditions and total numbers of incidence were observed: 1) Total magnetic attachment dentures: 50, and 2) Total abutment teeth: 84. Of the 50 dentures, there were 15 complete overdentures (including 2 implant overdentures), and 35 partial dentures including 6 nonmetal clasp dentures. Figure 3 shows the classification of the magnetic attachment dentures.



total magnetic attachment dentures : 50

Figure 3 : the classification of the magnetic attachment dentures

Results of investigation

1. The classification of the abutment teeth by tooth type

Figure 4 shows the results of the classification of the abutment teeth to be investigated by tooth type. It was found that the magnetic attachment was most adapted to both the maxillary and mandibular canine of the 84 abutment teeth we investigated. Conversely, there was little tendency to adapt to the mandibular central incisor and mandibular molar.

3	2	3	2	9	2	2	2	4	13	4	3	3	3
7	6	5	4	3	2	1	1	2	3	4	5	6	7
7	6	5	4	3	2	1	1	2	3	4	5	6	7
0	0	3	5	6	2	0	0	2	5	3	2	1	0

total abutment teeth : 84

Figure 4 : the classification of the abutment teeth by tooth type

2. The number of teeth lost

The number of teeth lost in the abutment teeth to which the magnetic attachment was applied during the five-year investigation period is shown in Figure 5. The total number of lost teeth totaled 13. Of these, 9 were via tooth extraction and 4 via teeth keeper detachment. Regarding these abutment teeth, it does not include continuation of recall after recreating the magnetic attachment.

1	0	0	0	0	0	0	1	2	1	0	0	0	1
7	6	5	4	3	2	1	1	2	3	4	5	6	7
7	6	5	4	3	2	1	1	2	3	4	5	6	7
0	0	0	1	1	1	0	0	1	2	1	0	0	0

the total lost abutment teeth : 13

Figure 5 : the number of teeth lost in the abutment teeth during the five-year investigation period

3. The 5-year survival rate

The 5-year survival rate of the abutment teeth to which the magnetic attachments were applied in this investigation was about 85%.

In a previous prognostic investigation of Hoshiai et al.¹⁾, the exact same 5-year survival rate was about 95%, and the 10-year survival rate was reported to be 88%. A very similar trend to the results obtained in this investigation was seen. Table 1 shows the comparison of 5-year survival rate of the abutment teeth between this investigation and the previous investigation of Hoshiai et al.

Results on the survival rate of the tooth type resulted in a high survival rate of the canines and premolars and a low survival rate of the anterior teeth and molars. However, the survival rate of the molars showed a high result when limited to a complete denture.

Table 1 : the comparison of 5-year survival rate of the abutment teeth

	the number of abutment teeth	the number of lost abutment teeth	5-year survival rate (%)
This investigation	84	13	84.5
previous investigation of Hoshiai et al.	250	12	95.2

Discussion

In this study, the prognostic investigation into magnetic attachment was conducted using common evaluation methodology used by collaborative research institutes. The following observations were made:

Despite the fact that investigation into the loss of abutment teeth is considered to be one of the most stable and simple evaluation methods in the prognostic investigation of magnetic attachments, it was discovered through this investigation that evaluation on detachment, resetting and remaking of the keeper, evaluation of the periodontal pocket and evaluation including the subjective factors of patients were very complicated and difficult.

Furthermore, the prognostic evaluation based on the evaluation sheet and protocol was very effective in considering the adaptation of the magnetic attachment, it unfortunately confirmed that objective evaluation of abutment teeth and surrounding tissues remains extremely difficult. In the future, we would like to further study the relevance of the evaluation items at the time of data analysis.

References

1. K. Hoshiai, Y. Tanaka, N. Hasegawa et al.: Longitudinal Study on Metal Plate Dentures with Magnetic Attachments, *J J Mag Dent*, 13(1), 1-8, 2004.
2. K. Hoshiai, R. Ito, M. Miwata et al.: Investigation on Longitudinal Survival Rates of Magnetic Attachments – Its relation to the probing depth of abutments - , *J J Mag Dent*, 20(1), 68-75, 2011.