

Using magnets to increase retention of lower dentures - case report

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Introduction

Oral diseases and the patient's history of dental treatments can compromise important jawbone characteristics. If possible, extractions should be avoided for all patients (1) who already suffered extensive bone loss because of the reduced stability and retention of the future denture, especially the lower one. Implants are a good solution but a healthy root system of teeth deteriorated above the gum line always surpasses the value of the artificial root due to the presence of periodontal ligament which enable the transmission of axial forces towards the alveolar bone.

The axial forces are essential in maintaining the height of alveolar bone. The magnetic attachment consists of the magnetic assembly and the keeper. The magnetic assembly is the main part of the magnetic attachment and consists of the magnet and its coating. The keeper is a metal part casted on the root cap which is attracted to the magnetic assembly.

It has to be noticed that magnets increase retention of partial or complete dentures and overdentures regardless of the path of insertion. Magnets are easy to use alone or together with any type of retainers. The most important aspect to be cleared is the influence of magnetism to human body. Modern magnets were tested in many aspects (cell toxicity, cell growth, allergic response) and the results meet international standards. The magnetic field leakage is extremely weak compared to daily use magnetic appliances. For a long time the saliva corrosion of rare-earth magnets was the reason which determined the decrease of magnetic attractive force. The problem was solved through the enclosure of magnets in anticorrosive steel with a small percentage of iron.

Objectives

Patient A.S., female, 62 years-old, came to the dental office for a complete rehabilitation complaining of chewing inefficiency and inesthetic appearance. She has a pathological history of osteoporosis and diabetes. The patient presented at the upper jaw two metalo-acrylic bridges (fig. 1, 2). The central incisors presented severe coronary destruction. Both fixed partial dentures presented mobility. The lower jaw presents only the frontal group of teeth united by a metalo-acrylic cantilever bridge with a two teeth distal extension only on the right side. Periodontal disease is extended and associated with labial and lingual gingival retraction at teeth 4.1, 3.1 and 3.2.

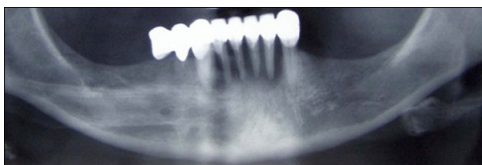


Fig. 1



Fig. 2

Material and Methods

The only tooth excepted from extraction was the left canine (3.3) because of its good implantation and stability. The surgical phase was executed and a 30-days period elapsed before the primary impression was made. During this period the endodontic treatment of 3.3 was completed. After the root canal treatment, this tooth was used for a cap-type magnetic appliance (Magfit, Aichi Steel Corporation, Japan) on the occlusal surface of the root cap. The preparation involves placing chamfered margin at the level of marginal gingiva and creating slightly divergent walls of root canal and slightly convergent for the axial walls (around 15°). Due to low lateral forces transferred to abutments, the dowel post can be shorter – about 5 mm or less. Also ferrule effect is useful in protection of abutments. Root cap embeds the keeper, which should be surrounded by proper thickness of metal; otherwise the possibility of casting defects will be high. The wax pattern cast with the bonded keeper is the critical laboratory phase; it is necessary to have at least 0,3 mm thick wax for a proper casting (fig. 3, 4).

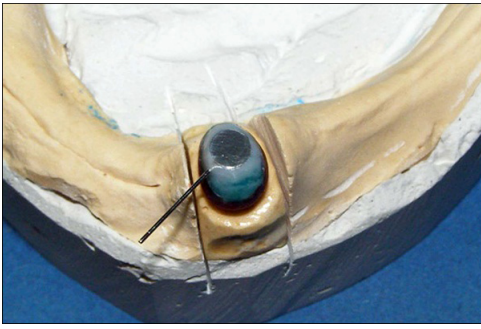


Fig. 3



Fig. 4

Results

Two complete overdentures were fabricated and the patient's esthetic appearance and chewing efficiency improved. The magnet's position is parallel with the occlusion plan in order to obtain better retention for the lower denture (fig. 5). The patient was instructed how to clean the denture in the area where the magnet is located (fig. 6). Placing the magnet on the lower canine did not disturb the esthetic appearance (fig. 7). The massive bone loss that began following extractions will be prevented around the kept canine (fig. 8).



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Conclusions

Rutkunas and Mizutani present the experimental superiority of studs regarding stabilization but underline that constant retentive properties of magnetic attachments assist abutment preservation. Decreased dexterity and multiple abutments could indicate the use of magnetic devices. Mizutani and al. compared the retentive force of magnetic (including Magfit) and mechanical attachments, concluding that magnetic attachments have adequate retentive force. Ono et al. support the use of magnets even when the bone supporting tooth is insufficient, the preservation becoming possible by reducing crown/root ratio. Chung et al. found a 18% decrease of retentive ability for Magnedisk system after 100 loadings but underline the ease of magnet replacing which can solve these situations.


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Poster Faksimile:



USING MAGNETS TO INCREASE RETENTION OF LOWER DENTURE

CASE REPORT



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INTRODUCTION

Oral diseases and the patient's history of dental treatments can compromise important jawbone characteristics. If possible, extractions should be avoided for all patients who already suffered extensive bone loss because of the reduced stability and retention of the future denture, especially the lower one. Implants are a good solution but a healthy root system of teeth deteriorated above the gum line always surpasses the value of the artificial root due to the presence of periodontal ligament which enable the transmission of axial forces towards the alveolar bone. The axial forces are essential in maintaining the height of alveolar bone.

CASE REPORT

Patient A.S., female, 62 years-old, came to the dental office for a complete rehabilitation complaining of chewing inefficiency and inesthetic appearance. She has a pathological history of osteoporosis and diabetes. The patient presented at the upper jaw two metalo-acrylic bridges (fig. 1, 2). The central incisors presented severe coronary destruction. Both fixed partial dentures presented mobility. The lower jaw presents only the frontal group of teeth united by a metalo-acrylic cantilever bridge with a two teeth distal extension only on the right side. Periodontal disease is extended and associated with labial and lingual gingival retraction at teeth 4.1, 3.1 and 3.2. The only tooth excepted from extraction was the left canine (3.3) because of its good implantation and stability. The surgical phase was executed and a 30-days period elapsed before the primary impression was made. During this period the endodontic treatment of 3.3 was completed. After the root canal treatment, this tooth was used for a cap-type magnetic appliance (Magfit, Aichi Steel Corporation, Japan) on the occlusal surface of the root cap. The preparation involves placing chamfered margin at the level of marginal gingiva and creating slightly divergent walls of root canal and slightly convergent for the axial walls (around 15°). Due to low lateral forces transferred to abutments, the dowel post can be shorter – about 5 mm or less. Also ferrule effect is useful in protection of abutments. Root cap embeds the keeper, which should be surrounded by proper thickness of metal; otherwise the possibility of casting defects will be high. The wax pattern cast with the bonded keeper is the critical laboratory phase; it is necessary to have at least 0,3 mm thick wax for a proper casting (fig. 3, 4).



Fig. 1. Mandibular radiographic status at referral.



Fig. 2. Initial clinical aspect.



Fig. 3. The wax pattern cast.



Fig. 4. Casted root cap.



Fig. 5. Parallelism between occlusal plane and magnet.



Fig. 6. Internal aspect of lower denture.



Fig. 7. Final clinical aspect.



Fig. 8. Final radiological aspect.

Two complete overdentures were fabricated and the patient's esthetic appearance and chewing efficiency improved. The magnet's position is parallel with the occlusion plan in order to obtain better retention for the lower denture (fig. 5). The patient was instructed how to clean the denture in the area where the magnet is located (fig. 6). Placing the magnet on the lower canine did not disturb the esthetic appearance (fig. 7). The massive bone loss that began following extractions will be prevented around the kept canine (fig. 8).

DISCUSSION

Rutkunas and Mizutani present the experimental superiority of studs regarding stabilization but underline that constant retentive properties of magnetic attachments assist abutment preservation. Decreased dexterity and multiple abutments could indicate the use of magnetic devices. Mizutani and al. compared the retentive force of magnetic (including Magfit) and mechanical attachments, concluding that magnetic attachments have adequate retentive force. Ono et al. support the use of magnets even when the bone supporting tooth is insufficient, the preservation becoming possible by reducing crown/root ratio. Chung et al. found a 18% decrease of retentive ability for Magnedisk system after 100 loadings but underline the ease of magnet replacing which can solve these situations.

CONCLUSIONS

Tooth loss and the imminence of wearing a mobile denture have a profound impact on the lives of the patients. In this case, the patient was feeling anxiety and even depression at the first stages of treatment when she was told that most of her teeth were subject to extraction and that she has to wear mobile dentures. Keeping the lower canine and using it in order to increase the stability and retention of the lower denture had also an important psychological effect. The technical simplicity, the usefulness for geriatric and handicapped patients, the increased control of jaw function trough the maintained periodontal ligament and the physiological action of magnetic forces in the tooth axis are arguments for the use of magnets.

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