

Case Report

Treatment of sharp mandibular alveolar process with hybrid prosthesis

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ABSTRACT

Background: Losing posterior teeth for a long time would occasionally lead to the sharpening of alveolar process. The removable partial denture usually have problems when used during mastication, because of the pressure on the mucosa under the alveolar ridge.

Purpose: The purpose of this case report was to manage patients with sharp mandibular alveolar process by wearing hybrid prosthesis with extra coronal precision attachment retention and soft liner on the surface base beneath the removable partial denture. **Case:** A 76 years old woman visited the Prosthodontic Clinic Faculty of Dentistry Airlangga University. The patient had a long span bridge on the upper jaw and a free end acrylic removable partial denture on the lower jaw. She was having problems with mastication. The patient did not wear her lower denture because of the discomfort with it during mastication. Hence, she would like to replace it with a new removable partial denture. **Case management:** The patient was treated by wearing a hybrid prosthesis with extra coronal precision attachment on the lower jaw. Soft liner was applied on the surface of the removable partial denture. Hybrid prosthesis is a complex denture consisting of removable partial denture and fixed bridge. **Conclusion:** It concluded that after restoration, the patient had no problems with sharp alveolar process with her new denture, and she was able to masticate well.

Key words: Sharp alveolar process, hybrid prosthesis, precision attachment, soft liner

ABSTRAK

Latar belakang: Kehilangan geligi posterior dapat menimbulkan processus alveolaris tajam. Gigi tiruan sebagian lepasan mempunyai masalah selama pengunyahan karena adanya tekanan di mukosa di bawah alveolar ridge. **Tujuan:** Tujuan laporan kasus ini adalah untuk menjelaskan cara menangani pasien yang mempunyai prosesus alveolaris yang tajam di rahang bawah dengan dibuatkan protesis hybrid dengan daya tahan extra coronal precision attachment dan soft liner di permukaan bawah basis gigi tiruan sebagian lepasan. **Kasus:** Pasien wanita berumur 76 tahun datang di klinik Prostodonsia Fakultas Kedokteran Gigi Universitas Airlangga. Pasien memakai gigi tiruan lekat rentang panjang di rahang atas dan gigi tiruan sebagian lepasan akrilik free end di rahang bawah, pasien mengalami masalah waktu mengunyah. Pasien tidak memakai gigitiruan lepasan rahang bawahnya karena tidak nyaman dipakai, dan pasien menginginkan pembuatan gigi tiruan lepasan rahang bawah yang baru. **Tatalaksana kasus:** Pada pasien ini dilakukan pembuatan Hybrid Prosthesis dengan daya tahan berupa extra coronal attachment di rahang bawah dan penggunaan bahan pelapis lunak yang diaplikasikan pada basis gigi tiruan lepasan nya. Hybrid prosthesis adalah gigi tiruan himpunan yang terdiri dari gigi tiruan lepasan dan gigi tiruan lekat. **Kesimpulan:** Hasil perawatan menunjukkan setelah mengganti gigi tiruan dengan gigi tiruan sebagian lepasan yang baru, pasien tidak mempunyai masalah dengan gigi tiruan yang baru akibat processus alveolaris yang tajam dan pasien dapat mengunyah dengan baik.

Kata kunci: Prosesus alveolaris yang tajam, hybrid prosthesis, precision attachment, bahan pelapis lunak

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INTRODUCTION

The main function of removable partial denture is to support the mastication process of the patients. In order to improve the function, it must be designed for the convenience of the patient. Unfortunately, in many cases, well designed removable partial denture still can not satisfy the patient's need. The reason is because the success of the treatment for dental structural lost cases with removable partial denture is also determined by certain factors such as aesthetics, mastication, and phonetics. Even though the removable partial denture is made according to the general clinical concepts, one of these three factors may still cause of failure.¹

The most common dental structural cases suffered mostly by elderly patients are usually related to the loss of posterior teeth, pain of the alveolar bone, the thinness of soft tissue, and the sharpness of the alveolar process. The attachment of the removable partial denture, nevertheless, will be uncomfortable during mastication on the upper alveolar process. The pressure then continues to the mucosa at the edge of the alveolar process and the surface base of the removable partial denture. Dentists should know and identify the detailed physical condition of the oral mucosa and structure according to the prosthodontic diagnostic index before designing a removable partial denture.

Precision attachment could be the right design to solve the problem of the posterior lower jaw. Compared to the wire clasp, it also has better aesthetics. Moreover, precision attachment can offer more biomechanical advantage than the wire clasp.² Another advantage of the precision attachment is that there are no buccal and lingual retention parts. Since the retention does not depend on the crown contour, the stabilization becomes better and the pressure produced by the supporting teeth becomes minimal. Eventually, patient will adapt more easily to the removable partial denture.³

However the use of precision attachment on the sharp alveolar process cases on the lower jaw still cannot solve the problem. The precision attachment should be combined with soft liner material applied on the bases of removable partial denture opposing the alveolar process. The function of soft liner is to cover the pain resulting from the mucosa pressure under the alveolar ridge during denture insertion.⁴

The aim of this case report was to improve mastication. Considering that, the removable partial denture with the sharp alveolar process of the lower jaw may still cause pain. Therefore, putting on the hybrid prosthesis with extra coronal precision attachment retention on the lower jaw and applying soft liner on the surface of the removable partial denture base will satisfy the patient's need.

CASE

A 76 years old woman patient visited Prosthodontic Clinic, Faculty of Dentistry Airlangga University. The

patient has a long span bridge on the upper jaw (Figure 1) and 34, 35, 36, 37, 38, 46, 47, 48 were lost. An acrylic removable partial denture on the lower jaw was made six months earlier. The patient could not masticate well, feel uncomfortable, and had not put on her denture for the past three months. There was no problem with the long span bridge on the upper jaw, yet she would like to have a new removable partial denture on the lower jaw.



Figure 1. Long span bridge on the upper jaw in the mouth.

CASE MANAGEMENT

On clinical examination, the patient wore long span bridge on teeth number 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26 and acrylic removable partial denture on the lower jaw. Patient has no problem with long span bridge on the upper jaw, the occlusion and radiographic photo were good and will be maintain as it is.

Anatomic duplication of her upper and lower jaws was conducted by using stock tray with irreversible hydrocolloid materials and was casted with type II hard gypsum in order to make diagnostic model (Figure 2).

Teeth number 33, 34 and 44, 45 were prepared for fixed splint before making the precision attachment on the lower jaw with extra-coronal attachment design. Teeth number 33, 34 and 44, 45 were prepared with a shoulder-formed gingival margin for the making of porcelain fused to metal material



Figure 2. Diagnostic model of upper and lower jaws.

(Figure 3). Extra-coronal attachment was located outside the crown contour. Generally, for female patient it is located on the removable partial metal denture of the lower jaw.



Figure 3. Lower jaw teeth preparation.

The next stage was duplicating the lower jaw in order to make the fixed splint. By using tray, the duplicating process of the lower jaw was conducted by using putty materials. The result, especially in 33, 34 and 44, 45 areas, was swapped about 2 mm, filled with regular duplicating material or light body, and then the duplicating of the lower jaw was conducted for the second time. Afterwards, the duplicating result was casted with type III hard gypsum and used as working model. The making of the fixed splint was for teeth number 33, 34 and the 44, 45.

The temporary cantilever bridge for teeth number 33, 34 and teeth number 44, 45 was made by duplicating diagnostic model with stock tray using putty materials. Afterwards, the duplicating areas of 33, 34 and 44, 45 were filled with self curing acrylic materials. It was then reduplicated into the patient's mouth and the result was the temporary cantilever bridge. The temporary cantilever bridge was smoothed, polished, and inserted into the patient's mouth. Next, it was followed with bite registration by using bite rim.

The working model of upper and lower jaw was put into the articulator, and sent to the laboratory to be prepared for the fixed splint with extra coronal attachment. After the fixed splint was copied, it was tested into the patient in order to check the occlusion. Finally it was sent back to the laboratory for finishing.

The fixed splint with extra coronal attachment was designed by using porcelain fused to metal, and tested into the patient in order to check the occlusion and the aesthetics (Figure 4). The semi-permanent cementation was conducted after the fitting the aesthetic was good.

The molding of the lower jaw was conducted for the second time by using putty material, teeth number 33, 34 and 44, 45 were swapped about 2 mm, and filled with regular molding material or light body, in which fixed splint was inserted in to the mold. The result of the molding then was filled with type III hard gypsum and used as working



Figure 4. Fixed splint of lower jaw with extracoronal attachment in the mouth.



Figure 5. The removable partial metal denture of lower jaw.



Figure 6. The maxillary long-span bridge and the mandibular removable partial metal denture inside mouth.

model. Then the bite registration was conducted on the working model of the lower jaw by using wax bite rim.

The molding of the upper jaw was conducted with stock tray and irreversible hydrocolloid. The result then was poured with type III hard gypsum and used as working model. The working models of the upper and lower jaws were placed on the articulator. After that, the removable partial metal denture was sent to the dental laboratory (Figure 5), before it was ready to be inserted into the patient.

In order to solve the problem with sharp alveolar process, the surface of the removable partial metal denture facing the anatomy surface was ragged and soft liner was applied on the surface of the removable partial metal denture base. The removable partial metal denture of the lower jaw then was inserted into patients (Figure 6). During

the attachment of the removable partial metal denture in the lower jaw, the occlusion was corrected by using articulating paper for adjustment in order to obtain the stable occlusion of the denture.

DISCUSSION

The structural loss with permanent deformity of the residual alveolar ridge occurred as the result of congenital defects, periodontal disease, and tooth extraction after surgical procedures. Therefore, removable partial denture is needed to maintain the defective function of mastication. In other words, the function of the removable partial denture is to maintain the remaining structure without causing any loss of the supporting teeth or health problems of the temporomandibular joint.⁵

Furthermore, since the surface of the lower jaw was smaller than the upper jaw and the production of the removable partial denture was not good enough. The removable partial denture may loosen or break easily. The patients will also have problem with the distal extension on both sides of the lower jaw and with the sharp alveolar process. As a result, better mastication function was surely required.⁶

In fact the distal extension of the removable partial denture was supported by two different tissues: the hard tissue that was supporting the teeth and soft tissue that was covering the mucosal area. These differences will cause the removable partial denture to rotate through three planes if pressure exists on the removable partial denture. Moreover, even a small pressure can still cause lifting power on the supporting tooth. If there was a pressure on the occlusal surface of the teeth, the removable partial denture would move and cause both rotating pressure on the teeth located at the most distal position and as well as trauma on the tissue. In other words, it was important to consider the supporting factors in choosing and deciding the design of the removable partial denture with distal extension.^{7,8}

The removable partial denture with the distal extension in the posterior area also has tendency to lift up during mastication of sticky food. Unfortunately, some types of wire clasp cannot prevent this movement, for example, when the removable partial denture rotates the edge of the wire clasp. The tendency of this rotation, however, can be prevented by combining structures known as indirect retainer.³

In addition, the indication of the use of extra coronal attachment can be determined by the condition of vertical height, mesio-distal space, and the distance between buccolingual teeth. It means that in order to fulfill the indication of using extra-coronal attachment, there must be enough distance for the vertical height, the wide mesiodistal space, and the wide bucco-lingual space on tooth number 33, 34, 44, and 45.

Furthermore, since the attachment does not make the removable partial denture to attached to the supporting teeth, but only to serve as a connection that enables

movements between two components of the removable partial denture, it was better to use the extra coronal attachment on the lower jaw. Thus, by using stress breaker, the pressure against the supporting teeth will be minimized. The use of precision attachment will not cause abrasion on the supporting teeth.^{2,3}

The removable metal partial denture and the aspects of aesthetic and retention of the precision attachment were better than the wire clasp. Nevertheless, the removable metal partial denture has some disadvantages that probably affect periodontal inflammation, abrasion on the abutment tooth, and make the wire clasp to move the abutment tooth when the removable metal partial denture was used in mastication.^{2,9}

Retention and stabilization of the removable partial denture depends on the maximum widening of the removable partial denture base covering the alveolar process, such as distolingual wing located physiologically on the retromylohyoid fossa. There will also be a problem on certain cases which the patients have sharp alveolar process. The pressure on sharp alveolar process during insertion period could be an anatomical problem. The base of the removable partial denture sometimes do not fit well and can reduce the retention and stabilization of the denture. Therefore, it was better to use soft liner on the removable partial denture base since it can reduce the pain during mastication. Moreover, since the characters of this soft liner material are elastic and viscoelastic, it can improve the convenience of the patients during mastication by protecting the mucosa and spreading the pressure evenly. As a result, optimal adaptation between the removable partial denture base and the processus alveolaris will be acquired. However, since the attachment system of the soft liner was not conducted chemically, but physically, the rigidity on the layer of the removable partial denture base were loosened. The loosening of the removable partial denture base must be conducted during the application in order to improve the retention.

The soft liner material has some weaknesses, soft liners could not resist longer, soft liner base must be replaced at least twice a year and then disinfection must also be conducted in order to prevent cross contamination.¹⁰ Thus, regular cleaning of the removable partial denture must be performed by using cleaners such as polydent, chlorhexidine, sodium hypochlorite, or glutaraldehyde.^{4,11}

It concluded that after restoration, the patient had no problems with sharp processus alveolaris with her new denture, and she was able to masticate well.

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