

## Case Report

## Aesthetic and masticatory rehabilitation on post mandibular resection with combination of hollow obturator and hybrid prosthesis

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### ABSTRACT

**Background:** Replacing tooth lost caused by caries, periodontal disease, trauma and neoplasm including ameloblastoma which requires mandibular resection is important. **Purpose:** The aim of the study to rehabilitation of post mandibular resection with combination of hollow obturator and hybrid prosthesis. **Case:** A patient 25 years old, male, for having prosthesis to cover defect due to post right mandibular resection. **Case Management:** In this presented case, mandibular plate was applied due to spreading defect with losing almost a half body of mandible (class II modification 2 according to cantor and curtis classification). The design of therapy was mandibular obturator using hybrid prosthesis (removable partial denture metal frame and fixed splint crown with precision attachment) with hollow obturator. The application was based on several advantages: good aesthetic performance, retention, stability, lighter weight and equal share of vertical load for teeth on non surgical site. The result of control I, II, III, showed that aesthetic performance, masticatory function, speech and swallowing were in good condition. **Conclusion:** The design of mandibular obturator using hybrid denture with hollow obturator could rehabilitate aesthetic performance, masticatory function, speech and swallowing for patient with post mandibular resection.

**Key words:** mandibular resection, hollow obturator, hybrid prosthesis

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### INTRODUCTION

Tooth loss can be caused by several factors such as caries, periodontal disease and trauma. A partial or complete tooth replacement is required to regain masticatory and lingual function, to improve aesthetic and sustain tissue health.<sup>1</sup>

Tooth loss is also contributed by another factor i.e neoplasm including ameloblastoma. Neoplasia is uncontrolled process of abnormal cell growth resulting in neoplasm (tumor).<sup>2</sup> Ameloblastoma is local and benign odontogenic epithelium neoplasm which has wide spectrum of histological pattern as an initial odontogenic. Among odontogenic cyst and tumor, 1% is ameloblastoma and over 80% occurs in lower jaw, mostly in molar and ramus region. Eversole<sup>4</sup> suggested that ameloblastoma

possibly stems from epithelial rest in Malassez, reduced by enamel epithelium covering impacted tooth or gingival epithelium.

Losing a part of mandible might be caused by trauma, congenital defect, osteoradionecrosis, and surgical intervention by removing tissue of malignant neoplasm. A patient losing a part of the mandible would result in lacking of all stomatognathic system due to partial glossectomy and pharyngectomy so that the oropharyngeal will not function well.<sup>5</sup> It is frequently found that ameloblastoma involves the bone of mandible, metastasis might occur resulting in mandible resection, consequently defect would occur due to surgery treatment and special care using obturator would be necessarily performed.<sup>6</sup>

Laney<sup>7</sup> suggested some reasons to determine the necessity of obturator application, such as: bad prognosis,

general condition which contra indicated to total anesthesia during surgical performance, major defect which would contribute difficulty to perform reconstructive surgical treatment in addition to chemotherapy which would worsen the treatment outcome.

Obturator in the form of metal frame denture and hollow obturator, made after recovery period as permanent obturator. The principles of obturator design should be stable, retentive and light.<sup>8</sup> Obturator is not a permanent restoration due to the function and the accuracy are affected by the alteration of supporting and adjacent tissue.

Hollow obturator is an obturator with cavity (hollow) in the middle part to make the obturator light so the weight of obturator will not contribute to pressure rotation and dislodging of the remaining abutment teeth.<sup>9</sup> The process of hollow obturator is more difficult compared to ordinary obturator. Impression procedure with double impression has been successfully done in the process of hollow obturator.

Grossman<sup>10</sup> suggested that mandibular obturator is a method to rehabilitate masticatory, speech, swallowing and aesthetic for patient post mandibulectomy. Obturator is supported by resin bonded extra coronal resilient attachment as buccal retention. Prosthetic treatment with resin bonded metal casting modified in abutment contour, was splinted to primary abutment in order to add the support, stability and retention on mandibular obturator.

Based on the above explanation, resin bonded extra coronal resilient attachment could be done on mandibular defect by considering the patient's systematic positive point of view.

Hybrid prosthesis is a complex removable partial denture (RPD) with some bridges and some removable parts and indicated if the fixed denture is unable to replace all the damaged tissue caused by widely damaged tissue due to trauma or required obturator.<sup>11</sup>

Precision attachment is a fabricated tool consisting of male (patrx) and female (matrix) component forming precise attachment, separated one another, and could be independently removed by the patient and functioning as a retainer for RPD or combined fixed splint crown (hybrid prosthesis). In practice, precision attachment is applied on permanent and removable partial denture, over denture and implant denture. The types of precision attachment based on location are as follow: intracoronar attachment and extracoronar attachment,<sup>12</sup> intraradicular attachment and extraradicular attachment. Extracoronar attachment is located in the outer part of crown countour. The male part is in the abutment tooth and the female part is in the removable partial denture. In extracoronar attachment, the effect of masticatory pressure in the length of abutment tooth is higher than intra coronar attachment. If the location of attachment is closer to cervical part of abutment tooth, the stability would be higher.

The advantage of using extracoronar attachment is minimal tooth reduction so tooth devitalization procedure could be avoided, having an ability to sustain normal

contour of crown and insertion direction is easier.<sup>12</sup> The patient should be recommended to keep his oral hygiene well to avoid irritation of periodontal tissue due to debris entrapment and the formation of calculus.

This study discussed about the rehabilitation of patient with post mandibular resection to regain aesthetic performance, masticatory function, speech and swallowing by applying mandibular hollow obturator using hybrid prosthesis.

## CASE

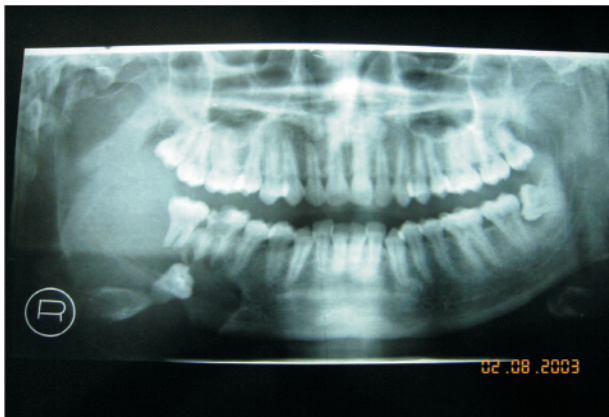
A 25 year old male patient came to Dental Hospital, Faculty of Dentistry Airlangga University, referred from Dr. Soetomo General Hospital for having prosthesis to cover the defect due to post right mandibular resection. Three months prior to surgical treatment, the patient came to a hospital in Banyuwangi due to increased swelling of right lower jaw which disturbed the aesthetic and mastication, then the patient was referred to Dr. Soetomo Hospital. The surgical treatment was performed on June 8, 2005 at Oral and Maxillofacial Surgery Department, Dr. Soetomo General Hospital, with the diagnosis of benign tumor in mandible



**Figure 1.** Pre-operative patient's profile (side view).



**Figure 2.** Pre-operative patient's profile (front view).



**Figure 3.** Pre-operative radiograph.

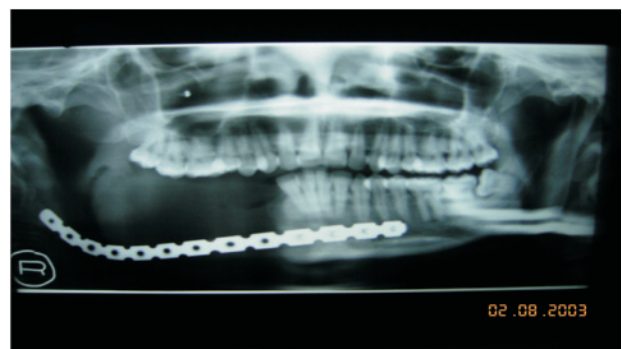


**Figure 5.** Post operative patient's profile (side view).

(ameloblastoma). The patient's profile appearance, intra oral condition and radiographic finding prior to surgical treatment shown in figure 1, 2 and 3. Chemotherapy and radiotherapy were not post operatively performed.

On extraoral examination, the eyes, nose, lips, and were normal, the face was asymmetrical and oval. On intra oral examination: defect on right mandible was indicated as class II modification 2 according to Cantor and Curtis.<sup>5</sup> The lost tooth were: 43, 44, 45, 46, 47, right mandibular resection ranging from teeth 43 to mandible angulus. Dental calculus was slightly found in almost all region, occlusion was still presented. The relation of posterior left teeth was cusp to marginal ridge 25 with 35, cusp to fossa 26 with 36 and 27 with 27. Overjet and overbite were respectively 3 mm, dynamic occlusion: unilateral balance occlusion, premolar and molar right vestibulum were deep, low lingual frenum, right mandibular flat ridge, ridge relation with transversal plane  $\geq 80^\circ$ , normal front, flat torus mandibular, exotosis was not presented, right and left retromylohyoid were deep. Patient's post operative profile could be seen on figures 4, 5 and 6.

On radiographic examination: mandibular plate was seen from right angle of mandible to 35. Based on the above condition, clinical diagnosis was established: post



**Figure 6.** Post operative radiograph.

resection of right mandible due to ameloblastoma removal; defect classification: class II modification 2 according to Cantor and Curtis<sup>5</sup> and chronic gingivitis marginalis due to dental calculus on the upper and lower jaw.

In this case, mandibular obturator using hybride prosthesis (a complex removable partial denture with metal frame, and fixed denture with precision attachment) with hollow obturator was planned.

Fixed splint on 31, 32, 41, 42 with lingual milled, extracoronal attachment type anchor on 42. Double Akers was used on 35 and 36, with acrylic teeth.



**Figure 4.** Post operative patient's profile (front view).

#### CASE MANAGEMENT

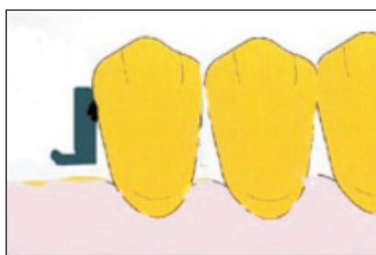
In this presented case, mandibular obturator using hybrid prosthesis with hollow obturator was planned. The initial treatment was done by removing dental calculus followed by making of the upper and lower jaw impression using alginate. More amount of alginate material was given on the impression tray of right lower jaw due to deep defect so that the deepest region of the defect could be recorded. Impression was filled with type 2 hard gypsum to get anatomical model while the base was made of plaster.

Anatomical model of lower jaw was covered by red wax limited to obturator outline and prosthesis. Self curing



acrylic was placed on the surface of red wax to form individual tray. Temporary crown of anatomical model was made for 31, 32, 41, 41, by duplicating anatomical model, Preparation was done on the duplicating model. Next, pontic was made from sheet wax and impression was taken with alginate material. Vaseline was given on the surface of duplicating model and the impression was given self curing acrylic no 4. After setting, it was removed and polished. Crown preparation was done on 31, 32, 41, 42 for fixed splint crown. Local anesthesia was previously performed before crown preparation in which it should be done not more than 2 mm considering dentine thickness, so that it would not involved the pulp.

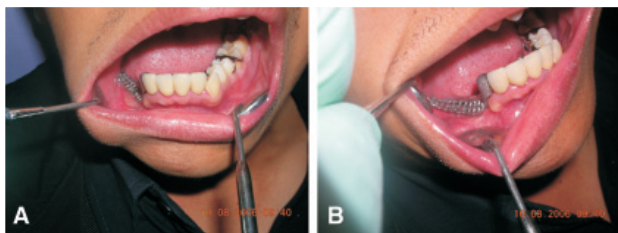
The next step, individual tray was tried in patient's mouth and adjustment would be done if necessary. Gingi master material was given on the surrounding cervical 31, 32, 41, 42. It was left for 1-2 minute to achieve detailed cervical edge of functional mold. Impression was done with double impression i.e putty and light body while muscle trimming was performed. After the material was hardened, the tray was removed from patient's mouth. The impression was filled up with type III hard gypsum to form working model. Maxillary and mandibular working model was sent to dental laboratory to make fixed denture with precision attachment on 42.



**Figure 7.** Extracoronal attachment on 42.

On the following visit, adjustment of fixed denture and precision attachment on 42 was done (Figure 7). After well adjusted, impression was made using polyvinyl siloxane material in individual tray, then the result was sent to dental laboratory for further process of metal frame. Trial was also performed to know whether convenience was achieved between metal frame and the precision attachment (Figure 8).

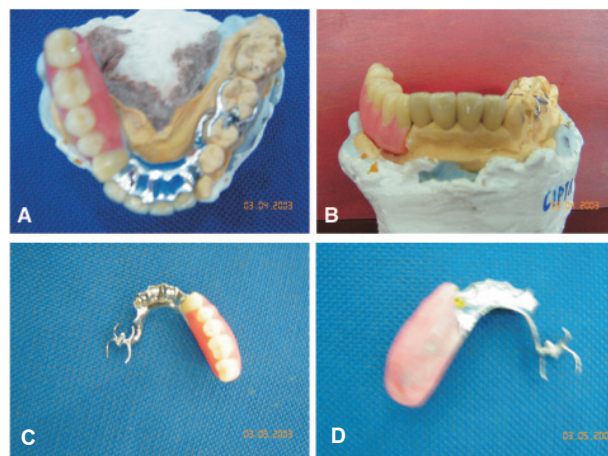
Glass ionomer cement type I (Fuji I, GC Japan) was used for cementing the fixed denture. Bite rim was made



**Figure 8.** (A) Trial fitting of metal frame and fixed denture with metal frame front view and (B) side view.

from hard sheet wax supported by 0.7 mm wire on the metal frame. Before bite adjustment, the patient was previously trained to open and close his mouth to achieve appropriate occlusion due to horizontal deviation which frequently occurred on the right lower jaw. Bite rim was softened, then put in the patient's mouth to obtain appropriate occlusion, and then returned to working model. Fixation was done on upper and lower jaw working model of lower jaw. After that maxillary and mandibular working model were fixated.

Prior to tooth alignment in the articulator, choice of tooth color was approved, followed by trial of wax mandibular obturator. Evaluation was done to determine whether the condition and the occlusion appropriate for the patient. Evaluation was done using mirror and the patient was involved during the process. Working model of lower jaw as well as mandibular obturator were removed from the articulator and implanted in the cuvet. Hollow obturator technic was done during acrylic processing by giving the space in order to reduce its weight. After finishing and polishing process were performed (Figure 9), mandibular obturator was adjusted in the patient's mouth. The evaluation was done on the aesthetic performance, occlusion, retention, stability and the possibility of pain. Selective grinding was



**Figure 9.** (A) Acrylic on model (sagittal view), (B) Acrylic on model (front view), (C and D) RPD acrylic with hollow obturator.

performed in the patient's mouth cavity using articulating paper. Premature contact was reduced to obtain good occlusion and equal tooth contact.

After selective grinding process was completed, mandibular obturator was inserted into the patient's mouth. The patient did not complain any pain, however, he still felt awkward with the new condition but quite satisfied with the aesthetic performance (Figure 10). Next, the patient was informed how to wear and to clean it. In the first 24 hours, mandibular obturator was recommended not to be used for eating but only for adaptation and must be worn during sleeping. The patient was also advised to have a regular control (three times) i.e: control I (one day after



**Figure 10.** (A) Patient's profile after insertion (front view), (B) Patient's profile after insertion (side view).

insertion), control II (7 days after insertion) and control III (one month after insertion).

Control I: mandibular obturator had been applied and the patient did not feel any pain. On intra oral examination occlusion and mucosal disorder was not found, no significant complaint was presented, the stability was good even the patient felt satisfied with the new aesthetic performance.

Control II: no complaint was presented, good occlusion stability shown on intra oral examination no lesion was found during prosthesis wear. The patient was recommended to use mandibular obturator during meal time, consuming soft food and mastication was done using left lower jaw to reduce the load on the right side.

Control III: mandibular obturator had been applied consuming fairly solid food and right lower jaw was carefully used. No complaint was presented. On intra oral examination good occlusion and stability shown, lesion due to prosthesis wear was not found. The patient was advised to have a regular control in every 6 month period for follow up.

## DISCUSSION

Tooth loss due to dental caries, periodontal disease, trauma and neoplasm including ameloblastoma requires replacement to achieve regaining of masticatory and speech function, aesthetic as well as to maintain tissue health.<sup>1</sup> In general, surgery is needed for patient with ameloblastoma by performing mandibular resection though it is based on the type of ameloblastoma.<sup>14</sup>

Many ways of rehabilitation on post mandibular resection are done based on the size of the resection. The use of implant is the choice of optimal treatment and it can contribute to functional and aesthetic regain for the patient.<sup>15</sup> The removal of ameloblastoma would involve large defect requiring almost half of the mandible from the ramus up to the symphysis of mandible. Mandibular plate is post operatively used to connect surgical and non surgical part of the mandible, therefore vertical loading

force should be well considered especially in prosthesis design. The outcome of surgical treatment shows good recovery, no significant disorder and good prognosis. The therapy of this case is mandibular obturator using hybrid prosthesis (metal frame denture and fixed splint crown with precision attachment) with hollow obturator.

The main reason in choosing this therapy is the advantage for the patient especially considering the number of tooth loss, resecting half body of mandible from surgical and nonsurgical site connected by mandibular plate, therefore it can contribute more aesthetic, retention, stability, lighter weight of prosthesis and equal share of vertical load on the remaining teeth on non surgical site.

The advantage of using hybrid prosthesis is that the patient can independently wear or remove the prosthesis so it can be easily cleaned, consequently, the health of oral cavity can be well maintained. Equal vertical load on mandibular plate resulting stable position of the plate can be maintained and removed from its position or fracture on non surgical site can be avoided. The application of precision attachment include a component of male (patrix) and female (matrix) forming precise connection, separating one another, removable and functioning as a retainer on RPD or combination of hybrid prosthesis. Precision attachment can contribute good additional retention and can equally share vertical load on the remaining natural teeth. The application of hollow obturator can reduce the heavy load of mandibular obturator which might cause the occurrence of pressure, rotation and dislodging of the remaining abutment teeth.<sup>16</sup>

Three important factors which would determine the success of maxillofacial prosthesis are the creativity of the operator, the technical mastering and the material in which those three factors would support a prosthodontist to express his maximal talent.<sup>17</sup>

The patient does not show concave appearance on the right buccal, therefore, right and left buccal are symmetrical and it would give psychological support to make the patient more confident in social life. The patient recommended to keep his oral cavity clean especially the extra coronal precision attachment of fixed denture and metal frame

denture. To observe the general condition of oral cavity as well as the prosthesis the patient is suggested to have regular control in every 6 months period.

It is concluded that mandibular obturator design using hybrid prosthesis (RPD metal frame and fixed splint crown with precision attachment) with hollow obturator is applicable to rehabilitate masticatory function, esthetic, speech and swallowing in patient post mandibular resection.

## REFERENCES

1. Osborne J, Lammie GA. Partial denture. 5<sup>th</sup> ed. Oxford, London, Edinburgh, Boston Palo Aito, Melbourne: Blackweel Scientific Pub; 1979. p. 20–40.
2. Hosa Practice Test: Medical spelling world list. Available at: [Http://www.mmachs.Meridian.school.org/HOSA/meridian%20Spelling%20\(MS\).doc](http://www.mmachs.Meridian.school.org/HOSA/meridian%20Spelling%20(MS).doc). Accessed June 25, 2006.
3. Marquette University School of Dentistry. Oral & maxillofacial pathology, ameloblastoma. Available at: [Http://www.dental.mv.edu/oral\\_path/lesions/ameloblastoma.Htm](http://www.dental.mv.edu/oral_path/lesions/ameloblastoma.Htm). Accessed July 20, 2006.
4. Eversole LR. Ameloblastomas with pronounced Desmoplasia. *J Oral Maxillofac Surgery* 1984; 42:735–40.
5. Mc Givney GP, Castleberry DJ. Mc Cracken's: Removable partial prosthodontics. 9<sup>th</sup> ed St Louis, Toronto, Princenton: The CV Mosby Company; 1995. p. 476–88.
6. Josef MK. Penatalaksanaan pemakaian resilient denture liner dalam pembuatan hollow obturator (kasus post hemimaxillectomy). Karya Tulis Akhir Program Pendidikan Dokter Gigi Spesialis Universitas Airlangga. 2005. p. 1–9.
7. Laney WR. Mc. Cracken's removable partial prosthodontics: Maxillofacial applications of removable partial prosthodontics. 7<sup>th</sup> ed. St. Louis, Toronto, Princeton: The CV Mosby Company; 1985. p. 443–59.
8. Boediono I, Soeprapto. Hollow acrylic resin obturator. *Pekan Ilmiah Kedokteran Gigi Terapan Nasional. Kongres Nasional ke VII PABMI*, 1998. p. 101–4.
9. Kobayashi M, Oki M, Ozawa S, Inoue T, Mukohyama, Takato T, Ohyama T, Taniguchi H. Vibration analysis of obturator prostheses with different bulb height designs. *J Med Dent Sci* 2002; 49:121–8.
10. Grossman Y, Madjar D. Resin-bounded attachments for maxillary obturator retention: A clinical report. *J Prosthet Dent* 2004; 93(5): 229–32.
11. Watt DM, Mac Gregor AR. Designing partial dentures. 1<sup>st</sup> ed. Edinburg: Johns Wright & Sons Ltd. Published Ynder The Wright Imprint; 1984. p. 183–7.
12. Staubli MDT, Bagley AS. Attachment & implants references manual. 2<sup>nd</sup> ed. Attachment International Inc. 2002; p. 1–10.
13. Preiskel HW. Precision attachment in dentistry. 2<sup>nd</sup> ed. St. Louis, Toronto, Princeton: The CV. Mosby Company; 1973. p. 41–111.
14. Neville BW. Oral and maxillofacial pathology. 2<sup>nd</sup> ed. South Carolina: Saunders; 1984. p. 611–9.
15. Oelgeisser D. Rehabilitation of irradiated mandible after mandibular resection using implant/tooth-supported fixed prosthesis: A Clinical report. *J Prosthet Dent* 2004; 67:310–4.
16. Aramany MA. Basic Principles of obturator design foe partialy edentulous patient. Part I: Clasification. *J Prosthet Dent* 1978; 40: 554–7.
17. Rahn AO, Boucher LJ. Maxillofacial prosthetics-principles and concept. 2<sup>nd</sup> ed. Philadelphia: WB Saunders Co; 1970. p. 39–83.