

Case report

## **Evaluated of Ameloblastoma Treatment with Oxygen Hyperbaric Therapist through Panoramic Radiographs**



This paper was presented in a poster presentation at event the 9<sup>th</sup> ACOMFR

Khoironi E<sup>1</sup>, Cahyo Benny D<sup>1</sup>, Laihah Fanny M<sup>1</sup>, Firman Ria N<sup>2</sup>, Azhari<sup>2</sup>,  
<sup>1</sup>Department of Dentomaxillofacial Radiology, Faculty of Dentistry, Hang Tuah University, Surabaya, Indonesian.<sup>1</sup> and <sup>2</sup>Department of Dentomaxillofacial Radiology, Faculty of Dentistry, Padjadjaran University, Bandung, West Java, Indonesian.

This paper was presented in a poster presentation at event the 9<sup>th</sup> ACOMFR

*dmu Chen*

## Case report

# Evaluated of Ameloblastoma Treatment with Oxygen Hyperbaric Therapist through Panoramic Radiographs

Khoironi E<sup>1</sup>, Cahyo Benny D<sup>1</sup>, Lailah Fanny M<sup>1</sup>, Firman Ria N<sup>2</sup>, Azhari<sup>2</sup>,

<sup>1</sup>Department of Dentomaxillofacial Radiology, Faculty of Dentistry, Hang Tuah University, Surabaya, Indonesian.<sup>1</sup> and <sup>2</sup>Department of Dentomaxillofacial Radiology, Faculty of Dentistry, Padjadjaran University, Bandung, West Java, Indonesian.

*Back ground: ameloblastoma is a tumor originating from the enamel organ tissues, which did not change where the main treatment is by dredging techniques. This dredging process often causes sizable cuts, so that the healing process runs long. Hyperbaric oxygenation therapy can help the healing process by influencing the mechanisms of leukocytes, osteogenesis / neovascularization and osteoclastic activity.*

*Materials and methods: This study is the case report of one case that had performed at Naval Hospital dr. Ramelan, Surabaya, east Java, Indonesia. Evaluated is done by analyzing the healing process through panoramic radiography before and after the therapy performed.*

*Result: After evaluation of the data obtained, that the healing process that occurs after hyperbaric oxygenation therapy was more rapid than in the no treatment hyperbaric oxygenation therapy.*

*Conclusion: Hyperbaric oxygenation therapy is able to accelerate the process of post-operative wound healing.*

**Key Words:** ameloblastoma, hyperbaric oxygenation, healing process

### Correspondence:

Emy Khoirony

Office: Department of Radiology, Faculty of Dentistry, Padjadjaran University

Address: Sekeloa Selatan I Bandung, West Java, Indonesia

Post Code: 40132

Telephone/ Fax: +62-22-2532683

Hp: 081330349837

E-mail: emykaha@gmail.com

## Background

Ameloblastoma is a benign tumor which grows slowly and originated from developing odontogenic embryonal cells. It is a benign lesion that tend to be locally invasive dan consist of proliferative odontogenic epithelials in a connective tissue stroma.

This tumor is much more commonly appearing in the mandible (80%) than the maxilla (20%), may occur in any age level, but the highest incidence at the age 20-49 years old. At the early stage, it grows so slowly and give no pain complaint, so it is hard to do early diagnosis. Patients commonly come to the dentist at the late stage as the pain arise from tumor growth or facial deformities. Ameloblastoma mainly originated from the inner part of the bone except the peripheral ameloblastoma. This tumor grows slowly and do not give any pain symptom at the early stage, so it is hard to diagnose at the early stage, except it is found accidentally on radiograph examination, or on the biopsy result of unsuspected lesion.

## Clinical Manifestation

Clinical manifestations of ameloblastoma are vary depend on lesion sites, mandible or maxilla, dan complaints commonly appear at the late stage. The tumor mass will continuously grows bigger and expand to any directions inside the jaw, push and destroy the bone structure, and also the surrounding soft tissues. This condition eventually lead to facial deformity.

The oral mucosa around the tumor is not commonly ulcerative, except secondary infection occur. Buccal mucosa will commonly tensely stretch over the tumor mass. And also the surrounding skin will tensely stretch and sheen. The tooth position around the tumor change and run

into mobile. The pain arise when secondary infection or surrounding nerve suppression occur.

## Radiography

Radiographic image is very important for careful examine of the tumor. The ameloblastoma lies inside the jaw bone so that radiographic image may be used to establish the diagnose and also to obtain site, size, shape of the tumor and its relation with surrounding tissue.

The radiographic images of ameloblastoma are vary, in general, this tumor appear as a radiolucent area and may be divided as follows:

- a. Interdental type
- b. Monocystic type
- c. Polycystic type

On the interdental type, the radiological image shows radiolucent area in between the roots. Commonly it has a small size and if it grows bigger then the alveolar part of the adjacent bone will be lost. Cementum resorption will also occur so that the tumor looks like invaded the basal bone. This type of tumor commonly originated from the rest of periodontal membrane cells, so the lamina dura at the involved side will be wrecked.

The monocystic type is difficult to distinguish with odontogenic cyst, particularly dentigerous cyst. There are a few mark which can be used to distinguish ameloblastoma with a cyst, those are:

1. An indentation / discontinuity on the capsule wall or on the bone nearby.
2. Shift / migration of the adjacent teeth.
3. The root looks bare inside the tumor / resorption over the roots expanded through the involved tissue.

Polycystic type reveal overlapping multicystic shadows on radiograph, that give a bubble soap image. With the presence of connection between the big size cyst and the small size cyst indicate

that the tumor have been in the late stage and the bone have widely invaded. While the beehive image is appear when the tumor have been invading the cancellous bone. The polycystic or multicystic type are the most common to be found.

The stage of healing process of the post extraction wound and the excision surgery of the ameloblastoma involve the inflammatory phase, proliferative phase, dan maturation phase or remodeling phase which occur in the soft tissue or the bone tissue.

Ossification stage is replacement of necrotic tissues by the new cells dan matrix starts at day 5 and so on. The new bone remains rough, young, and fibrous which form at day 10. The bone formative cells need adequate number of oxygen.

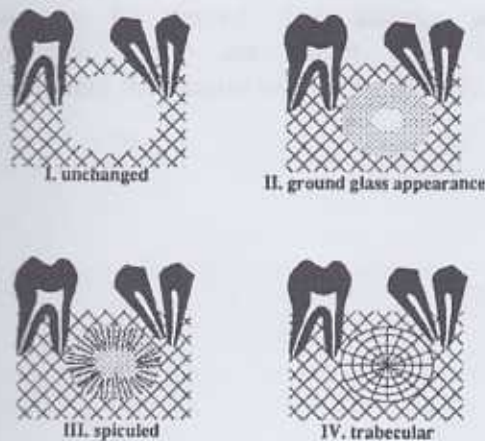
Recovery phase or bone reconstruction in which the osteoblast and osteoclast cells have a role marked with alteration of young lamellae with mature bone lamellae occur in a few months until years and resorption of the bone by the osteoclast at day 25 up to approximately four months. At the fourth week the bone formation starts to be active which then to be a group of new bone lies between a new bone with the others to form trabecular bone and on the twelfth week the bone formation become more apparent.

Schematic drawing of radiographic features of interior of surgical site observed during course of bone healing after removal of ameloblastoma:

- I. Unchanged: radiographic features of internal surgical site show no change after operation.
- II. Ground glass appearance: peripheral portion of surgical site shows ground glass appearance.
- III. Spiculated: radial bone spicules are found in peripheral portion.
- IV. Trabecular: surgical site is regenerated with normal cancellous bone architecture.

#### Hyperbaric Oxygen Therapy

Hyperbaric oxygen therapy is a medical treatment which sets a patient to be in a pressurized chamber and breath with 100% oxygen or less, with pressure level bigger than 1 atm (760 mmHg) technically using monoplace chamber, and the pressure given by 100% of oxygen or a multiple recompression chamber which gives 100% of oxygen pressure through an oxygen mask or endotracheal tube. The objective of this therapy is to increase oxygen distribution to the whole body by increasing partial pressure of oxygen in the plasma. It based on Henry's law which states that the gas concentration which dissolves directly in a liquid is proportionate with the pressure given to the gas. Increasing of the pressure level up to 2 – 3 ATA to the whole body while breathing will also increasing leukocyte activity, normal vasoconstriction of the blood vessel, restoration of fibroblast growth and collagen production, increasing osteoclast activity, increasing capillary proliferation.



*Imura dan*

**Case report**

A 39 year old male came to the Oral Surgery department of RSAL Dr. Ramelan, Surabaya, East Java, Indonesia on November 2011 with history of swelling on lower jaw for 7 years. The swelling was getting bigger without any complaint of pain. Since a year ago the pain was arise on the swelling area.

**Clinical Examination**



General status: good, compos mentis, afebrile

Swelling was found on the buccal site starts from lower left molar region into right molar region accompanied with pain. Intra oral examination found a swelling on lower jaw mucosa start from left permanent first molar through right permanent first molar, the swelling was smooth, red bluish color, localized, and can not be moved. The anterior and posterior teeth are intact, the left permanent first molar was move distally.

**Radiographic Examination**



CT scan 3D: destruction and erosion at regio mentale accompanied with bulging soft tissue replacement inside with density value 0 to 45 HU, size approximately 2,87 x 5,35 x 2,91 cm without any evidence of lesion exceed the cortical line even a defect was found on the anterior and posterior side of mandible. Suspect for ameloblastoma.

**Panoramic radiograph:**



radiolucency with well-defined border from apical 36 extends to mandibula border and alveolar bone at regio 31,32,33, and apical 41,42,43 up to 46. Root migration of 35 and 46 to distal direction. Root resorption over 32,31,41,42. Right mandibular canal is not visible and Size of the lesion 45mm x 128mm.

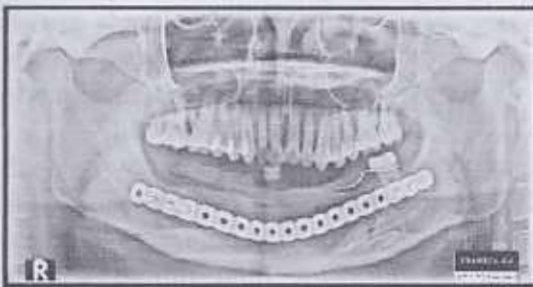
### Histopathology Examination

Tissue section shows ameloblast cells which arranged in circles, mixomastic tissue stroma with stellate cells. Necrotic bleedings were found accompanied with suppurative chronic inflammation. No sign of malignant. Conclusion: mandible ameloblastoma.

### Therapy

Extracted of involved teeth 35,32,31,41,42,43,44,45,46 dan retained root 47. Dredging method surgery, i.e. excision of the entire ameloblastoma lesion, rarefaction of the involved bone as far as the healthy tissues achieved. Followed by placing of bridging plate at regio 36 up to 47 with 6 screws and placing of the obturator. Given medicines were: ciprofloxacin injection 1 gr/12 hours, ketorolac injection ampoule / 8 hours, transamin 500 mg / 8 hours, ranitidine injection 10 mg, followed by serial oxygen hyperbaric therapy. Evaluation was done on radiographic examination result before excision of ameloblastoma, three months fourteen days and seven months and twenty four days after therapy. Broad of lesion measured and analyzed radiographic.

### Result



Three months fourteen days after surgical therapy and hyperbaric oxygen, the panoramic radiograph examination was done and showed radioopaque mass from regio 38 to 34. On anterior region of

mandible border and right mandible at regio 44,45,46,47,48 near the base plate. The size of radiolucent lesion was getting smaller.



At seven months and twenty four days after therapy, the bridging plate was removed and the panoramic radiograph examination was taken. It shows the density on radioopaque lesion site was increased, right mandibular canal appears. the size of the lesion declined to 13,78 mm x 52,72 mm.

### Discussion

Dredging method is a conservative surgical treatment which aim to removed the tumor mass and restore the shape and function of normal jaw to prevent defect caused by surgical procedure. On the first step, pressure reduction (deflation) or enucleation was done to the tumor mass. After removal of the tumor mass, the lesion site remains empty. The site was left opened and frequently cleaned from food debris.

Eventually, the bone surface inside the hollow will form new bone. But the mesenchymal cells on the newly formed bone turns into a scar tissue and hamper subsequent bone formation, thus the scar and the remaining tumor have to be removed at once. This measure was done repeatedly at interval of two up to three months to recover the hollow perfectly.

On the case of extensive ameloblastoma and wound caused by

excision operation procedure of ameloblastoma and extraction of the involved teeth may cause extensive tissue destruction lead to blood vessel destruction, thus the injured tissue metabolism needs increased. The local ability to support those changes are limited thus the local energy crisis and hypoxia occur on the lesion site. Administration of hyperbaric oxygen as adjuvant therapy plays an active role on the wound healing process by increased of fibroblast replication and collagen production. Oxygen may improve leukocyte ability to kill bacteria and generate epithelialization on the wound site. PO<sub>2</sub> may maximally increased by neovascularization to fill the hollow with cartilage structure or blood vessel, including leukocyte and antibiotic effect on focus infection. Oxygen are able to improve osteoclast activity to remove defective bone.

On Three months fourteen days , evaluation was done radiographically on panoramic radiograph which a radioopaque mass from regio 38 to 34 and on the anterior region of mandibular border and also right mandibular region 44,45,46,47,48 near the base plate. The radiolucent lesion size are getting smaller.

On seven months and twenty four days the bridging plate was removed, and the panoramic radiograph was taken, reveals that the density of the radioopaque lesion increased, the lesion size was getting smaller 13,78 mm x 52,72 mm.

This result was accordance with the study done by Kawai et al. that stated the radiography image differences of marginal and interior site were showed up at first month until four months after excision of ameloblastoma dan complete bone healing process was found four months or more after excision. The radiographic changes including speculated or trabecular filling the post surgical

hollow. At fourth month is the optimal time to do follow up radiography for early diagnose of residual lesion which marked by a sharp view on peripheral border as in pre-operative lesion margin or interior of the radiolucent lesion.

### Conclusion

Evaluation of panoramic radiography in ameloblastoma before and after surgical treatment with adjuvant hyperbaric oxygen therapy showed a more rapid healing process

### References

1. Andreasen, J.O. et al. 1997, Textbook and Color Atlas Of Tooth Impaction, 1st ed. Mosby Year Book, Munksgaard, St Louis, Missouri.
2. Chindia, M.M.L., et al. 1991, Ameloblastoma after surgical Removal of An Impacted Mandibular Molar *Int. J. Oral Maxillofac. Surg.*: 73 -74
3. Dujon, G.D. 1996, Wound Healing, Dept Plastic Surgery Northern general Hospital, Sheffield
4. Gardner, D. G., 1984, *A Pathologist's to the treatment of Ameloblastoma*, *Asian J. Oral Max. Surg.*: 161-166
5. Hupp, J.R. 2003, Wound Repair In: Peterson, et All. *Contemporary Oral and Maxillofacial Surgery*, 4<sup>th</sup> ed, Mosby, St Louis, p:49-55.
6. Jamil M, Eckardt A. Hyperbaric Oxygen Therapy. Clinical Use in Treatment of Osteomyelitis, Osteoradionecrosis, and

- Reconstructive Surgery of the Irradiated Mandible. In abstract :Pub Med Galveston.2000.
7. Jain K. Textbook of Hyperbaric Oxygen Therapy. Clinical Use in Treatment of Osteomyelitis, Osteoradionecroses, and Reconstructive Surgery of the Irradiated Mandible. In abstract: Pub Med Galveston.2000.
  8. Karasutisna, T. dan Kasim, A., 2001, *Ameloblastoma Kambuhan*, Majalah PABMI, No. 1, Th. 5, Pebruari: 15-17
  9. Kawamura, M., Inoue, N., Kobayashi, I., Ahmed, N., 1991, *Dredging Method, A New Approach for the treatment of Ameloblastoma*, Asian j.Oral maxillofac, Surg, vol. 3: 81-88.
  10. Kindwal E. Hyperbaric Medicine Practice. Best Publising Company. Flagstaff.1994
  11. Langais, R.P., Langland, O.E., Nortje, C.J., 1995, *Diagnostic Imaging of the Jaw*, Lea and Fibiger Book, Baltimore, Philadelphia: 343-349
  12. Shafer, Hine, dan Levi, 1983, *A Text Book of Oral Pathology*, 2 ed., W.B. Saunders Co., Philadelphia-Toronto: 258-313
  13. Susanto, H.S., 1983, *Ameloblastoma Rahang: Sebuah tinjauan dari segi klinis dan terapi dalam Tumor Kepala dan Leher: Diagnosis dan Terapi*, Fakultas Kedokteran Universitas Indonesia, Jakarta
  14. Tadahiko Kawai,et al.2012. Healing after removal of benign cysts and tumor of the jaws. Adapted from [www.Scribd.com/doc/54296294/Healing after removal of benign cysts and tumor of the jaws.](http://www.Scribd.com/doc/54296294/Healing%20after%20removal%20of%20benign%20cysts%20and%20tumor%20of%20the%20jaws)
  15. Wright James 2001. Hyperbaric Oxygen Therapy for Wound Healing. Adapted from [www.worldwidewounds.com/2001/april/Wright/Hyperbaric Oxygen.html](http://www.worldwidewounds.com/2001/april/Wright/HyperbaricOxygen.html).