

DENTINO
JURNAL KEDOKTERAN GIGI
Vol VI. No 2. September 2021

**ODONTECTOMY MANAGEMENT WITH LOCAL ANESTHESIA IN PATIENT
 WITH OPEN-ANGLE GLAUCOMA
 (CASE REPORT)**

Bramasto Purbo Sejati¹⁾, Bambang Dwiraharjo¹⁾, Elizabeth Riyati Titi Astuti¹⁾

¹⁾Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Gajah Mada University, Yogyakarta, Indonesia

ABSTRACT

Background: *Glaucoma is characterized by optic neuropathy with increased intraocular pressure. The high prevalence of impaction causes some glaucoma patients to require odontectomy. There are no contraindications to odontectomy in glaucoma patients, but special preparation is needed to prevent recurrence during the procedure. Glaucoma recurrence is precipitated by increased intraocular pressure which correlates with elevated systemic blood pressure with increased intraocular pressure and corticosteroid use. Therefore, dentists must be vigilant in choosing an atraumatic odontectomy procedure, anesthetic dose and techniques, as well as administering the type and dose of analgesics. Objective:* This paper reports a case of mandibular third molar odontectomy with local anesthesia in a patient with open-angle glaucoma, which is a rare case and in this case there is a high risk of complications. **Case:** A 26-year-old male patient complained of pain in the left back gum when chewing. Orthopantomographic radiographic examination showed impacted 38. The patient has been diagnosed with open-angle glaucoma for 5 years. An odontectomy was performed under local anesthesia. Durante surgery, bleeding is minimal and does not cause recurrence of glaucoma. Postoperative evaluation gave good results, minimal complications, and no recurrence of glaucoma. **Conclusion:** Odontectomy with local anesthesia in glaucoma patients requires special preparation in the form of atraumatic surgical procedures and perioperative pharmacotherapy management in the form of pre-emptive analgesia, selection of a maximum of two ampoules of lidocaine and epinephrine 1:80,000 with the mandibular block anesthetic technique, and using multimodal analgesia in combination with NSAIDs without corticosteroids.

Keywords: *Complications, Glaucoma, Odontectomy*

Corresponding: Bramasto Purbo Sejati, Faculty of Dentistry Universitas Gadjah Mada, Jln. Denta 1 Sekip Utara Yogyakarta 55281 ph. (0274) 515 307 fax. (0274) 515 307. bramasto.ps@ugm.ac.id

INTRODUCTION

Glaucoma and cataract are the leading causes of blindness. Glaucoma is an optic neuropathy characterized by changes in the shape of the optic disc and an increase in intraocular pressure, both of which cause decreased vision. Decreased vision in glaucoma occurs due to retinal ganglion cell apoptosis and reduced axons in the optic nerve so that the optic disc becomes atrophic and the optic cup enlarges. Nerve damage also occurs as a result of increased intraocular pressure. Impaired drainage of aqueous humor in the trabecular meshwork causes aqueous humor to accumulate, causing an increase in intraocular pressure. The higher the intraocular pressure, the greater the nerve damage to the eyeball. In normal eyes, intraocular pressure ranges from 10-22 mmHg. High

systemic blood pressure also has an impact on high intraocular pressure.^{1,2}

There are two types of glaucoma, namely open-angle and closed-angle. Open-angle glaucoma is characterized by the opening of the angle between the iris and the cornea as in normal anatomy, but there is a pathological appearance in the form of degenerative damage to the trabecular meshwork. This disease has a strong genetic risk and can occur at a young age.³ There are no contraindications to oral surgery in glaucoma patients but special preparation is required in the surgical procedure and perioperative pharmacotherapy management. One of the cases of oral surgery that is often found is an impacted tooth disorder.

Impaction is the obstruction of the normal eruption path of the tooth, either by the tooth, the mucosa or a combination of the tooth

and mucosa or by a pathological tissue.⁴ This condition can be predicted clinically if the opposing tooth and the tooth on the other side have erupted. All teeth can be impacted, but the most common are third molars, canines, maxillary second premolars and supernumerary teeth. Impacted conditions if not treated often correlate with various pathological conditions such as cysts, tumors, and the occurrence of dental caries, so treatment is needed to prevent these conditions. Treatment for impacted teeth is called odontectomy.^{4,5}

Odontectomy is a surgical procedure to remove impacted teeth. This procedure consists of opening the periosteal flap, bone reduction, removing the impacted tooth, and closing the flap. This procedure can be performed using local anesthesia or general anesthesia.⁴ Odontectomy with local anesthesia has undesirable local and systemic effects, although it has been proven to be safe. Local effects include trismus, hematoma, edema, and visual complications, while systemic effects due to anesthesia include loss of consciousness, allergies, cardiovascular emergencies, and exacerbations of the patient's congenital disease. Types of visual complications of anesthesia include diplopia, miosis, mydriasis, or ptosis.^{4,5,6} Pharmacological management of postoperative pain and infection after odontectomy must also be considered, especially the selection of drugs in systemic patients because the administration of multiple drugs can be immunosuppressive, antagonistic to certain drugs, or trigger disease recurrence.⁶

There are no contraindications to oral surgery in glaucoma patients but special preparation is needed in surgical procedures to be traumatic, such as perioperative pharmacotherapy management in the form of pre-emptive analgesia, selection of drugs and anesthetic techniques, and postoperative drugs so that pain and infection are minimal but also remains safe for the patient. This paper reports the management of dental odontectomy under local anesthesia in patient with open-angle glaucoma.

CASE REPORT

A 26-year-old male patient came to remove the lower left back tooth. Since 3 months, the patient has felt that the gums on the right and left have become lumpy and uncomfortable to chew, and have been examined by a dentist and advised to have all of his wisdom teeth removed by an oral surgeon. The patient was diagnosed with open-angle glaucoma since 5 years ago and the patient felt a stinging vision. The patient's mother and brother of the patient were also diagnosed with glaucoma.

Based on extraoral examination, facial asymmetry was found; cheeks, nose, lips are symmetrical and there are no abnormalities; salivary and lymph nodes are not palpable. On intraoral examination, 38 and 48 were impacted. The mucosa, gingiva, tongue, and floor of the mouth were within normal limits, there were no signs of pericoronitis (Figure 1). Panoramic X-ray showed 38 experienced horizontal class II B impaction and 48 mesioangular class III C impaction (Figure 2). Routine blood laboratory examinations showed results within normal limits, the value of intra-ocular pressure in the right eye was 10 mmHg and 11 mmHg in the left eye, which means it was still within normal limits.



Figure 1. Clinical condition of the patient's oral cavity: (a) 48 impacted, unerupted; (b) 38 impacted, unerupted.

Prior to the odontectomy of tooth 38 under local anesthesia, preoperative preparations were carried out including consultation with the eye department to prevent or minimize postoperative complications. The result was that the drops were continued and it was recommended after the operation to check the intraocular pressure.



Figure 2. Panoramic X-ray showing 38 horizontal class II B impaction and 48 mesioangular class III C impaction

On the day of surgery, the patient was given paracetamol tablets 1000 mg one hour before the operation was started as pre-emptive analgesia. Anesthesia was performed under direct atraumatic mandibular block anesthesia with two ampoules of 2% pehacaine with 1:80,000 epinephrine.

The operation began with a triangular flap incision in the buccal region. Incision using scalpel number 15 started from the buccal gingiva

of tooth 37 to distobuccal 38 and with a vertical incision in the distal third of 37. The full thickness mucoperiosteal flap was freed from the bone using a raspatorium (Fig. 3).



Figure 3. Triangular flap incision at 37 and distal 38

Osteotomy was performed to obtain space for the removal of the tooth (Figure 4). Osteotomy was performed using the Moore-Gillbe collar technique. An osteotomy was performed on the buccal bone using a round bur number 8 until the crown of 38 was visible and followed by a separation procedure on the bifurcation with a fissure bur.



Figure 4. Osteotomy performed with bone reduction using a round bur until the 38 crown was visible and followed by root separation at the bifurcation

Tooth extraction was done with a combination of elevator and forceps. The method used was an elevation movement with an elevator (Figure 5a) and removal of the mesial and distal parts of tooth 38 with a luxator and forceps (Figure 5b).



Figure 5. Extraction of tooth 38 (a) removal of crown; (b) removal of the root with an elevator.

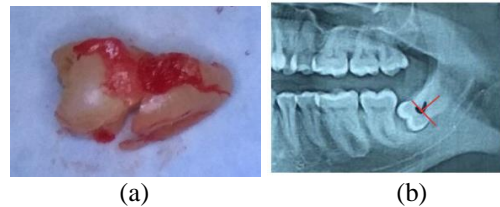


Figure 6. Clinical features of tooth 38 after odontectomy (a) separated into three parts: crown, mesial root, and distal root; (b) action plan with cutting in crown and bifurcation

The stage after the tooth has been successfully removed was cleaning the tooth socket. The tooth socket or ex-extraction space was cleaned of bone remnants and the follicle was removed because it can cause residual cysts. Sharp edges of bone should be smoothed with a bur or bone file. The socket was also cleaned with sterile NaCl irrigation to allow the fragments of bone to escape (Fig. 7a). Wound closure was performed with 5 knots interrupted suturing (Fig. 7b). Suturing is done so that the excision cavity and the incision area are closed so that food debris does not enter and the healing process goes well. Postoperative medications were Amoxicillin caplet 500 mg/8 hour, Paracetamol tablet 500 mg/8 hour, and Potassium diclofenac tablet 50 mg/8 hour given for five days.



Figure 7. Clinical tooth socket and mucosa after odontectomy (a) bone smoothing and socket debridement; (b) suturing of the mucoperiosteal flap with five knots of 4/0 silk atraumatic suture.

During control 1 week after surgery, the patient had no complaints. Intraoral examination showed good wound healing and no swelling, infection or bleeding (Fig. 8).



Figure 8. Intraoral clinical condition of the postoperative seventh day.

DISCUSSION

In patients with systemic disorders, it is necessary to pay attention to whether there is a relationship between local anesthetic solutions and the occurrence of recurrence or exacerbation of a disease. The purpose of anesthetic action is to inhibit the transmission of nerve impulses (conduction) by inhibiting the delivery of Na ions to the Na-K gate pump by non-ionized local anesthetic drugs, thus creating an anesthetic condition. The content of local anesthetics consists of lipid solubility, protein binding, pKa, which will affect both the duration and onset of the local anesthetic. The rate of onset of local anesthetics depends on the pKa, which is a state of equilibrium between the pH of the tissue and the pH formed by the local anesthetic. The closer to the tissue pH, which is 7.4, the faster the onset of anesthesia will be. The high protein binding of local anesthetics will cause long-acting anesthetic duration, this mechanism is different from the action of vasoconstrictors. Vasoconstrictors work by decreasing the rate of absorption, reducing bleeding at the surgical site, and limiting the systemic toxic effects of local anesthetics.^{7,8,9}

The choice of a vasoconstrictor is based on the duration required, the need for hemostasis, and the underlying systemic disease state. The use of vasoconstrictors should be avoided in cases of uncontrolled hypertension. The use of vasoconstrictors, especially adrenaline in the recommended dose (maximum 0.2 mg for healthy patients per visit and 0.04 mg for patients with cardiovascular disease), did not result in significant changes in blood pressure and if any changes were only temporary.^{8,9,10} In patients with a history of hypertension, vasoconstrictors provide more benefits than considering the potential risks, in terms of the use of low doses of vasoconstrictors (1-2 carpules) and avoidance of intravascular injection of local anesthetics by aspiration before deponing the anesthetic agent.^{11,12,13} In this case, 2 ampoules of pehacaine 2% with epinephrine 1:80,000 were used to avoid the effect of vasoconstrictors which can increase blood pressure during surgery. Adrenaline is safe to use for hypertensive patients (concentration 1:80,000-1:200,000) because it will not increase blood pressure dramatically due to stimulation of β_1 and β_2 receptors which are almost the same, besides the half-life of adrenaline is 1 minute and will be eliminated in approximately 10 minutes, therefore the effect is only momentary.^{12,13}

In glaucoma, there is an association between increased blood pressure and intraocular pressure. There was an increase in intraocular pressure of 0.27 mmHg in patients who had a systolic increase of 10 mmHg. This can be caused

by two things. The first is that the increase in blood pressure will increase the ciliary artery pressure which will increase the intraocular pressure. Second, increased arteriolar pressure will cause an increase in venular pressure so that aqueous clearance will decrease which causes intraocular pressure to increase. Therefore, the type of anesthesia with a vasoconstrictor but with a maximum dose of 2 ampoules was chosen.^{13,14,15}

In this operation, the flap used was triangular type, because the indication for the flap is an embedded case and requires a lot of bone reduction. The rules that must be met in making flaps include providing adequate space in the operating area, a larger flap base so that the soft tissue gets adequate blood supply for wound healing, the flap design must not affect the surgical manipulation area to prevent trauma to the flap, the flap should not too far to distobuccal direction to prevent the buccal nerve trauma, the flap incision should be designed to achieve primary closure, and the incision does not injure important anatomical areas.^{8,11}

Bone reduction is based on the amber line, which is a line formed from the interdental septum of the first and second molars with the distal aspect of the third molar. The amber line indicates the amount of bone that needs to be reduced. In addition, the red line describes the depth of the apical point of the elevator, this line is perpendicular to the amber line and is at the mesial point of the cementoenamel junction, except for the distoangular impacted tooth.^{8,9,10} The type of reduction with a bur using the Moore-Gillbe collar technique is to make a trench on the buccal and distal aspect of the third molar to expose the entire crown at the cementoenamel junction.¹⁰ Distolingual bone reduction needs to be considered because in addition to damaging the lingual flap, it can also injure the lingual nerve. When the fulcrum of the elevator is at the mesial point, the bone reduction should be adequate so that it forms an angle of 45° to the mandible.^{9,10}

Bone reduction must be able to produce sufficient space between the impacted tooth and bone, so that it is able to provide support for the elevator. In the case of horizontal impaction, tooth extraction is done by cutting both the crown and the root of the tooth. This is intended to reduce the amount of injury to both the bone and surrounding soft tissue. Cutting tooth should make it easier for the operator to retrieve the teeth. The operator must know the type of force and fulcrum applied to the impacted tooth. This will reduce the amount of energy expended. The principle of the right fulcrum, load arm, and power arm will produce the right outcome. The lever principle is used to cut the bifurcation, and

remove the crown while the axe and wheel is used to remove the mesial and distal roots to reduce bone loss. The advantages of tooth separation include reducing the amount of bone removed, reducing the length of operation time, reducing the risk of fracture in the jaw, reducing the risk of injury to neighboring teeth, soft tissues, and injury to nerves due to a small operating field.¹³

The use of Paracetamol 1000 mg before the procedure is intended as a pre-emptive analgesia. Pre-emptive analgesia is a procedure for administering drugs before the pain response that arises due to tissue damage during surgery. This action aims to reduce nociceptive pain sensitization and prevent chronic postoperative pain. Paracetamol reduces central sensitization in the brain and may reduce postoperative analgesic use.¹²

The use of steroid drugs in the type of open-angle glaucoma needs to be considered, because the use of steroids, whether topical, oral, or inhaled, is reported to be able to increase the resistance to release of aqueous humor, thereby increasing intraocular pressure.^{11,12} The mechanism that occurs when the accumulation of glycosaminoglycans causes a condition called trabecular meshwork inducible glucocorticoid response protein (TIGR) which reduces the outflow of aqueous humor.^{14,15}

The second mechanism is that corticosteroids are reported to affect pinocytosis of the aqueous humor, which also inhibits glycosaminoglycan clearance.¹⁶ The choice of medication in this patient is a combination of NSAIDs. The use of potassium diclofenac as a non-selective COX 1 and COX 2 inhibitor, combined with Paracetamol as a COX 3 inhibitor will produce an agonist mechanism. The NSAID diclofenac exerts analgesic, antipyretic, and anti-inflammatory action by inhibiting the cyclooxygenase (COX)-1 and COX-2 enzymes. Inhibition of COX-2 causes the production of prostaglandin E2 (PGE2) in the area of inflammation to be inhibited while the COX-1 in the gastroduodenal mucosa. The diclofenac group has a more potent action on COX-2 inhibitors and acts peripherally. Paracetamol is a weak inhibitor of COX-1 and COX-2 so that it is a weak inhibitor of PG synthesis at the periphery, but is able to inhibit the third COX-3 enzyme in the central nervous system.^{18,19,20,21}

It can be concluded that odontectomy with local anesthesia in glaucoma patients needs to consider pharmacological modalities consisting of giving paracetamol 1000 mg as pre-emptive analgesia, selecting a maximum of two ampoules of local anesthetic with vasoconstrictor, and a combination of NSAIDs without corticosteroids

as postoperative drugs. Accuracy of treatment will get satisfactory results and prevent or minimize complications

REFERENCES

1. Cheema A, Robert C, Shrivastava A, Kuldev S. Update on the Medical Treatment of Primary Open-Angle Glaucoma. *Asia-Pac. J.Ophthalmol.* 2016; 2(5): 51-8.
2. Chung J, Hwang H, Lee J, The Association between Primary Open-Angle Glaucoma and Blood Pressure: Two Aspects of Hypertension and Hypotension, *Biomed Res Int.* 2015;5: 827516.
3. Jordan S, Carrie H, Thomas S, Gerald M, Cynthia O, Christopher G, Lindsay R. Compliance with Primary Open-angle Glaucoma and Primary Open-angle Glaucoma Suspect Preferred Practice Pattern in a Retail-based Eye Clinic. *J.Glaucoma.* 2018; 27(12): 1068-1072.
4. Balaji SM. *Text Book of Oral and Maxillofacial Surgery.* 3rd ed. New Delhi: Saunders - Elsevier Inc. 2018. p.121-2.
5. Kademani D, Tiwana P. *Atlas of Oral and Maxillofacial Surgery.* China: Elsevier; 2016. p.42-7.
6. Hupp J, Ellis E, Tucker, M. *Contemporary Oral and Maxillofacial Surgery.* 7th ed. New York: Elsevier; 2018. p.31-2.
7. Abubaker A, Lam D, Benson K. *Oral and Maxillofacial Surgery Secret.* 3rd ed. New York: Elsevier; 2015. p. 73-5.
8. Malamed S. *Handbook of Local Anesthesia.* 6th ed. New York: Mosby; 2012. p. 34-6.
9. Haggerty C, Laughlin R. *Atlas of Oral and Maxillofacial Surgery.* New York: Wiley Blackwell; 2015. p. 210-2.
10. Malamed S. *Medical Emergencies in the Dental Office.* 7th ed. New York: Mosby; 2014. p. 145-7.
11. Malik N. *Text Book of Oral And Maxillofacial Surgery.* 4th ed., New Delhi: Jaypee Brothers Medical Publisher (P) Ltd; 2016. p. 55-6.
12. Yamaguchi A, Sano K. Effectiveness of preemptive analgesia on postoperative pain following third molar surgery: Review of literatures. *Jpn Dent Sci Rev.* 2013; 49(4):131-8.
13. Fonseca RJ. *Oral and Maxillofacial Surgery.* 3rd ed. New York: Elsevier; 2014. p. 241-9.
14. Little J, Falace D, Miller C, Rhodus N. *Dental Management of the Medically Compromised Patient.* 6th ed. St. Louis, Missouri : Mosby; 2013. p.114-6.
15. Ahmad M, Ahmed I, Ahmed W, Syed Z. Intraocular pressure; Incidence of steroid

- induced rise in local population of normal, V.K.C and C.S.G patient. *Professional Med. J.* 2014;21(1):157-162.
16. Mandapati J, Metta A. Intraocular pressure variation in patient on long-term corticosteroid. *Indian Dermatol. Online J.* 2011; 2:67-9.
 17. Yamamoto S, Sawaguchi S, Tomita D. Primary Open-Angle Glaucoma in a Population Associated with High Prevalence of Primary Angle-Closure Glaucoma. *American Academy of Ophthalmology.* 2013;121(8): 1558-1565.
 18. Zhang Z, Wang Z, Jonas, J, Wang H, et al. Valsalva manoeuver, intra-ocular pressure, cerebrospinal fluid pressure, optic disc topography: Beijing intracranial and intra-ocular pressure study. *Acta Ophthalmol.* 2014; 92: e475–e480.
 19. Brune K, Patrignani P. New Insight into the Use of Currently Available Non-Steroidal Anti-inflammatory Drugs. *J. Pain Res.* 2015; 8:105-118.
 20. Thenarasu V, Gurunathan D, Selvarasu K. Comparison of Efficacy of Diclofenac, And Paracetamol as Preemptive Analgesic Agent. *Biomed. Pharmacol. J.* 2018; 11(3).
 21. Iswar H, Selvam, P. Cyclooxygenase 3 inhibition: a probable mechanism of acetaminophen in human: A review. *J.Pharm.Sci.Res.* 2015; 6(3): 23-29p.