


Management of Pericoronitis of Newly-erupted Permanent Tooth using Electrosurgery–A Case Report

Stephani Dwiyanti Indrasari
My 'n Your Dentist, Kuningan City, Jakarta, Indonesia

ABSTRACT

Pericoronitis is an inflammation of gingival tissue surrounding the coronal portion of a tooth. Treatment for pericoronitis is aimed at management of the acute phase, followed by resolution of the chronic condition. Six-year-old boy came with a dull pain on his lower left gum, diagnosed as pericoronitis on gingival region 36, caused by plaque, worsened by secondary trauma during mastication as well as food retention in inflamed gingiva. The treatment plan for the pericoronitis on this patient was operculectomy using electrosurgery.

Keywords: Electrosurgery, operculectomy, pericoronitis

ABSTRAK

Pericoronitis merupakan inflamasi pada jaringan gingiva yang mengelilingi bagian korona dari gigi. Perawatan untuk perikoronitis terutama ditujukan untuk penanganan fase akut, yang diikuti resolusi kondisi kronik. Pasien anak laki-laki berusia 6 tahun dengan keluhan nyeri tumpul pada gusi kiri bawah, didiagnosis menderita perikoronitis pada gingiva regio 36, disebabkan oleh plak, diperburuk oleh trauma sekunder selama proses pengunyahan dan juga retensi makanan pada gingiva yang meradang. Rencana perawatan untuk pasien ini adalah dengan operkulektomi menggunakan *electrosurgery*.

Kata kunci: Electrosurgery, operkulektomi, perikoronitis

INTRODUCTION

Pericoronitis is an inflammation of gingival tissue surrounding the coronal portion of a tooth. Pericoronitis usually affects the lower third molar (wisdom) tooth where gingival tissue overlaps the chewing surface of the tooth. Pericoronitis can be either acute or chronic. Chronic pericoronitis is a mild persistent inflammation of the area, while acute pericoronitis may result in fever, swelling, and pain.[1]

Three treatment methods are based on the severity: pain and infection management, minor surgery to remove the overlapping gum tissue (operculectomy), and removal of the tooth. Operculectomy, which consists of removal of operculum, is indicated when the tooth is still useful. This allows better access to clean the area and prevent the accumulation of bacteria and food debris.[1]

Traditional periodontal surgery has the goal of eliminating periodontal defect via resection or regeneration. Certain technical goals are essential to achieve an optimal periodontal surgery, such as control of hemorrhage, visibility, absence of harmful effects to the surgical site and adjacent tissues, postoperative comfort, and rapid healing. Most of these goals can be achieved using scalpel, but its use has several disadvantages such as bleeding and poor visibility. One alternative technique is electrosurgery. This technology is to apply controlled electrical current to soft tissue. Electrosurgery has been used in dentistry for more than 50 years and continuously evolving with active research into various new applications.[2]

PERICORONITIS

Pericoronitis is an inflammation of the gingival tissue surrounding molar teeth, such as an impacted wisdom tooth, or partially erupted tooth. Pericoronitis can develop when partially-erupting tooth break through gingival tissue, allowing bacteria to enter through the opening. Food or plaque may be trapped underneath a flap of gingiva around the tooth, irritate the gingiva and lead to pericoronitis.[3]

The signs and symptoms include pain, swelling of gingival tissue, bad taste, swelling of neck lymph nodes, and difficult to open mouth. If the pericoronitis is severe, swelling and infection may extend beyond jaw, spreading to cheeks and neck. X-ray is sometimes needed to determine teeth alignment.[3]

Treatment for pericoronitis is aimed at management of the acute phase, followed by resolution of the chronic condition. If pericoronitis is limited to the tooth and the pain and swelling has not spread, the infection can be treated by rinsing the mouth with warm salt water. The dentist should also ensure that the gingival flap has been cleaned and there is no trapped food underneath.[3,4]

Alamat Korespondensi *email: stephani.dwiyanti@gmail.com*

If the patient is under severe pain, infected area should be anesthetized for comfort. Drainage (in case of abscess) is obtained by gently lifting the soft tissue operculum with a periodontal probe or curette. The underlying debris is then removed, followed by gentle irrigation with sterile saline. If there is regional swelling, lymphadenopathy, or systemic signs, systemic antibiotics may be prescribed.[3,4]

The patient is dismissed with instructions to rinse with warm salt water every 2 hours, and the area is reassessed after 24 hours. If discomfort was one of the initial complaints, appropriate analgesics, such as paracetamol or ibuprofen should be prescribed. After the acute phase has been controlled, the partially erupted tooth may be treated with either surgical excision of the overlying tissue or removal of the offending tooth. [3,4]

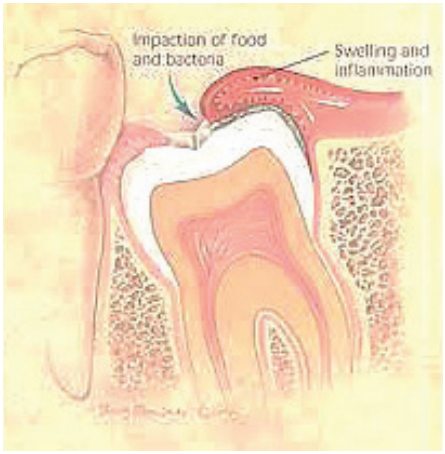

Figure 1. Pericoronitis: Impaction of food and bacteria under the operculum of a tooth results in swelling and infection[5]

OPERCULECTOMY

Operculectomy is a minor surgical procedure which removes the operculum or the flap of tissue over a partially erupted tooth, particularly a third molar, in pericoronitis. This procedure leaves an area that is easy to clean, preventing plaque buildup and subsequent inflammation. Operculectomy can be done with a surgical scalpel, electrocautery, laser or, historically, with caustic agents (trichloracetic acid).[6]

Operculectomy is indicated when there is available space for third molar eruption, proper alignment of impacted third molar in the arch with a vertical angulation with respect to the long axis of second molar, presence and proper alignment of opposing tooth, if third molar will be used as an abutment for fixed prosthesis, and if the patient is unwilling to undergo tooth extraction.[7]

Figure 2. Operculectomy: A and C. Before operculectomy; B and D. After operculectomy[6]

ELECTROSURGERY

Electrosurgery is described as high-frequency electrical current passed through tissue to create a desired clinical effect.[8]

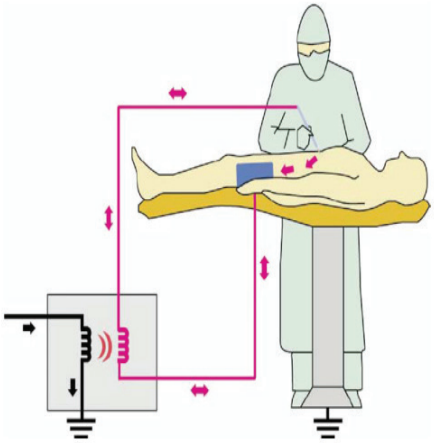

Figure 3. Principle of electrosurgery:
Generator delivers a current that flows from one electrode to another return electrode, before returning back to its source. As the current is delivered, it passes through and heats the tissues[8]

When an oscillating current is applied to tissue, rapid movement of electrons in the cytoplasm of cells will increase the intracellular temperature. Below 45°C, thermal damage to tissue is generally reversible. As tissue temperatures exceed 45°C, tissue protein undergoes denaturation, losing their structural integrity. Above 90°C, the liquid in tissue evaporates, resulting in desiccation if the tissue is heated slowly or vaporization if the tissue is heated rapidly. Once the tissue temperatures reach 200°C, the remaining solid components of the tissue are reduced to carbon.[8]

Use of monopolar electrosurgery in patients with pacemakers or implantable cardioversion devices should be consulted with the manufacturer of the devices to avoid interference with the implants and the potential for current concentrations in the tips of the lead wires. In patients with prosthetic conductive joints, every effort should be made to place the conductive joint out of the direct path of the circuit; i.e. if the patient has a left hip prosthesis, the return electrode pad should be placed on the patient's right.[8]

Electrosurgery is indicated for elongation of clinical crowns, gingivectomies and gingivoplasties, frenectomies, operculectomies, incision and drainage of abscesses, hemostasis, and troughing of crown and bridge impressions. Electrosurgery can also be used for tuberosity reduction, biopsies (incisional and excisional), and periodontal pocket reduction. The procedure should not be used for structures in close proximity to the bone. Patient with pacemaker cannot be treated with monopolar electrosurgery.[2]

Krejci, *et al*, have provided the following clinical guidelines for electrosurgery:[2,9,10]

- Incision of intraoral tissues with electrosurgery should be done with a higher frequency unit tuned to optimal power output and set to generate a fully rectified filtered waveform. Smallest possible electrode should be used for incision.
- Incision should be made at the rate of 7 mm/s, allowing cooling period of 8 s between incision. This period must be increased to 15 s when using loop electrode for excision.
- Clinician should anticipate a slight amount of gingival recession when an electrosurgical incision is used for troughing or excision of gingival crevice.
- Contact of the activated electrode to the cemental surface of a tooth must be avoided in regions where connective tissue reattachment is desired.
- Intermittent contact of an active electrode


delivering a well-controlled current to alveolar bone will initiate only slight osseous remodeling which will not result in clinical changes. Nevertheless, incorrect current control or extended contact with alveolar bone may produce irreversible changes which might result in diminished periodontal support.

- Contact of an active electrode with metallic restorations should be limited to periods of less than 0.4 seconds. Longer contact periods may result in pulpal necrosis.
- Any contact with metallic restorations should be avoided.
- Use of electrosurgery to provide fulgurating sparks to control hemorrhage should be used only after all other clinical methods have been tried. A delayed healing response following the use of fulguration should be expected.
- During operation, surgeon should not touch the patient with his free hand, avoiding open circuit.
- Electrode tip should be frequently cleaned with sponge. Idle electrodes should be placed in an insulated holster.

Post-operative instructions are needed, such as patient should avoid smoking, eating of hard or spicy foods, citrus juices, and alcohol following surgery. A toothbrush may be carefully used in areas not involved with the surgical procedure. After electrosurgery, some discomfort is expected, so analgesics can be prescribed. Patient can apply ice packs to the area to minimize swelling after extensive surgery. And patients should be instructed to call if any problem arises.[2]

CASE REPORT

Six-year-old boy came with a dull pain on his lower left gum. The pain started one month ago, occurred only during eating. He was given analgesics. The patient was also suffering from flu and was given antibiotics by his physician.

Upon clinical examination, that there was an enlargement of the gingiva on 36, covering distal cusp. The gingiva appeared hyperemic, swollen, and bled upon probing. The tooth itself was just fully erupted and did not have any cavity. The patient had fair oral hygiene.

The patient was diagnosed with pericoronitis on gingival region 36, caused by plaque, worsened by secondary trauma during mastication as well as food retention in inflamed gingiva.

Figure 4. Pericoronitis on 36: Hyperemia and enlargement of gingiva 36, covering its distal cusp

Dental health education and the best way to treat the condition were given to the patient and parents on the first visit; the correct method, time, frequency, and duration of tooth brushing was also explained. The patient was specifically instructed to brush the inflamed area more properly, focusing on the area covered by the inflamed gum. Scaling was done to clean plaque and pigmentation that covered the teeth. The enlarged gum will be removed on the next visit. No medication was given, as the patient had already consumed antibiotics (amoxicillin) and analgesics (ibuprofen) prescribed by his physician.

On the second visit, the patient felt much better. The gum was less painful. Upon clinical examination, gingiva on 36 was still enlarged, but less inflamed. There was no bleeding on probing. The treatment plan for the pericoronitis was operculectomy using electrosurgery.

Electrocautery instrument was prepared and a bracelet was put on patient's arm, connecting it with the main electrosurgical equipment. Asepsis was done on the gingiva surrounding 36 by swabbing it with povidone iodine. Topical anesthesia was applied on the gingiva, followed by infiltration and intraligamentary injection using lidocaine HCl 2% with epinephrine 1:100,000.

After the region was anesthetized, gingiva of 36 was scaled, followed by excision using electrosurgical instrument with a loop electrode. Next, gingivoplasty was done to contour the soft tissue using straight electrode while hemostasis was achieved using ball electrode. Extra caution was carried out to avoid contact with the bone since irreparable damages will occur. The operated area was irrigated using saline and povidone iodine. The gingiva was massaged to improve circulation and checked for bleeding. No suture was needed. Ibuprofen and gel containing oxygen was prescribed after procedure. Patient was instructed to avoid chewing on the left side, suck the operated area, and vigorous brush and rinse for the first two days. Gel was applied twice a day after tooth brushing.

On the third visit a week later, patient did not feel any pain. The operated area was painful during the first two days relieved by analgesics. On clinical examination, gingiva of 36 was no longer swollen but slightly redder than normal. No open wound and no bleeding upon probing. The gingiva of 36 was scaled and irrigated with saline and povidone iodine. Patient was instructed to keep using hyaluronic acid gel locally until the color of the gum is back to normal. Further follow up was unnecessary unless there is sudden pain or inflammation in the area.

Figure 5. One-week post-operculectomy
The dimension of gingiva 36 was normal, but the color was slightly redder than normal.

DISCUSSION

The patient was diagnosed with pericoronitis on gingival region of 36. The etiology was secondary infection from the partially erupted 36 and gingival trauma during mastication. Plaque build-up under the operculum of partially-erupted 36 causes inflammation and enlarged gingiva. The swollen gingiva was easily bitten during mastication, causing more swelling.

The patient showed typical sign and symptoms of pericoronitis; he suffered from

dull pain worsened during mastication. The dull pain was due to the inflammation of the gingiva, while the pain during mastication was due to the biting of swollen gingiva against the upper tooth. The gingival region of 36 also showed classic signs of inflammation: hyperemia, swollen, and bleeding on probing. Nevertheless, the infection was localized and did not extend to lymph nodes. Dental radiograph was not taken during patient's visit, as the source of the infection had been determined and 36 was almost fully erupted with enough surrounding space.

Management of pericoronitis is aimed at eliminating the acute phase, followed by resolution of the chronic condition.[3,4] Scaling was done on the first visit to improve oral hygiene. Deep cleaning was focused on 36 to remove plaque that was the source of bacterial infection. Soft tissue operculum was gently lifted with a scaler and the underlying debris was removed, followed by gentle irrigation with saline and povidone iodine.[3,4]

As the cause of pericoronitis was bacterial infection, patient was asked to continue taking his antibiotic. Amoxicillin was chosen as it was a broad-spectrum antibiotic. Patient was also asked to continue taking ibuprofen to manage the pain and inflammation. Dental gel was prescribed as local antiseptics.

Operculectomy with electrosurgery was planned on the second visit. Electrosurgery was chosen as it offered several advantages. First, the surgical site is in region 36 at the back of patient's mouth and is difficult to access; bleeding is expected from tissue excision while tissue separation is clean with minimal bleeding, providing a clear view of the surgical site. Second, the technique is pressure less and precise. With electrosurgery, planning of soft tissue is possible. Third, it provided minimal healing discomfort and scar formation. The gingiva 36 appeared almost normal with no scar tissue within 1 week after electrosurgery operation. Lastly, duration and operator fatigue are reduced. In child patient, operculectomy needs to be done rapidly and with minimal discomfort.[2]

Electrosurgery may offer a lot of advantages, but is costlier[2] and also has some disadvantages. Electrosurgery cannot be applied near inflammable gases and on patients with poorly shielded pacemakers. The odor of burning tissue is present if high-volume suction is not used.

CONCLUSION

Electrosurgery can be used as an alternative to conventional surgery. Operator needs to have complete understanding of the biophysical aspects of electrosurgery and tissue, the correct indication, as well as a good surgical skill. Continued research into the area shows promising development of novel applications of electrosurgery.

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