

Management Of Postoperative Morbidity After Third Molar Surgery: A Review Of The Literature.

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Abstract

Background: Patients' complaints of pain, swelling and limitation in mouth opening following lower third molar surgery is an important factor affecting their daily life. The aim of this study was to review the different methods of minimizing postoperative morbidity following lower third molar surgery.

Methods: Relevant literatures from Scirus, Pubmed and Medline computerized search on management of postoperative morbidity following third molar surgery were evaluated and highlighted. Information was also obtained from texts and journals in the medical libraries of Federal School of Dental Technology and the University of Nigeria both in Enugu.

Results: studies reviewed have not pointed to the effectiveness of the routine use of any systemic or local agent for minimizing postoperative morbidity after third molar surgery without other undesirable effects. Oral surgeons across the world have devised several methods, which include the use of drugs, different surgical techniques, laser therapy and the use of drains.

Conclusion: Postoperative morbidity after the surgical removal of impacted lower third molar still remains an important factor in patients' recovery and comfort. The awareness of different methods of reducing morbidity after lower third molar surgery would help both the surgeon and the patients in the management of impacted lower third molar.

Keywords: third molar-surgery-morbidity-management

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INTRODUCTION

Pain, swelling and trismus are the most common cause of discomfort and postoperative morbidity after the surgical removal of impacted lower third molar under local anesthesia.^{1,2} These complaints are associated with inflammatory response following lower third molar surgical extraction and they affect patients daily life.³ The postoperative quality of life in this category of patients has been studied extensively.^{4,5} Assessment of the effect of third molar surgery on a number of measures of health care outcome within the first postoperative week showed

that some patients experienced deterioration in their quality of life.³

Decision analysis studies of lower third molar surgery show respondents and patients preferring the discomfort of pericoronitis to the risk of complication and postoperative morbidity considering the "cure" worse than the "disease".⁶ Hence the concern of many clinicians and oral surgeons about the morbidity and the quality of life of patients who undergo the surgical removal of impacted lower third molar.^{6,8} There are many indications for the surgical removal of third molars and a number of complications may be associated with the surgery. The decision for surgical removal rest on the dentist and the patient working together. Effective and adequate communication is central to the surgeon / patient relationship and to good clinical care. Patients require information about the possible complications that follow third molar disimpaction and the consequences of not having their third molar removed explained.⁹ An ideal agent for use after lower third molar surgery should alleviate pain, reduce swelling and trismus to a minimum, promote healing and have no adverse effects however, such agent does not exist¹⁰ hence the development of several methods by oral clinicians. This study reviewed the different methods of minimizing postoperative morbidity following lower third molar surgery.

The Use of Drugs

Pain, swelling and trismus occur as a result of inflammation.¹¹ The drugs commonly used to minimize these postoperative variables after third molar surgery can be considered under the following headings: Analgesics and Corticosteroids.

Analgesics

Analgesics are used to control postoperative pain after a dental surgical procedure. Postoperative dental pain is usually of short duration and analgesics are often required for the first 24-48 hours.⁴ They are classified into three groups viz; peripherally acting, centrally acting and compound analgesics.¹² Aspirin, paracetamol, ibuprofen, mefenamic acid diflunisal, and other non-steroidal anti-inflammatory drugs are

peripherally acting. They inhibit the synthesis of some of the biochemical mediators of pain produced in damaged or traumatized tissues. They also possess anti-inflammatory properties and some exhibit an anti-pyretic effect and are particularly effective in management of postoperative dental pain following surgical procedures. The opioids; morphine, pethidine, codeine and pentazocine are mainly centrally acting analgesics but their efficacy in dental pain is poorly established and are mainly used in hospital practice to treat moderate to severe pain.¹² The most commonly used analgesics after lower third molar surgery are paracetamol (acetaminophen), ibuprofen and diclofenac.^{13,14} Paracetamol is an aniline derivative with analgesic, antipyretics and weak anti-inflammatory properties. It is remarkably safe analgesic at normal therapeutic doses. There are very few medical contra-indications to its use and the drug can safely be prescribed to the very young, the pregnant and breast-feeding mothers and to the very old.¹⁵ Panadol is a brand of paracetamol, which contains ionic sodium. Long-term use of panadol should be avoided in patients where salt intake should be restricted, which include patients with hypertension, cardiac or renal insufficiency and pregnant women with oedema.¹² Paracetamol has occasionally been implicated in skin rashes, white blood cell disorder and thrombocytopenia. However, the most serious side effect is hepatotoxicity in overdose. Clinical manifestation of liver damage occurs 2-4 days after overdose and includes hepatic tenderness followed by jaundice and coagulation disorder due to impaired production of the clotting factors.^{12,16} Survival after paracetamol overdose is unlikely if more than 60 percent of liver cells are necrotic.¹⁶ It is readily available to the public and is often used in attempted suicide.¹²

Ibuprofen is a propionic acid derivative and has a similar pharmacodynamic profile to aspirin.¹⁵ Propionic acid derivatives are probably the most widely used non-steroidal anti-inflammatory drugs (NSAID).¹³ It is very effective in controlling pain and reducing swelling after the surgical removal of impacted lower third molars. The incidence of unwanted side effects from ibuprofen and other propionic derivatives are uncertain, with some reviews suggesting that these drugs are well tolerated¹⁷, while other studies report an incidence of unwanted effects in the range of 10-30 percent.¹⁸ Unwanted effect include dyspepsia, gastrointestinal disturbances and hemorrhage, skin rashes. Ibuprofen may produce bronchoconstriction in aspirin-sensitive asthmatics, thus this drug should be avoided in asthmatic patients. Ibuprofen can cause intracranial fluid changes which may account for the development of headaches when

treatment is started with this drugs^{19,20} However, several studies have shown that ibuprofen remains one of the best drug of choice the management of postoperative morbidity after lower third molar surgery^{12, 13, 16, 17} because apart from controlling postoperative pain, ibuprofen has a reduction effect on swelling. Diclofenac (cataflam) is a non-steroidal anti-inflammatory drug derived from phenylacetic acid. It possesses analgesic, anti-pyretic and anti-inflammatory properties. Diclofenac is available as tablets, suppository and as a preparation for intramuscular administration. It is recently introduced in use after the lower third molar surgery.¹² The main unwanted effect of this drug are gastrointestinal disturbances ranging from bleeding, ulceration or even perforation of the intestinal walls. Thus in line with other NSAIDs, diclofenac should not be given to a patient with history of gastrointestinal disturbances. Diclofenac has also been implicated as a cause of chronic hepatitis²¹

Corticosteroids

Corticosteroids are hormones produced by adrenal cortex, which have a diverse range of properties and functions. Therapeutically, corticosteroids are mainly used for their anti-inflammatory and immunosuppressive properties, and in replacement therapy.¹² In dentistry, they are principally used for their anti-inflammatory properties in reducing swelling and trismus especially after third molar surgery. Recent studies have shown that preoperative corticosteroids are effective at controlling postoperative dental pain after third molar surgery.²² Peterson²³ advocated the use of corticosteroid to help minimize swelling, trismus and pain. He noted that the most effective method of usage is yet to be defined. It was observed that an initial intravenous dose of steroid at the time of surgery had a major clinical impact on swelling and trismus in the early postoperative period. Also he concluded that if the initial intravenous dose is not followed up with additional doses of steroid, this early advantage disappears by the second or third postoperative day. He stated that maximum control of swelling requires that additional steroids be given for 1 or 2 days following surgery. The two most widely used steroids are dexamethasone and methylprednisolone. Both of these are almost pure glucocorticoid with little mineralocorticoid effect. Common dosages of dexamethasone range between 4 to 12 mg given intravenously at the time of surgery. Additional oral dosages of 4 to 8mg twice a day commenced on the day of surgery and two days afterwards leads to a maximum relief of swelling, trismus and pain. Methylprednisolone is most

commonly given intravenously 12mg at the time of surgery followed by significantly lower doses, usually 4mg three or four times daily taken orally for the day of surgery and for two days after surgery. Peterson maintained that high dose, short-term usage has minimal side effect. For several decades surgeons have administered corticosteroids before, or just after third molar surgery to reduce inflammation and improve recovery from sequelae of inflammation, pain, swelling and trismus²²⁻²⁵ However, the use of steroid is contraindicated in the patient with gastric ulcer, active infection and a certain type of psychosis such as psycho-neurosis and euphoria.¹² The potential complications of peri-operative corticosteroids use are adrenal suppression and delayed wound healing.²⁶ Kaldwarf et al.²⁷ however are of the opinion that suppression of adrenal cortex does not occur with high doses of short-term corticosteroid therapy. Bysledt and Nordenram²⁸ in their study on effect of methylprednisolone on the degree of postoperative pain, swelling and trismus following third molar surgery found a high incidence of alveolar osteitis (dry socket), thus making another alternative agent for the reduction of pain, swelling and trismus imperative.

USE OF DIFFERENT SURGICAL TECHNIQUES

Different surgical techniques were employed by several authors²⁹⁻³³ to reduce the postoperative morbidity after the removal of impacted lower third molar. Tetsch and Wegner²⁹ observed that when a lingual split bone technique was compared with buccal approach (bur technique), the postoperative morbidity in form of pain, swelling and trismus were reduced in favour of the former. On the other hand, Rood et al³⁰ investigated the effect of removal of impacted lower third molar on pain, swelling and trismus using the lingual split bone and bur technique. The result of the study indicates that the lingual split bone techniques have no advantage over the use of bur technique through the buccal approach. A subjective assessment of pain and swelling following the surgical removal of impacted third molar teeth using different surgical techniques was carried out by Shevel et al³¹ The result of this study shows that when a small incision was used, with minimal reflection of the mucoperiosteum, the subjective evaluation of patients is that there is significantly less postoperative pain and swelling than when the larger standard incision is used. Garcia et al³² investigated the effect of raising a micoperiosteal flap on trismus and pain after extraction of impacted third molars. The result showed no significant different between the control and the experimental groups. The different methods of surgical approach have advanced to be useful in minimizing these postoperative sequelae after third

molar surgery. Holland and Hindle³³ in their study observed that pain, swelling and trismus after third molar surgery may be associated with the type of closure technique and the length of surgical intervention. They used a suturing technique that led to primary healing while Berge³⁴ and Akota et al.³⁵ employed secondary closure technique. While there was reduction of postoperative discomfort in those with secondary closure, the healing of the wound was faster in those with primary intention. However conflicting opinions have been expressed in the literature concerning these two types of healing. Some authors Guralnick³⁶, Thoma³⁷, Howe³⁸, Kruger³⁹ and Killey and Kay⁴⁰ are in favour of closed healing, whereas other authors, Branbender and Calteneo⁴¹, Rakprasitkul and Pairuchvej⁴² and Saglam⁴³ report that primary healing frequently causes greater pain and swelling than secondary healing. In contrast, Winter⁴⁴, Clark⁴⁵ and Suddhasthira et al.⁴⁶ are of the opinion that postoperative progress does not differ in the two types of healing. Brabander and Cattaneo⁴¹ compared the result of the two methods of wound closure after mandibular third molar removal. In both the test group and the control group, the molars were removed using a mucoperiosteal flap; a wedge of tissue distal to the second molar was removed before closure to secure self-irrigation of the empty socket. The test group received a gauze drain partially submerged into the socket to secure more drainage and to prevent primary wound healing. Examinations were performed 2 days and 7 days after surgery. Pain, swelling, trismus and wound condition were recorded. Analysis of variance indicated that there was no significant difference between the 2 methods of wound closure. They therefore maintained that secondary closure technique has no effect on pain, swelling and trismus. Pasqualini et al.⁴⁷ in their recent report on primary and secondary closure of the surgical wound after removal of impacted mandibular third molars, concluded that in cases of equal intra-operative difficulty, open healing of surgical wound after third molar removal produces less postoperative swelling and pain than occurs with closed healing by hermetically suturing the socket.

THE USE OF COLD AND HEAT

Engstrom et al.⁴⁸ suggested the use of ice packs to help minimize postoperative swelling. Once the surgery is completed and the patient is ready to be discharged, application of ice packs to the area may help minimize the swelling and make the patient feel more comfortable. Ice pack should not be placed directly on skin but rather should have a layer of dry cloth between

the ice container and the tissue to prevent superficial tissue damage from occurring. The ice pack should be applied at 20 minutes intervals for 24hrs postoperatively. The effect of external application of local cold on swelling, trismus, temperature and pain postoperatively in surgical removal of impacted mandibular third molars was studied by Forsgren et al.⁴⁹ The patients were treated postoperatively with cold dressings after the first or second operation. There were no significant differences in swelling, trismus, temperature or postoperative pain between the 2 groups of operations. They therefore concluded that the external application of cold after the surgical removal of impacted mandibular third molars does not appear to improve the postoperative course, either on a short or long term basis. Ice packs are only minimally effective at controlling edema. Peterson⁵⁰ advocated the use of heat to resolve swelling. He however, recommended that on the second postoperative day neither ice nor heat should be applied on the face but on third and subsequent post-operative days application of heat may help to resolve post operative swelling more quickly. He further warned that patients should avoid high-level heat for long periods at a time to prevent scalding or injuring the skin. In a recent similar study, Sortino et al.⁵¹ recommended a rational application of ice packs appropriate to the degree of expected morbidity in each patient as effective way of minimizing postoperative discomfort after third molar surgery.

THE USE OF LASER THERAPY

In recent time, a modern method of reducing postoperative discomfort after third molar surgery with laser therapy has been developed. Maskova and Smekal.⁵² while highlighting the effect of laser therapy in dentistry are of the opinion that laser irradiation of the alveolus along with the lingual and buccal bony wall after molar extraction will lead to faster coagulation, less postoperative discomfort and quicker healing. In their study, Rucerovia et al.⁵³ evaluated the effect of different frequencies of lowerlevel laser radiation (diode-670nm and heliumneon 632,8nm) on healing process after human molar extraction. They concluded that laser therapy objectively improves extraction wound healing, less postoperative discomfort which is contributory not only due to subjective feelings of the patients who accept laser therapy but also due to its non-invasiveness and painlessness. A randomized double-blind clinical trial on the effectiveness of helium-neon laser in the prevention of pain, swelling and trismus after removal of third molars was carried out by Carrillo et al.⁵⁴ in 100 patients randomly allocated to receive helium-neon laser, Ibuprofen or

placebo in a prospective parallel clinical trial. Trismus was significantly reduced in helium-neon laser and Ibuprofen groups while pain was significantly less in the Ibuprofen group with regard to helium-neon laser and placebo groups but swelling was the same in the three treatment groups. Roynesdal⁵⁵ investigated the effect of soft laser application on postoperative pain and swelling following molar extraction and found the use of laser therapy helpful in minimizing these postoperative variables. However, Fernando et al.⁵⁶ and Braams et al.⁵⁷ in their related studies expressed contrary opinions.

THE USE OF DRAINS

The search for less complicated and cost effective ways of reducing post-operative discomfort has lead to several researches by dental clinicians and oral surgeons across the world. Ayad et al.⁵⁸ in their study on comparative prospective randomized study of surgical removal of mandibular wisdom teeth with and without rubber drain found a significant difference between the two methods. This investigation compared the effect of two methods of wound closure; primary closure technique with and without Penrose drains (Natural latex). In both the test group (n = 27) and control group (n = 25), the molar were removed using a buccal mucoperiosteal flap. The test group received a drain partially submerged into the socket to secure more drainage of wound secrete. Examinations were performed 1 day, 3 days and 7 days after surgery, and swelling, trismus pain and analgesic consumption were recorded. Analysis of variance indicated that there was a significant difference between the two methods (p < 0.05). The drain method appears to minimize postoperative edema, trismus, pain and analgesic consumption, and thus contributes to enhanced patient comfort. Rakprasitkul and Pairuchevj⁴² in a similar study recommended the use of a small tube drain when primary closure is employed following third molar surgery. While this measure has little effect on postoperative pain, a significant reduction in the swelling and trismus was found. They reported that the use of a tube drain in the surgery of impacted third molars improves the quality of life of patient after surgery. Saglam⁴³ investigated the effect of a tube drain with primary closure techniques on postoperative trismus and swelling after the removal of a fully impacted mandibular third molars by comparing the effects of primary closure alone and primary closure with tube drain. The study group included 13 patients aged 15-39 years with bilateral fully impacted mandibular third molars. The insertion of a small surgical tube drain before primary closure (drain group)

was compared to a simple primary closure procedure (no drain group) after removal of the impacted third molars in a randomized crossover study. The patients were evaluated postoperatively for signs of facial swelling and trismus. The result showed that the facial swelling experienced by the 'drain group' was significantly less than that experienced by the 'no drain group'. The degree of trismus was greater in the no-drain group than in the drain group but the difference was not statistically significant. He therefore recommended the use of tube drain with primary closure technique to minimize postoperative discomforts in patients after third molar surgery. Cerqueira et al.⁵⁹ in a comparative study of the effect of a tube drain in impacted lower third molar surgery concluded that the use of the tube drain helps to control swelling but had no significant effect on pain or trismus. Fifty-three patients of both genders with bilateral impacted lower third molar were studied. The patients were divided into 2 groups: In the first group, the suture procedure was accomplished without a drain while in the second group a tube drain was used. The postoperative pain, swelling and trismus were evaluated. The result showed that swelling was statistically significant at 24 and 72hrs in the group with the tube drain in comparison with the group in which the drain was not used. However, pain and trismus were not statistically significant at the evaluation period. They equally recommended the use of a tube drain to minimize postoperative discomfort.

CONCLUSION

The surgical removal of impacted mandibular teeth has been associated with morbidity in form of pain, swelling and trismus, which are serious enough to affect the patient's daily activities. Several studies reviewed have not pointed to the effectiveness of the routine use of any systemic or local agent in preventing or reducing postoperative sequelae after removal of impacted third molars without other undesirable effects hence the recent advances in development of non-invasive and non-therapeutic methods. In view of the available data on the use of drain in reducing the postoperative morbidity after lower third molar surgery as drug free method, we recommend oral surgeons carrying out surgical removal of impacted lower third molar to consider the use of drains to minimize the postoperative morbidity.

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