ANALGESICS USED IN PERIODONTAL SURGERY

Dr. Prabhu MN,

College of Dentistry, Gulf Medical University, United Arab Emirates

Address For Correspondence
Dr. Prabhu, MDS, MFDS RCPS (Glasgow), MFGDP RCS (Eng), Ph.D (Periodontics)
College of Dentistry, Gulf Medical University, United Arab Emirates
Email id – prabhumds@rediffmail.com
Phone no. – +971562134322

ABSTRACT

Periodontal surgical procedures commonly require the support of the analgesics as part of home care management. There are a wide range of analgesics which are available for management of the post-operative pain following a periodontal surgery. Acetaminophen, nonsteroidal anti-inflammatory drugs and opioids are the commonly used analgesics in Dentistry. They have specific advantages, disadvantages, indications and contraindications. This article provides a brief review of their role in the management of postoperative pain following a Periodontal surgery.

KEY WORDS: analgesics, post-operative pain, periodontal surgery, pain control, therapeutic dose.

INTRODUCTION

The first considerations in pain control are to prevent discomfort by proper local procedures and to eliminate the cause of pain already present. Analgesic drugs are only secondary to these efforts.

The selection of an analgesic for any particular case is essentially a matter of matching the potency of an analgesic against the severity of the pain present or anticipated. This rather simplistic concept becomes complicated when you consider the importance of the emotions on pain and pain control. Numerous analgesics are available, and the recent introduction of new agents provides even more options from which to choose. One must never lose sight of the fact that the psychologic makeup of a patient is an extremely important factor in the selection of the proper analgesic. Healthy patients have approximately the same capacity to perceive pain, but their reaction to what they perceive may vary widely. Discomfort that requires no analgesic in one patient may require aspirin or acetaminophen in another and even codeine, meperidine, or morphine in others. Thus knowing one’s patients is of considerable value. Predisposition toward a greater reaction to pain has been said to be associated with emotional instability, fatigue, youth, the female sex, fear, and apprehension (Monheim, 1969). Fear and apprehension are of particular significance and are the basis of the potentiation of analgesics by sedatives.

A range of analgesic potencies will be required in alleviating discomfort from periodontal infections and temporomandibular joint dysfunction as well as varying degrees of postoperative discomfort, but proper local treatment will usually allow complete pain control with mild analgesics such as aspirin or acetaminophen. Only in extensive cases, where local treatment is restricted or when
the patient is hypersensitive to discomfort, are more potent analgesics required. Routine post-operative discomfort often requires no analgesic, and when one is required, aspirin or acetaminophen is frequently adequate. Only in extensive osseous cases, where there has been heavy trauma, where wound closure has been inadequate, or again where the patient is hypersensitive to discomfort, will more potent agents be required.5

ASPIRIN

Most pain of periodontal origin can be effectively controlled by aspirin alone (650 mg (10 grains) every 4 hours). Analgesic, antipyretic, and anti-inflammatory effects are provided. Many practitioners are too quick to go to more potent drugs with greater toxicity and more troublesome side effects and could make a greater use of aspirin alone. However, the clinician should be aware of the adverse effects of this drug. Aspirin causes gastric irritation, especially if taken on an empty stomach, and should be avoided in people with ulcers or other gastrointestinal difficulties. Many individuals are allergic to aspirin and obviously should not be given this drug or any combination product containing it. Aspirin is known to prolong prothrombin time and inhibit platelet function. However, this is not likely to be clinically significant in the practice of periodontics except in patients with peptic ulcer, hemorrhagic disease, or those on anticoagulant therapy. The practitioner should also be aware of the clinically important aspirin drug interactions that have been demonstrated, notably those with the coumarin anticoagulants and the sulfonylurea hypoglycemics. The clinician should also recognize the danger of aspirin overdose in infants and children.

ACETAMINOPHEN

When aspirin should be avoided, acetaminophen (Tylenol, Tempra, Nebs) is an excellent substitute. In the same dosage as aspirin (650 mg (10 grains) every 4 hours) this drug equals aspirin in analgesic and antipyretic potency. At this time acetaminophen is not believed to have anti-inflammatory effects. It is not known whether the absence of this effect is important in situations with a significant inflammatory component, as in most dental cases requiring an analgesic. Although acetaminophen appears to have the same drug interactions as noted earlier for aspirin, it does not have the adverse gastrointestinal effects or the antiprothrombin and antiplatelet effects of aspirin. Acetaminophen should also be safe in cases of aspirin allergy5. Acetaminophen is indicated for the management of mild to moderate pain if there is a contraindication to an NSAID. Excessive doses can lead to irreversible liver damage and thus caution must be exercised in patients with a history of liver disease or alcoholism. Long-term use should be avoided as it may lead to renal toxicity. For the management of severe pain acetaminophen is usually insufficient by itself, although it may be used in combination with an opioid such as codeine or oxycodone.
### TABLE - 1

<table>
<thead>
<tr>
<th>Drug (Brand name)</th>
<th>Dose (mg)</th>
<th>Frequency</th>
<th>Daily maximum (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adults</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>500-1000</td>
<td>q4-6h</td>
<td>4,000</td>
</tr>
<tr>
<td>Acetylsalicylic acid (Aspirin)</td>
<td>325-1000</td>
<td>q4-6h</td>
<td>4,000</td>
</tr>
<tr>
<td>Celecoxib (Celebrex)</td>
<td>200</td>
<td>Once/day</td>
<td>400</td>
</tr>
<tr>
<td>Diflunisal (Dolobid)</td>
<td>500</td>
<td>q12h</td>
<td>1,500</td>
</tr>
<tr>
<td>Etodolac (Ultradol)</td>
<td>200-400</td>
<td>q6-8h</td>
<td>1,200</td>
</tr>
<tr>
<td>Floctafenine (Idarac)</td>
<td>200-400</td>
<td>q6-8h</td>
<td>1,200</td>
</tr>
<tr>
<td>Flurbiprofen (Ansaid)</td>
<td>50</td>
<td>q4-6h</td>
<td>300</td>
</tr>
<tr>
<td>Ibuprofen (Orudis)</td>
<td>400</td>
<td>q4-6h</td>
<td>2,400</td>
</tr>
<tr>
<td>Ketoprofen (Orudis)</td>
<td>25-50</td>
<td>q6-8h</td>
<td>300</td>
</tr>
<tr>
<td>Ketorolac (Toradol)</td>
<td>10</td>
<td>q4-6h</td>
<td>40 (5 days max)</td>
</tr>
<tr>
<td>Naproxen (Anaprox, Naprosyn)</td>
<td>275/250</td>
<td>q6-8h</td>
<td>1,375</td>
</tr>
<tr>
<td>Rofecoxib (Vioxx)</td>
<td>50</td>
<td>Once/day</td>
<td>50 (5 days max.)</td>
</tr>
<tr>
<td><strong>Children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetaminophen (Tylenol, Tempra)</td>
<td>10-15mg/kg</td>
<td>q4-6h</td>
<td>65 mg/kg²</td>
</tr>
<tr>
<td>Ibuprofen (Children’s Advil)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 2-12</td>
<td>10 mg/kg</td>
<td>q6-8h</td>
<td>1,200</td>
</tr>
<tr>
<td>Over age of 12</td>
<td>200-400mg</td>
<td>q4h</td>
<td></td>
</tr>
</tbody>
</table>

**NSAIDS**

NSAIDS have been used as interestingly as analgesics not just as anti-inflammatory agents since the mechanism of action of acetylsalicylic acid was discovered approximately 30 years ago. Clinical trials have shown repeatedly that by themselves NSAIDS are effective for the management of any management of dental pain, whether mild moderate or severe.²⁻⁵

Optimal use of these drugs reside in understanding their mechanism of action on arachidonic acid cascade. NSAIDS block the cyclooxygenase enzymes which exist in 2 forms known as cyclooxygenase 1(cox-1) cyclooxygenasease 2(cox-2). cox-1 is responsible for synthesis of several mediators including the prostaglandins that protect the gastric mucosa and that regulate the renal blood flow, and thromboxanes that initiate platelet aggregation. Analgesic and anti-inflammatory actions are their main properties. These actions combined with their inhibition of uterine contraction make them effective for the management of menstrual pain.

Dosing regimens for the NSAIDS tested in a dental pain model is listed in table 1. Studies have shown that NSAIDS may be all that is required to manage any level of post operative pain.²⁻⁵ It has been suggested that NSAIDS can be more effective analgesics if they are given early enough and in sufficient doses to prevent the synthesis of prostaglandins, as opposed to prescribing them to deal with the pain once prostaglandins have been already formed. Therefore one should consider an initial loading dose such as the double maintenance dose which will allow therapeutic levels to be reached more rapidly. Post operative administration of NSAIDS may reduce the need for analgesics postoperatively. Consideration can thus be give to either preoperative dosing or at least to beginning the dosing immediately after surgery, before the offset of local anaesthesia.
IBUPROFEN

Commercial Products:
Motrin, Advil, Nuprin
Structure
2-p-isobutylphenyl propionic acid

Mode of Action
Non-steroidal anti-inflammatory agent which reduces prostaglandin activity by inhibiting prostatalgin synthetase. Has anti-inflammatory, analgesic, and some antipyretic activity.

Periodontal Indications
Control of postsurgical pain. Peak blood levels obtained within one to two hours, stays active as an analgesic for four to six hours. Prolonged use has been shown to cause a small reduction in bone loss due to periodontal disease, but further studies are needed before ibuprofen is used in this manner.

Precautions Ibuprofen inhibits platelet aggregation but this effect usually causes small changes in bleeding time in normal patients. This is less than that seen with aspirin. Patients on anticoagulant therapy or with intrinsic bleeding disorders can be at risk for hemostatic problems with the concurrent use of ibuprofen.

Patients with decreased renal or liver function, heart failure or under diuretic therapy can be at risk for liver dysfunction, renal failure, and fluid retention while taking Ibuprofen.

Drug Interactions
Anticoagulants—see precautions
Methotrexate – Ibuprofen can enhance the toxicity of methotrexate. Lithium – Ibuprofen can increase toxicity of lithium

Diuretics such as furosemide and thiazides can have less effect in patient using Ibuprofen

How Prescribed: Available in USA without prescription in 200 mg dosage.
Usual prescription is for 400 mg ibuprofen every four hours to six hours as needed for control of postsurgical pain for one to five days.

DIFLUNISAL

Commercial Products: Dolobid
Structure: 24-difluoro-4-hydroxy-3-biphenyl, carboxylic acid.

Derivative of salicylic acid similar to aspirin. Mode of Action: Non-steroidal anti-inflammatory agent.

Peripherally acting analgesic with anti-inflammatory and some antipyretic effects. It is a prostaglandin synthetase inhibitor.

Periodontal Indications
Control of postsurgical pain. Peak blood levels obtained within two to three hours, and stays active as an analgesic for eight hours.

Dosage Adults: an initial loading dose of 1000mg diflunisal followed by recommended for pregnancy or nursing women.

Side Effects Gastrointestinal problems like nausea, dyspepsia, heartburn, vomiting, and abdominal pain can occur and more severe problems such as gastric ulceration and bleeding can occur. Sleep disorder, fatigue, tinnitus and skin disorder occur infrequently, i.e. less than 1 in 200 with short term use.
Contraindication  History of intolerance to diflunisal, aspirin or other non-steroidal anti-inflammatory drugs.

Precautions Diflunisal inhibits platelet aggregation but has less effect than aspirin and has minimal effects in short term use, ie., less than 7 days. Patients on anticoagulant therapy or with intrinsic bleeding disorders can be at risk for hemostatic problems with the concurrent use of diflunisal. Patient with decreased renal or liver functions, heart failure or under diuretic therapy can be at risk for liver dysfunction, renal failure and fluid retention while taking diflunisal. Patients using beta blockers or ACE inhibitors can have complications if NSAIDS are used that can result in increased blood pressure.

**Drug Interactions**

How Prescribed. An initial loading dose of 1000 mg followed by 500 mg Coumarin type anticoagulants see precautions every 8 to 12 hours as needed for control of postsurgical pain for one to five days

**NAPROXEN**

**Commercial Products**

Naprosyn, Alleve, Anaprox

**Structure:** 5-6 methoxy-d-methyl 2-naphthaleneacetic acid, methoxy

**Mode of Action**

Non-steroidal anti-inflammatory agent which reduces prostaglandin activity. Has anti-inflammatory analgesic and some antipyretic activity.

**Periodontal Indications**

**Dosage**

Adults 500 mg naproxen followed by 250 mg every 6 to 8 hours. Do not exceed 1250 mg per day. Not recommended for pregnant or nursing women.

Side Effects Gastrointestinal problems like constipation, heartburn pain, nausea, dyspepsia and diarrhea. Severe problems like gastric ulceration and bleeding are present in 1 to 4 per cent of patients using naproxen for prolonged periods up to one year. Short term use does not cause changes in blood coagulation. Changes in vision, hearing disorders and vertigo have also bee reported with Naproxen.

Contraindication History of allergic reactions to naproxen other non-steroidal anti-inflammatory drug and aspirin.

Naproxen inhibits platelet aggregation but this effect.

Control of postsurgical pain. Peak blood levels obtained in two to four hours, stays active as an analgesic for six to eight hours usually causes small changes in bleeding time in normal patients. This is less than that seen with aspirin. Patients on anticoagulant therapy or with intrinsic bleeding disorders can be at risk for hemostatic problems with the concurrent use of ibuprofen Precautions.

Patients with decreased renal or liver function, heart failure or under diuretic therapy can be at risk for liver dysfunction renal failure, and fluid retention while taking Naproxen.
Drug Interactions

How Prescribed Available in USA without prescription. Usual prescription is 500 mg followed by 250 mg every 6 to 8 hours as needed for control of post surgical pain for one to five day.

Opioids

Opioid analgesics may be used to manage dental pain. They should be considered if acetaminophen or an NSAID alone will not be sufficient.

Patients using beta blockers or ACE inhibitors can have complications if NSAIDS are used that can result in increased blood pressure.

Effects of opioids

Analgesia is the primary action of opioids, affecting both the pain threshold and pain reaction. Although high doses can be very effective for the relief of severe pain, opioids are most often accompanied by unacceptable side effects. Prescribing opioids for dental pain should be considered only in combination with an NSAID or acetaminophen. Opioids can be prescribed alone if the patient already has a prescription for an NSAID or is taking acetaminophen appropriately. If an opioid is necessary, codeine should be the first to consider. Formulations combining acetaminophen or ASA with codeine are available and popular because of ease of administration. If codeine is insufficient, the next opioid to consider is oxycodone. This drug is most commonly available with either ASA or acetaminophen.1,7

Use of analgesics in pregnancy and lactation8

Optimal management of dental pain during pregnancy is removal of the source of pain using local anesthesia. If, however, postoperative pain is present, an analgesic may be necessary and should be made available. Acetaminophen is clearly the analgesic of choice in all stages of pregnancy. The use of NSAIDS is less favorable, particularly late in pregnancy. NSAIDS may predispose to ineffective contractions during labour, increased bleeding during delivery or premature closure of the ductus arteriosus of the heart. NSAIDS are therefore contraindicated in the third trimester.

If acetaminophen is insufficient, opioids are considered acceptable during pregnancy provided they are given for a short duration. Chronic opioid use can result in fetal dependence, premature delivery and growth retardation.1,8

As with pregnancy, acetaminophen is the analgesic of choice in lactation. ASA and diflunisal may increase bleeding and should be avoided if possible. Opioids are considered safe in lactation.

General Guidelines for Analgesic Use1,6

Eliminate the source of pain, if at all possible and Individualize regimens based on pain severity and medical history. Always it should be noted that the dose of nonopioid should be increased before adding an opioid and Optimize dose and frequency before switching. With regards to NSAIDS, consideration should be given to Preoperative and Loading dose. Care
should be taken to avoid chronic use of any analgesic whenever possible and reduce the dose and duration of any NSAID or opioid in the elderly, always. Overall prescribing recommendations. A protocol, or algorithm, for analgesic use is presented below.

<table>
<thead>
<tr>
<th>IF MILD TO MODERATE POSTOPERATIVE PAIN IS EXPECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACETAMINOPHEN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IF 1,000 MG OF ACETAMINOPHEN IS INSUFFICIENT (I.E. FOR MODERATE TO SERVE PAIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF NO CONTRAINDIC</td>
</tr>
<tr>
<td>IF NSAIDS CONTRAINDICATE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IF CONCERNS REGARDING GASTRIC BLEEDING OR IF ELDERLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF MORE ANALGESIA IS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADD CODEINE TO ACETAMINOPHEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADD OXYCODONE WITH ACETAMINOPHEN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADD CODEINE TO NSAID, ACETAMINOPHEN OR ASA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADD OXYCODONE WITH ACETAMINOPHEN OR ASA</td>
</tr>
</tbody>
</table>

**CONCLUSION**

Nonsteroidal anti-inflammatory drugs (NSAIDS) are a chemically heterogenous group of compounds that have anti-inflammatory, analgesic and antipyretic effects and share common therapeutic action and toxic effects. The principal mechanism of action of NSAIDS is the inhibition of cyclooxygenase, the enzyme responsible for the biosynthesis of prostaglandins.

Patients have variability in their susceptibility to the analgesic effect of the various non-steroidal anti-inflammatory agents and so when these drugs are used it may be necessary to change to another agent in this group in order to get acceptable analgesia. In order to get peak levels to the analgesic agent at the time the local analgesia is wearing off, the appropriate time for the patient to take these tablets is based on the pharmacodynamics of each agent. Acetaminophen and Ipubrufen work best if given at the end of the surgical procedures, longer acting agents like diffunisal may be more effective given immediately prior to the surgery.

The non-steroidal anti-inflammatory agents and acetaminophen have very few side effects or contraindication, particularly when used for short periods of time as suggested after Periodontal surgery. The adverse effects of these agents have one-half to one-tenth the frequency reported for long term utilization.
Analgesics are a second –best means of managing pain; the next means is to remove the source as quickly as possible. We have numerous analgesics at our disposal. Our goal should be use these drugs optimally to treat pain most effectively.

REFERENCES


