



## Effectiveness of the Use of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) for Postoperative Pain Management in Patients Undergoing Major Surgical Operations at Manokwari Hospital

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### ABSTRACT

Postoperative pain is a common complication in patients undergoing major surgical operations, interfering with comfort and recovery and increasing the risk of further complications. This study aimed to evaluate the effectiveness of NSAIDs in managing postoperative pain at Manokwari Regional Hospital. Utilizing qualitative research methods, data was collected through observation and literature study and analyzed via data reduction, data presentation, and conclusion drawing. The findings indicate that NSAIDs effectively alleviate postoperative pain by inhibiting cyclooxygenase (COX) enzymes responsible for prostaglandin production. However, their use is limited by potential systemic side effects, including gastrointestinal disorders, kidney impairment, increased blood pressure, heart attack, and heart failure. Consequently, topical NSAID formulations are recommended to mitigate these risks. The study suggests that while NSAIDs are effective, clinicians should consider their side effects and prefer topical alternatives. Future research should explore the efficacy and safety of topical NSAIDs and alternative pain management strategies to enhance clinical practice.

**Keywords:** Anti-Inflammatory Drugs, Pain Management, Postoperative, Major Surgery.

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### INTRODUCTION

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Pain is a significant public health issue worldwide, with chronic pain affecting approximately 27% of the adult population in Europe and more than 100 million adults in the United States. Acute pain that is not treated properly can increase the risk of various health problems. The impact includes delayed wound healing, decreased immune function, cardiovascular problems associated with the stress response, and respiratory problems such as pneumonia. In addition, severe, unresolved chronic pain can have far-reaching negative impacts

on a person's quality of life, daily functioning, sleep quality, interpersonal relationships, and work productivity. In addition, chronic pain is also associated with a large economic burden on individuals and society as a whole (Panchal & Sabina, 2023).

Postoperative pain is one of the complications that often occur in patients undergoing major surgical operations. These painful sensations disturb the patient's comfort and can hinder their overall recovery process. Therefore, postoperative pain management is an important aspect of the care of major surgical patients to ensure optimal recovery and reduce the risk of postoperative complications. A wide variety of pain medications have been used to manage postoperative pain, including nonsteroidal anti-inflammatory drugs (NSAIDs).

NSAIDs are one of the most commonly prescribed drugs both in Indonesia and in other countries. The use of NSAIDs often lasts for a long period of time because these drugs are used to relieve symptoms of inflammation in chronic conditions such as osteoarthritis and rheumatoid arthritis. Although NSAIDs provide benefits in reducing symptoms of inflammation, the mechanism of action can also interfere with the defense of the digestive tract mucosa (Maulida et al., 2023). Therefore, it is necessary to conduct research to evaluate the effectiveness and safety of using NSAIDs in managing postoperative pain in patients undergoing major surgical operations.

Previous research by (Arfania et al., 2023) found that the nonsteroidal anti-inflammatory oil is very useful as a single pain reliever after minor surgery and has an opioid-saving effect for major surgery. Another study by (Bae et al., 2022) found that NSAIDs are effective in postoperative analgesia after lumbar spine surgery. The type of study, the dosage of NSAIDs, the different types of surgery, and the type of analgesics might affect the efficacy of NSAIDs.

The novelty of this study is from the research subjects, namely patients undergoing major surgical operations at Manokwari Hospital, which have never been studied before. The results of this study can be the foundation for further research in deepening understanding of the mechanism of action, appropriate dosage, and potential side effects of using NSAIDs in the context of postoperative pain management. The purpose of this study was to evaluate the effectiveness of the use of NSAIDs in the management of postoperative pain in patients undergoing major surgical operations at Manokwari Regional Hospital.

## RESEARCH METHODS

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This study used qualitative research methods. A qualitative research method is a method of research that emphasizes analysis or description. In a qualitative research process, subjects' perspectives are highlighted, and the basis of theory is established so that the research process is in accordance with the facts encountered in the field. Qualitative research methods aim to

explain a phenomenon in depth and are carried out by collecting more detailed data (Mertens, 2023). The location of this research is at Manokrawi Hospital, Jl. Bhayangkara No. 1, East Manokwari Village, West Manokwari District, Manokwari Regency, West Papua Province. Zip Code 98312. Data collection techniques in this study were carried out through two main approaches: observation at Manokwari Hospital and literature studies. Observation was carried out directly at Manokwari Hospital to directly observe the process of applying Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) in the management of postoperative pain in patients undergoing major surgical operations. In addition, literature studies are also carried out as an additional approach to collect data that support observations in the field. The data that has been collected is then analyzed in three stages, namely data reduction, data presentation, and conclusions.

## RESULTS AND DISCUSSION

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Surgery or surgery is a general term in medicine that refers to a medical process that involves physical intervention on a person's body. The types of surgery are divided into two main categories: minor surgery, which consists of minor or uncomplicated procedures, and major surgery, which includes larger, more complex procedures. Minor surgery involves intervening in a limited part of the body, while major surgery involves the body's organs as a whole. The risk of complications tends to be lower in minor surgery compared to major surgery. Most patients undergoing minor surgical procedures can usually go home the same day (Pane, 2020).

Surgery is performed for various purposes, including diagnosing disease, treating injury or disability, and treating medical conditions that are difficult or cannot be overcome by medication alone. Major surgery includes various procedures such as gallbladder removal (cholecystectomy), kidney removal (nephrectomy), making openings in the intestine (colostomy), removal of the uterus (hysterectomy), breast removal (mastectomy), limb amputation, surgery due to trauma, abdominal opening (laparotomy), and Caesarea procedure (cesarean section) to deliver a baby (Putri & Martin, 2020).

It was recorded that in 2018, major surgical procedures in Indonesia reached a significant level. One such type of procedure, laparotomy, ranked fifth in the number of cases. Of the total 1.2 million surgeries performed, it is estimated that about 42% of them are laparotomy. According to data from the Indonesian Ministry of Health in 2018, surgery ranks eleventh out of 50 diseases treated in hospitals throughout Indonesia, with a percentage of around 12.8%. About 32% of these surgeries are estimated to be laparotomy. Then, the rate of major surgery in Indonesia is very high, with about 75% of cases performed; the procedure involves various surgical specialties, including digestive, pediatric, oncology, plastic, thorax, vascular, orthopedics,

and urology. More than 60% of these cases are related to digestive surgery, while the rest are evenly distributed in cases from other surgical specialties (Yuliana & Rohma, 2021).

Major surgery has become part of medical services in various hospitals throughout Indonesia, including at RSUD Manokwari. RSUD Manokwari is a type C regional general hospital located in Manokwari Regency, Papua. Manokwari Hospital provides various medical and health services to the local community. Major surgery is a major surgical procedure generally performed using general or general anesthesia. This type of surgery involves comprehensive intervention and is often performed in an inpatient surgical unit (Sari et al., 2020).

Major surgery involves the use of general anesthesia to remove the patient's consciousness during the procedure so that they do not feel pain. In medical terms, major surgery can be considered as major surgery that requires general anesthesia. According to EU-IACUC standards, major surgery includes surgical procedures that penetrate and expose entire body cavities, including the skull and bone dissection, or result in significant damage to anatomy or bodily functions. Major surgery involves head, neck, chest, and abdomen interventions. Typically, major surgery involves one of the three major cavities of the body: the abdomen (laparotomy), chest (thoracotomy), or skull (craniotomy), and can also include vital organs (Darmadi et al., 2020).

General anesthesia is necessary for major surgical procedures such as laparotomy because it involves opening the abdomen by making incisions in the layers of the abdominal wall to access organs within it that may have problems such as bleeding, perforation, cancer, or obstruction. This action is generally performed for conditions such as perforated appendicitis, inguinal hernia, stomach, colon, rectal, intestinal obstruction, chronic colitis, cholecystitis, and peritonitis (KRISNAWATI & DWI, 2023).

Major surgeries have proven effective in treating serious injuries, disabilities, and medical conditions that are difficult to treat with other methods. However, the side effects of surgical procedures are often in the form of pain that can be experienced by the patient. The surgical process involves invasive procedures that require the opening or appearance of the part of the body to be operated on by making an incision. This can cause discomfort for patients due to trauma that occurs in body tissues during the operation process, which then leads to pain sensations (Hidayat, 2020). In (Sonyorini & Sulastri, 2023), laparotomy can be performed with various incision directions, including:

1. Median incision, which is performed in the middle of the abdomen and is used for abdominal surgery involving large areas inside the abdomen.
2. Paramedian incision (to the right) is usually used for cases such as appendix masses or surgery on other specific areas to the right of the abdomen.
3. Pararectal incision is an incision made around the rectal area and used for surgery related to surrounding organs.

4. McBurney's incision is performed in an area known as McBurney's point, which is to the lower right of the abdomen and is often used for appendectomy surgery (removal of the appendix).
5. Pfannenstiel incision, which is an incision in the lower area of the abdomen, near the pubic hairline, and is often used for surgery on the bladder or uterus.
6. A transverse incision, which is a horizontal incision in the abdomen can be used for various types of surgery depending on the need.
7. Subcostal (right) incision, which is an incision under the right rib cage and is often used for surgeries such as cholecystectomy (removal of the gallbladder).

During the surgical process and as a result of the incision, patients often experience pain or tenderness. The intensity, duration, and frequency of postoperative pain can vary from patient to patient. The pain felt by postoperative patients is caused by mechanical irritation of the surgical wound, which triggers the release of chemical mediators that stimulate pain perception in the body (Selvita Berlian Desta, 2020). Surgical procedures can cause trauma to the tissue, leading to the release of inflammatory mediators, which in turn can trigger significant pain sensations. Pain is an unpleasant sensory and emotional experience caused by actual or potential damage to body tissues, which is felt in the event in which the damage occurred. If acute pain is not managed with adequate pain treatment or therapy, it is likely to progress to chronic pain (Mailawati et al., 2020). Almost all patients, after undergoing major surgery, report experiencing pain, often without adequate knowledge of how to reduce such discomfort (Lestari et al., 2022).

Although postoperative pain is a natural physiological reaction, it is one of the complaints that worries patients the most. The painful sensation begins to be felt before the patient has completely recovered from the anesthesia, and the intensity increases as the effect of the anesthetic decreases. It is important to manage pain because comfort is a basic human need. Discomfort due to pain can affect a person's daily activities and quality of rest (Wati et al., 2020). Pain that persists over a long period of time can hinder the patient's ability to move freely at some level. This may make it difficult for patients to maintain personal hygiene, such as bathing or eating. In addition, unresolved pain can also disrupt the patient's sleep patterns, causing sleep disturbances that have an impact on the patient's recovery and health.

According to research, as many as 46% of patients who undergo major surgery experience chronic pain afterward. This percentage far exceeds the prevalence of chronic pain reported in adult populations in other developing regions (Mailawati et al., 2020). That is, chronic postoperative pain is a serious problem and needs further attention in efforts to deal with it. Pain management can be done through pharmacological and non-pharmacological approaches. Pharmacologically, it involves administering analgesic and sedative drugs. Meanwhile, non-pharmacological approaches include various techniques such as anticipatory guidance, ice and

heat therapy, TENS (Transcutaneous Electrical Nerve Stimulation), distraction, relaxation, guided imagination, hypnosis, acupuncture, massage, and music therapy (Wati et al., 2020).

The alternative applied to reduce pain at Manokwari Hospital after major surgery is to give Non-Steroidal Anti-Inflammatory Drugs (NSAIDs). NSAIDs are drugs that are often prescribed by doctors and are freely available in the community. The mechanism of action of NSAIDs mainly involves the inhibition of cyclooxygenase (COX) enzyme activity. The enzyme COX has a key role in the production of prostaglandins, which are the main mediators of pain sensation. The effectiveness of NSAIDs is based on their ability to inhibit prostaglandin synthesis through inhibition of cyclooxygenase enzyme action. The cyclooxygenase enzyme works in the conversion pathway of arachidonic acid into prostaglandins and thromboxane. When these enzymes are inhibited by NSAIDs, this conversion process is disrupted, resulting in reduced prostaglandin production. As a result, the pain response of the tissue affected by surgery is reduced (Arfania et al., 2023).

The cyclooxygenase enzyme (COX) is a protein that facilitates the chemical reaction that converts arachidonic acid into prostaglandins. Prostaglandins are important molecules involved in various physiological processes in the body, such as regulating inflammatory responses, responding to pain, regulating protective secretions of the stomach lining, maintaining blood flow to the kidneys, and regulating platelet aggregation in blood clotting (Maulida et al., 2023). When anti-inflammatory drugs inhibit COX, it can provide an analgesic effect by reducing prostaglandin production, thus helping to reduce the intensity of pain felt after surgery.

The pain that appears after surgery is often caused by the stimulation of the nociceptor, which is a receptor sensitive to stimuli that can cause pain. Opioids, such as morphine, are one type of drug that is often used to manage postoperative pain. Opioids work by activating opioid receptors scattered in different parts of the brain so that nociceptive signals are centrally blocked, reducing pain perception. However, opioid use is not always ideal because it has the potential to cause side effects such as dependence, respiratory depression, and constipation. Therefore, the administration of NSAIDs has been considered effective in the management of postoperative pain, especially for major surgery. The use of NSAIDs is on the rise due to concerns about side effects associated with opioid use (Mol et al., 2016; Ridwan et al., 2021).

At Manokwari Hospital, NSAIDs commonly used for pain management after major surgery are in the form of oral drugs such as Paracetamol, Diclofenac Sodium, and ibuprofen. In addition, if more intensive treatment is needed, intravenous administration can be done with drugs such as ketorolac or acetaminophen (paracetamol). The dose of intravenous acetaminophen is usually adjusted to the patient's weight, with about 15 mg/kg body weight or 1 gram if the patient's body weight is more than 50 kg.

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Based on observations in patients undergoing major surgery at Manokwari Regional Hospital, the administration of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) proved to be very useful as a single analgesic after surgery. NSAIDs help reduce pain by a different mechanism than opioids and, therefore, may be a safer or preferred option for some patients. Although NSAIDs bring significant benefits in pain management, their use is sometimes limited by the risk of possible systemic side effects. These side effects include disorders of the gastrointestinal tract, such as damage to the gastrointestinal mucosa, as well as problems such as constipation and renal dysfunction. In addition, non-selective use of NSAIDs can also be associated with an increased risk of cardiovascular events, such as hypertension, stroke, and heart attack, and can even cause death (Ridwan et al., 2021).

So, to prevent side effects or other potentially dangerous negative impacts for patients, it is essential to adhere to the basic principles in the use of painkillers. The use of the drug is considered appropriate if the patient receives it according to his clinical needs, in adjusted doses, with appropriate duration of use, and at a reasonable cost. Meanwhile, in addition to using NSAIDs in oral and parenteral (intravenous) forms, Manokwari Regional Hospital also uses additional approaches in topical form. One example of topical NSAIDs used at Manokwari Hospital is Sodium Diclofenac Topical, which aims to reduce pain at the surgical incision site. Using NSAIDs in topical form, the drug can be applied directly to the area of pain so that it can provide an analgesic effect locally with a smaller amount of medication compared to oral or parenteral use. This can reduce the risk of systemic side effects associated with the use of NSAIDs (Triana & Suparman, 2022).

The use of NSAIDs in topical form is a safer option and is preferred in pain management. This is because topical formulations can provide effective analgesic effects with a lower risk of side effects. However, it is important to ensure that such topical formulations are used according to the doctor's instructions, and the patient must be properly informed about how they are used. Therefore, it is advisable to improve the understanding of medical staff at Manokwari Hospital regarding the administration of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) in the management of major postoperative pain due to varying pain preferences and patient risks.

### **CONCLUSION**

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The application of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) has proven effective in reducing postoperative pain in patients undergoing major surgical procedures at Manokwari Regional Hospital. The mechanism of action of NSAIDs is by inhibiting the activity of cyclooxygenase (COX) enzymes, which have an important role in producing prostaglandins that trigger pain sensations. Although NSAIDs bring significant benefits in pain management, their use

is sometimes limited by the risk of systemic side effects. These side effects include disorders of the digestive tract, decreased kidney function, increased blood pressure, risk of heart attack, and even heart failure. Therefore, to reduce the risk of these side effects, the use of NSAID formula in topical form is a preferred alternative.

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