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## PAIN CONTROL AFTER TRAUMATOLOGICAL OPERATION: A BIBLIOGRAPHIC REVIEW

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**Abstract: INTRODUCTION:** Pain has always been one of man's biggest concerns, however, despite the evolution of science, there are still several barriers to its adequate treatment, including a lack of knowledge on the part of the medical team about the mechanism of the different drugs and techniques used. In this article, we talk about the importance of adequate postoperative analgesia, considering the main drugs and techniques used to control pain, their mechanisms of action, dosages, routes of administration and side effects, as well as the importance of integration of the entire team involved in patient care for treatment success. **METHODOLOGY:** This is a literature review, of a narrative type, which aims to describe the types of post-operative treatments in trauma surgery and their respective indications, from a theoretical point of view, through materials that have already been published on the topic in question. question, through analysis and interpretation of the literature. The inclusion criteria were: articles in Portuguese and English; published between 2019 and 2023 and which addressed the themes proposed for this research, review-type studies made available in full. The review was carried out from August to December 2023, through searches in the databases Virtual Health Library (VHL), Latin American and Caribbean Literature in Health Sciences (LILACS), National Institutes of Health's Library of Medicine (PubMed) and Scientific Electronic Library Online (SciELO). **RESULTS AND DISCUSSIONS:** Pain is a frequent phenomenon in the postoperative period and can result in suffering and unnecessary risks for the patient. Studies demonstrate inadequate pain relief after surgery and its relationship with failures in assessment and lack of knowledge about analgesic methods. The article discusses postoperative pain management that includes the use of non-steroidal anti-inflammatory

analgesics, opioids, cognitive-behavioral interventions and high technology such as epidural catheters and patient-controlled analgesia systems. Furthermore, adequate pain control includes discussion of ethical and economic aspects. **CONCLUSION:** Among the techniques used, multimodal therapy with analgesics with the use of active ingredients with different mechanisms of action applied systemically, regionally or locally prevails in effectiveness, associated with the individualization of the POD approach aiming for better results in the short and long term.

**Keywords:** Pain; treatment; post-operative.

## INTRODUCTION

Pain has always been one of man's biggest concerns, however, despite advances in science, there are still several barriers to its adequate treatment, including the lack of knowledge on the part of the medical team about the mechanism of the different drugs and techniques used. The objective of this work is to address the main drugs and techniques used to control postoperative pain, aiming to stimulate interest in the subject as well as increase the effectiveness of the treatment given to patients. This article highlights the importance of adequate postoperative analgesia, considering the main drugs and techniques used to control pain, their mechanisms of action, dosages, routes of administration and side effects, as well as the importance of integration of the entire team involved in patient care for successful treatment. Inadequate treatment of postoperative pain is not justified, as there is a considerable arsenal of drugs and analgesic techniques. What is necessary, therefore, is that the entire team, anesthetists, surgeons, and nurses have knowledge and are integrated in the use of this arsenal.

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## METHOD

This is a literature review, of a narrative type, which aims to describe the types of post-operative treatments in trauma surgery and their respective indications, from a theoretical point of view, through materials that have already been published on the topic in question. question, through analysis and interpretation of the literature. The inclusion criteria were: articles in Portuguese and English; published between 2019 and 2023 and which addressed the themes proposed for this research, review-type studies made available in full. The exclusion criteria were: duplicate articles, available in abstract form, which did not directly address the proposal studied and which did not meet the other inclusion criteria.

The review was carried out from August to December 2023, through searches in the databases Virtual Health Library (VHL), Latin American and Caribbean Literature in Health Sciences (LILACS), National Institutes of Health's Library of Medicine (PubMed) and Scientific Electronic Library Online (SciELO). The following descriptors were used: "pain control", "orthopedic pain", "post-trauma pain", in order to find articles relevant to the topic covered. After the selection criteria, 5 articles remained that were subjected to

thorough reading for data collection. The results were presented in a descriptive way, divided into thematic categories addressing: describing the subtitles or points that were mentioned in the discussion.

## RESULTS AND DISCUSSION

Trauma resulting from surgery involves physiological and emotional changes that, if not adequately controlled, predispose patients to complications and can prolong hospitalization. Among the conditions that can affect an individual's recovery, pain deserves to be highlighted. Pain is a very common phenomenon in the postoperative period and can result in suffering and exposure of patients to unnecessary risks. There are several reports that its control is inadequate (MARTINS, LMM; PIMENTA, CAM, 1997) Studies carried out in our country also observed insufficient pain relief (VARDER NIEUWENHUYZEN, MC; 1995)

When evaluating patients in the first 5 days after cardiac and abdominal surgery, complaints of pain at the time of the interview occurred in 46% of cardiac surgery patients, and in 44% of those in the postoperative period of abdominal surgery. When the presence of pain in the last 24 hours was considered, these values rose to 76% and 90%, respectively. Among patients who had undergone heart surgery, pain was rated as moderate by 34.2% and 26.4% of patients considered it severe. Among those who underwent abdominal surgery, pain was assessed as moderate by 46.6% of those assessed and as severe by 15.5% of patients. Patients who reported pain at the time of the interview were assessed whether they had received analgesics in the last 4 hours. It was observed that all patients had some analgesic prescribed on an "if necessary" basis, but around half had not received it. Those who had received analgesics remained in pain (PIMENTA, CAM; TEIXEIRA, MJ. 1997)

A study carried out in inpatient units of a general hospital evaluated pain and satisfaction with analgesia in 110 patients in the immediate postoperative period (POI), 1st and 2nd postoperative days (PO). Patients were grouped according to the size of the surgery and were evaluated 3 times a day. Among those who underwent major surgery (41), 97.6% reported pain. In POI, pain was described as intense by 38.7% of patients (between 8 and 10 on the numerical scale from 0 to 10). On the 1st POD, 23% of patients rated the pain as severe and 38.5% as moderate (5 to 7). Disabilities arising from pain were: 82.6% of patients reported that pain made it difficult to move in bed; 56.8% reported that it was difficult to breathe deeply; 45.2% reported sleep loss; 25.2% of patients reported difficulty walking due to pain and 21.3% stated that the pain affected their appetite. The analysis of analgesic prescriptions showed that 97.6% of patients were prescribed non-steroidal anti-inflammatory drugs (NSAIDs). Of the prescriptions, 19.7% contained 1 NSAID, 36.1% included 2 NSAIDs and 44.2% allowed the use of up to 3 NSAIDs. NSAID prescriptions were “if necessary” 58.4% of the time. Weak morphines represented 19.5% of prescriptions and potent ones 21.9% of them. The administration regime was “if necessary”, almost all of the time. When asked about their satisfaction with analgesia, 67.4% of patients reported being somewhat satisfied or dissatisfied with the analgesia they received 8.

In a study carried out in a teaching hospital, specialized in the treatment of neoplasms, with 55 patients who underwent a surgical procedure, it was observed that 78.2% of patients reported having experienced pain in the first 24 hours of the postoperative period. The mean pain intensity was 5.6 (median 6). Moderate pain was reported by 58.3% of patients and severe by 27.1% of those assessed. The activities of daily living

most affected by pain were moving in bed and sleeping/resting. It was observed that 44.6% of patients had a negative Pain Management Index, that is, the potency of the prescribed analgesic was insufficient for the intensity of the pain experienced. The comparative analysis between prescribed analgesics and those actually received showed that the average dose received was 92% for the fixed-time administration regimen, 80% for the exclusive “if necessary” regimen and 63% for the mixed regimen. Contrary to the high frequency of pain occurrence, the intensity of the pain complaint and the impairment of pain in the performance of activities of daily living observed, the majority of patients (74.4%) were very satisfied with the analgesia received. Perhaps the concept that post-operative pain is inevitable has influenced this assessment (SANTOS, EMM; PIMENTA, CAM. 2000).

## PAIN PATHOPHYSIOLOGY

Pain is conceptualized by the International Association for the Study of Pain as “an unpleasant sensory and emotional experience associated with, or described in terms of, actual or potential tissue damage” (BONICA, JJ 1990). Acute pain is related to nociceptive stimulation produced by an injury (fracture, surgical incision, burn). It results from a set of sensitive, cognitive and emotional experiences, associated with autonomic and behavioral responses. It is associated with a high level of anxiety. In the evolution of acute pain conditions, in general, there is a gradual reduction in pain intensity, related to the resolution of the inflammatory process and healing of the injured area. It is speculated that persistent acute pain may alter the plasticity of the nervous system, leading to chronic pain (WHEDON, M; FERRELL, BR. 1992).

The harmful stimulus of a mechanical, thermal or chemical nature causes tissue damage, which results in the accumulation

of algogenic substances (histamines, prostaglandins, hydrogen, among others). These substances sensitize free nerve endings, generate action potentials and depolarize the neuronal membrane. Painful information is transmitted by nociceptive fibers A delta and C that go to the posterior horn of the spinal cord. After ascending through the spinothalamic and spinoreticular tracts, painful information reaches the reticular formation, thalamus, periaqueductal gray matter, limbic system and cerebral cortex. Painful information increases the activity of the autonomic nervous system, leading to increased synthesis of catecholamines and hormones. The intense and prolonged release of these substances produces cardiocirculatory changes (tachycardia, increased stroke volume, peripheral vasoconstriction, increased cardiac output, oxygen consumption and blood pressure), tachypnea, water retention, increased catabolism with increased glucose levels, changes in coagulation and reduced immune response. Stimulation of the sympathetic nervous system reduces intestinal tone, delays gastric emptying, predisposes to the occurrence of paralytic pain, nausea and vomiting and increases the tone of the bladder sphincter, which may lead to urinary retention (WHEDON, M; FERRELL, BR. 1992).

Surgery, especially when performed on the chest or abdomen, makes deep ventilation difficult and reduces the elimination of secretions from the respiratory tract. These changes can lead to atelectasis and respiratory infections (SANTOS, EMM; PIMENTA, CAM. 2000). Pain results in respiratory, hemodynamic and metabolic changes, which predispose the patient to cardiovascular instability, greater energy and protein consumption and reduced ventilatory volume. Uncontrolled pain may be associated with cardiac arrhythmias, atelectasis and pneumonia and protein-calorie depletion,

among others (SANTOS, EMM; PIMENTA, CAM. 2000). Pain also reduces early movement and ambulation, favoring the appearance of deep thrombosis, especially in elderly patients and those undergoing extensive surgery. Furthermore, it interrupts sleep, which can result in greater physical exhaustion, fatigue and less motivation to cooperate with treatment (LEON-CASASOLA, et al 1994).

Pain assessment aims to identify the existence of pain complaints and establish the etiology of the symptom, characterize the painful experience in all its domains, assess the repercussions of pain on the individual's biological, emotional and behavioral functioning, identify factors that may contribute to maintaining or exacerbate the complaint, select treatment alternatives and verify the effectiveness of the therapies implemented. Failures by professionals to identify the presence of pain or negligence in controlling pain complaints are reasons for inadequate postoperative pain relief. Assessments carried out and recorded in a systematic way, in which specific scales are used to characterize and measure the pain condition, can contribute to improving the management of painful symptoms (READY, LB; EDWARDS, WT. 1997). Inadequate postoperative pain control can also be attributed to factors such as: gaps in knowledge about available analgesic methods, erroneous information related to the pharmacokinetics and pharmacodynamics of analgesic drugs in general and, in particular, exaggerated fears regarding the risk respiratory depression or the development of psychological dependence related to the use of opioids (WHEDON, M; FERRELL, BR. 1992).

## OPTIONS FOR PAIN CONTROL

Postoperative pain control basically involves: use of non-hormonal and morphine anti-inflammatory analgesics, via various routes; cognitive-behavioral interventions, such as educational, relaxation, distraction and guided imagery techniques; use of physical agents such as massages, application of heat or cold and electroanalgesia through Transcutaneous Electrical Stimulation (TENS). The painful phenomenon comprises peripheral and central neural mechanisms. Due to surgical trauma, there is the production of algiogenic inflammatory substances. This results in the recommendation to use analgesics that contribute to the control of inflammation (NSAIDs) and those that inhibit the conduction of painful information to the central nervous system (opiates) (AMERICAN PAIN SOCIETY 2003), associated with cognitive-behavioral techniques that can modify the interpretation of pain (education, distraction techniques, music, guided imagination, among others). Prescribing analgesics at a fixed time avoids large fluctuations in the drug's plasma level and prevents pain spikes. Furthermore, the prescription must provide for the possibility of additional doses of the analgesic (NS), to rescue analgesia. Without the possibility of supplementary doses (NS), the patient and the nursing team are limited in adequate pain management. Considering these concepts, prescribing in a mixed schedule (fixed schedule + NS) more adequately meets the needs of patients (AMERICAN PAIN SOCIETY 2003).

## ADDRESSING THE PAIN

Considering the wide range of possibilities in the treatment of POD, it is necessary to create protocols for this entity. With the purpose of improving the approach to postoperative pain, a group of scholars at a

German university hospital implemented and evaluated the impact of an approach based on three principles: multimodal therapies, specific protocols for each surgical procedure based on evidence and individual adjustment of the analgesia offered. In the research results, it was observed that the adoption of this tripod approach to POD reduced the intensity of pain simultaneously with the reduction of side effects of postoperative analgesia (Usichenko, T.I et al. 2012).

Multimodal therapy consists of the use of more than one class of analgesic agent or analgesic technique. This approach to postoperative pain has been shown to be more effective than monomodal therapy due to the synergistic and/or additive effect of different drugs/techniques as well as the reduction of opioid-related side effects. Researchers have shown that multimodal therapy also decreases the incidence of chronic POD (Buvanendran A, et al 2003).

It is important to remember that individualization of treatment, regardless of the protocol adopted, considering the patient's particularities as well as the specificity of the analgesia method used for each type of surgery, must be recommended for better results in POP treatment. In the process of individualizing treatment, pain assessment is necessary to determine the effectiveness of analgesia in each patient's particular situation.

## ASSESSING THE PAIN

Although it is not easy to measure, pain assessment is essential to better understand the patient's needs. A widely used method is the Verbal Numerical Scale (VNS). In it, the patient must assign a numerical score from zero to ten for pain intensity, with zero being the absence of pain and ten being the most intense pain imaginable. This scale is still under the subjective effect of the patient, however, as we must consider the patient's

reaction to pain, it is important not to evaluate only nociception (Barros GAM, Lino, LTSA 2003). In the case of patients who cannot communicate, it is essential to evaluate signs that manifest themselves as complaints, but as non-vocal painful states of cautious or unusual postures, suffering facies, deep nasolabial folds, friction or protection of the painful area, as well as autonomic activities such as pallor, flushing, sweating. There is also crying, moaning, screaming and sighing in addition to appeals using language (Barros GAM, Lino, LTSA 2003). Due to the need for a system to evaluate pain as a symptom objectively, the Institute of Biomedical Sciences is developing the Autonomic Nervous System State Index (ANSSI) for the objective evaluation of pain in the immediate postoperative period of major surgeries (Pereira LV, Sousa FAEF 2007). While more precise methods of measuring pain are not available, the use of subjective pain scales remains widespread.

Epidural catheter analgesia involves the infusion of morphines into the central nervous system. One end of the catheter is located next to the dura mater and the other is externalized. The analgesic is administered through the exteriorized tip, which passes through the dura mater and binds to opioid receptors in the spinal cord, producing analgesia without motor blockade. With small doses of morphines, which minimize the occurrence of side effects, adequate and prolonged analgesia can be obtained. Complications such as infection, sedation, migration of the catheter into the subarachnoid space, accidental exit and breakage are possible (AMERICAN PAIN SOCIETY. 1993). There is a need for studies that evaluate the cost-benefit ratio of the method in our country.

Patient-Controlled Analgesia (PCA) is a concept based on the principle of feedback. When experiencing pain, the patient can take an additional dose of analgesic

independently. This concept can be used to administer analgesics orally, subcutaneously, intravenously and intrathecally. ACP has been associated with the use of electronic infusion pumps, specific for this purpose, which enable continuous infusion and, in situations of pain exacerbation, the patient activates a system device that releases a dose of supplementary analgesic. This method makes it possible to quickly adapt the dose of analgesics to the patients' needs, when the rescue system is activated, maintaining plasma concentration with a minimum of drug, which would minimize side effects and, self-administration of the analgesic, would provide giving the patient a sense of control over pain 1,17. In research carried out in other countries, where ACP was compared to other methods of analgesia (intravenous, intrathecal, intramuscular and oral), contradictory results were observed in terms of efficiency, analgesic, dose and side effects of drugs, frequency of complications, costs and patient satisfaction. This variability of results makes the decision-making process for recommending the method difficult. There is a need for studies in our country that analyze these variables, within the standards accepted by the scientific community for testing interventions.

There are ethical aspects involved in recommending methods used to manage pain. Health professionals must know them and analyze the complex, but fundamental, interrelationships between them. The ethical principles of autonomy, beneficence, non-maleficence and justice must guide the therapeutic decisions of the entire healthcare team (Chaves, LD, Pimenta, CAM 2003).

Autonomy is the right of others to act in accordance with their own values and beliefs. It is the opposite of paternalism: "I know what is best for you" (Chaves, LD, Pimenta, CAM 2003). Patients and professionals share decisions and responsibility for them. When

receiving any type of analgesia, the patient must be informed of alternative treatments, understand the technique that is intended to be used, and know the costs and risks associated with the treatment of choice.

Beneficence represents promoting well-being, preventing or removing harm. The principle of non-maleficence aims to not inflict harm, damage or injury. It is the counterweight to the principle of beneficence and both are deeply intertwined with the patient's autonomy (Chaves, LD, Pimenta, CAM 2003). Nurses must avoid causing harm and strive to protect the patient from complications. Pain treatment aims to bring comfort and well-being. If it results in impaired quality of life, side effects and significant complications, the methods used must be reviewed.

The principle of justice represents impartiality, the right of everyone to access services, health professionals and therapeutic resources (Chaves, LD, Pimenta, CAM 2003). The use of expensive technology to control pain, when simpler and more economical methods are possible, violates the principle of justice, considering that not everyone can access it and the distribution of economic resources in an equitable way is impractical. Yet, the costs associated with the use of advanced technology in pain control have not been well documented.

Adequate postoperative pain treatment is not only a pathophysiological issue, it is also an ethical and economic issue. Better pain control avoids unnecessary suffering, provides greater

patient satisfaction with care and reduces costs related to possible complications, which determine longer periods of hospitalization.

## CONCLUSION

Adequate postoperative pain control is part of the anesthetic planning, aiming both at greater patient comfort and satisfaction and at reducing complications inherent to the surgical process. The availability of analgesic drugs and anesthetic techniques are wide and enable the adequate treatment of POD, without justifying their non-use and, consequently, the unnecessary suffering of the surgical patient (Buvanendran, A et al 2010). Among the techniques used, multimodal therapy with analgesics with the use of active ingredients with different mechanisms of action applied systemically, regionally or locally prevails in effectiveness, associated with the individualization of the POP approach aiming for better results in the short and long term (Pimenta CA, et al, 200)

It is necessary that pain assessment methods are not only recommended but also improved to better assess the patient's painful sensation both when planning POP treatment and when monitoring it. Despite the wide range of resources and techniques used in the treatment of POP, its treatment remains inadequate and undervalued, and it is extremely urgent to establish postoperative pain treatment protocols with an approach to the most effective therapies for each type of surgical patient.

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