Evaluation of Post-operative Analgesia in the Immediate Post-operative Period of Recovering Patients

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Abstract

Introduction: The incidence of post-operative pain is between 46% and 53% due to a lack of the use of analgesics. Up to 30-50% of operated patients present moderate-to-intense pain in the post-operative period. **Objective:** The objective of this study was to evaluate pain in the immediate post-operative period and to identify its association with schooling, surgery, anesthesia, and analgesia. **Materials and methods:** An observational, descriptive, and transversal study was carried out with a sample of 158 patients between 18 and 90 years old, in both genders of the recovery area. **Inclusion criteria:** Age 18-90 years, previous or post-surgical hospitalization, patients in the recovery area, and outpatients were included in the study. **Exclusion criteria:** Glasgow < 14 points and/or psychiatric patients were excluded from the study. A survey was conducted. **Results:** Our sample was 49.4% male and 50.6% female; 55 patients underwent abdominal surgery, 23 underwent trauma surgery, 22 underwent urological surgery, 19 underwent head surgery, 17 underwent gynecological surgery, 15 underwent reconstructive surgery, 4 underwent thoracic surgery, and 2 underwent vascular surgery. The incidence of pain was 45.6%. Of the total, 93.1% presented visual analog scale < 4. **Conclusions:** Almost half of the patients presented pain in the post-operative period; however, the pain was mild. There was a direct relationship between schooling and level of pain referred to by the patient. Less pain was reported with combined analgesia and, compared to other studies, there was a lower incidence of acute pain.

Key words: Post-operative analgesia. Acute pain. Combined analgesia.

Introduction

In recent years, significant breakthroughs have been achieved in our understanding of the physiopathology of acute pain. This comes as a result of basic research and experimental clinical studies¹. Acute pain is the normal and expected physical response to a stimulus either chemical, thermic, or mechanical. This stimulus induces a change in the central nervous system known as neuronal plasticity, raising the awareness of the nervous system, and thus generating alodine and hyperalgesia².

There are four elements in pain processing - transduction, transmission, modulation, and perception. Transmission of pain modulation involves the alteration of neural transmissions through pain. The most frequent place for modulation through pain is the dorsal horn of the spinal cord, and modulation can involve inhibition or increase of pain signals. Inhibitory spinal modulation includes the liberation of neurotransmitters (gamma-aminobutyric acid and glycine) and the activation of descendant efferent neural pathways (liberation of nor-adrenaline, serotonin, and endorphins in the dorsal

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horn). Chemical mediators of transduction and transmission are pain receptors including N-methyl-D-aspartate (NMDA), alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor (AMPA), and metabotropic receptors².

Response to surgical stress and post-operative acute pain are similar, yet not the same. Surgical stress induces the release of cytosine, triggering neuroendocrine and sympathetic suprarenal responses, an increase in catabolic hormone secretion, and a decrease in the secretion of anabolic hormones².

Post-operative pain control is a challenge in the surgical field. The prevalence of post-operative pain demands knowledge of the main factors which condition the degree of such pain. Among others, there are specific factors of surgical intervention, pre-operative preparation, possible post-operative complications, anesthetic treatment, and quality of post-operative care³. Improper management of acute pain leads to major clinical and economic repercussions, increasing perioperative morbidity as well as the risk of developing chronic pain in the future, increasing hospital stay, and lowering quality of life, in addition to the patient's dissatisfaction with the care service providers¹. The experience of pain has been reported as a common problem in clinical practice, and 73% of hospitalized patients experience unrelieved pain with an intensity ranging from moderate to severe, despite treatment with opioids⁴. Moreover, a similar incidence (75%) was found in postsurgical patients, while 80% of surgical patients could suffer moderate-to-intense pain in the post-operative stage; there have not been significant improvements in pain management; reports suggest that during the 90s, up to 74% of surgical patients experienced moderate-to-severe pain after 24 h, and 65% experienced severe pain 72 h after surgery. Based on this data, organizations such as The American Pain Society have stressed the need of systemic focuses to establish post-operative pain therapy⁴.

Numeric or descriptive scales are used as measurement tools to assess acute pain; the most frequently used tool is the visual analog scale (VAS), which is easy to use and easy to stage pain in mild, moderate, and severe⁴. The VAS allows us to measure the intensity of the pain, the patient is describing with maximum reproducibility among observers. It consists of a horizontal 10 cm line, with extreme expressions of a symptom at each end. On the left side is the absence of pain or lesser intensity, and on the right side, greater intensity. The patient is asked to indicate on the line the intensity of their pain, which is measured using a millimeter ruler.

Intensity is expressed in centimeters and as mild pain with a score under 3, moderate with a score between 4 and 7, and severe when the score is ≥ 8 ². The objective of our paper was assessing pain in the immediate post-operative period and identifying its connection to schooling, surgery, anesthesia, and analgesia.

Materials and methods

An observational, descriptive transversal study was conducted (Figs. 1-3). The study included patients of both genders who underwent surgery in the operating room located on the 5th floor of the "Dr. Jose E. Gonzalez" University Hospital. Inclusion criteria were ages between 18 and 90, males and females, previous or postsurgical hospitalization, patients in the recovery area, and patients who underwent outpatient surgery on the 5th floor. The exclusion criteria were Glasgow < 14 points, psychiatric patients, and patients with difficulty standardizing pain. Furthermore, patients who did not finish the survey and those who refused to complete it were eliminated.

A survey was elaborated to gather data from the patients who were included in the study. Within the recovery discharge assessment, patients who met the selection criteria were informed of the study and the application of the survey. All obtained data were recorded on an Excel sheet, and a statistical analysis was conducted using the software SPSS 20.0 for Windows.

The applied survey gathered data such as age, gender, schooling, surgical service, performed surgical procedure, administered anesthesia, and analgesia. Pain was assessed using the VAS scale upfront (arrival and recovery) and final VAS (discharge and recovery), and patients were asked whether or not they received a rescue analgesic for pain; moreover, the patients were asked if they were pleased with their pain management in the immediate post-operative. The sample was calculated using a ratio estimation formula within an infinite population with a confidence of 95% and a bilateral power of 90%, with an expected prevalence of 0.40 and a precision of 0.5. The sample consisted of 158 patients.

Results

A total of 158 patients who met the inclusion criteria were included during the period of October 2016 and January 2017. Of the 158 patients, 78 were male (49.4%) and 80 were female (50.6%); 109 of the patients were hospitalized, while the rest were from outpatients. There was a higher incidence for the 18-35 age group

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Evaluation of postoperative analgesia in the immediate postoperative in recovery patients.

Date: _____ **Time:** _____ **Number:** _____

Survey for the patient
 We are interested in knowing your opinion about how your pain is being treated during the immediate postoperative at the hospital. Please answer the following questions. Your comments may be of great help. This survey is confidential; your personal data will be destroyed after the study.

1. At some point during your stay in the recovery room, were you in need of a rescue treatment for the pain?
 a) Yes b) No

2.-How long has the pain been present (if applicable) _____

The following questions are to assess the efficiency of the analgesic technique used in the transoperative, if you have any question, please ask the interviewer.

3.-Do you know the type of anesthesia utilized in your surgery?
 A) Yes b) No c) I don't remember **Specify (if you know) _____**

4.- Have you felt pain during the last 2 hours?
 a) Yes b) No

5.- On a scale from 0 to 10, were 0 is "without pain" and 10 "maximum pain", indicate how much pain you have felt here during recovery.

NO PAIN 0 1 2 3 4 5 6 7 8 9 10 **MAXIMUM**

6.-On a scale from 0 to 10, were 0 is "without pain" and 10 "maximum pain," indicate how much pain do you feel right now.

NO PAIN 0 1 2 3 4 5 6 7 8 9 10 **MAXIMUM**

7.-Were you administered any rescue medication for the aforementioned pain?
 a) Yes b) No c) It doesn't apply

8.- Mark the satisfaction level of your postsurgical pain management.

a) dissatisfied b) Somewhat satisfied c) Satisfied

Figure 1. Sheet one of the survey, the degree of pain referred to by patients is evaluated, and if any rescue medication has been received.

(36.1%), while the lowest incidence was in the 76-96 age group (3.8%) (Table 1). Regarding schooling, most patients had completed middle school (Table 2).

157 patients were reported, who underwent various surgeries, with abdominal surgery being the most frequent, with 34.8% of the total (Table 3). Regarding the type of anesthesia and analgesia, the frequency and percentage of patients who received it is described in the following tables (Tables 4 and 5).

The incidence of acute post-operative acute pain was 72 patients (45.6%) (Table 6). On entering the recovery area, it was found that up to 70.9% of the patients did not report pain, according to the VAS (Table 7). Taking

into account that the maximum post-operative pain occurs between 12 and 32 postsurgical hours, decreasing to 42 h, the VAS in recovery would be < 4 or nil.

Of the 158 patients, 147 had a VAS < 4, this is acceptable pain in 93.1% of the patients, while 11 (6.9%) of the patients who had a VAS > 4 pain received additional treatment. The results in the frequency of the final VAS or pre-high recovery are on the following table (Table 8). We were able to appreciate a direct relationship between schooling and the level of pain referred to (Table 9). Analyzing the patients according to the type of surgery and the final VAS, the following results were obtained (Table 10).

9.-Was there a point where the received medication for the pain was not enough and you were required to request another dose?

a) Yes b) No c) It doesn't apply

10.- When you requested medication for the pain, how long did you have to wait?

a) 15-30 minutes b) 30-60 minutes c) over 1 hour d) It doesn't apply

11.-During your stay during recovering, did the physicians and/or nurses communicate the importance of pain treatment?

a) Yes b) No c) I don't remember

12.- Were you instructed to notice the medical personnel or nurse whenever you felt pain?

a) Yes b) No c) I don't remember

13.- Highest level of study completed?

a) None b) Elementary c) middle school d) high school/technical e) University

14.- Do you have any suggestion to improve the pain treatment received?

Figure 2. Sheet two of the questionnaire, asking if the patient received rescue medication, the waiting time for the administration of the medication, and if he was aware of the importance of notifying personnel about the pain he presented.

Table 1. Age range and frequency.

Age range	Frequency (%)	Valid percentage	Accumulated percentage
Valid			
18-35	57 (36.1)	36.1	36.1
36-55	51 (32.3)	32.3	68.4
56-75	44 (27.8)	27.8	96.2
76-96	6 (3.8)	3.8	100.0
Total	158 (100.0)	100.0	

Table 2. Schooling level and frequency.

Schooling	Frequency (%)	Valid percentage	Accumulated percentage
Valid			
None	4 (2.5)	2.5	2.5
Elementary	22 (13.9)	13.9	16.5
Secondary	70 (44.3)	44.3	60.8
High school	28 (17.7)	17.7	78.5
University	34 (21.5)	21.5	100.0
Total	158 (100.0)	100.0	

Discussion

The development of protocols and clinical practice guidelines based on the best scientific evidence constitute the first step to establishing recommendations and new assessment methods and promoting the use of more powerful and effective analgesic techniques¹. Having a greater knowledge of the physiology of pain, of new active principles and new analgesic techniques, would revolutionize the clinical practice of the patient in the post-operative period¹. Apfelbaum et al. studied the experiences of acute post-operative pain, analyzed the most frequent questions of patients who would undergo surgical procedures, being the concern for pain after surgery (59%), which is one of the most important ones along with the question of whether surgery would improve their current condition (51%). Other concerns included pain during surgery and recovery after surgery and whether health professionals would be sensitive to their medical needs or not⁵. In recent years, and coinciding with the development of pain treatment units, it

DATA FOR THE INTERVIEWER

1.-Name of the patient: _____

2.- Age: _____ Surgery service: _____

3.- Gender: _____

4.- Time elapsed from the surgery: _____

5.- Surgical procedure performed: _____

6.- Anesthetic technique utilized (specify opioid and route of administration and/or anesthetic used).

7.-Type of post operatory analgesic (specify analgesic, dosage and route of administration).

8.-¿Will the patient be hospitalized?
a) Yes b) No

9.- Pain intensity depending on the type of surgery (i.e.):

A) INTENSE PAIN	B) MODERATE PAIN	C) MILD PAIN
- Major abdominal surgery	- Appendectomy	- Laparoscopic cholecystectomy
- Conventional cholecystectomy	-Inguinal repair	- Laparoscopic appendectomy
- Perianal surgery	- Mastectomy	- change dressing
-Esophagectomy	- Thyroidectomy	- Catheter placement
- Thoracotomy	- Minor orthopedic surgery	- Circumcision
- Cardiovascular surgery	- Hysterectomy	
- Joint replacement		

Figure 3. Sheet three, where information was collected about the patient (abbreviating their name), the type of surgery, and the anesthesia and analgesia administered.

Table 3. Type of surgery.

Surgery	Frequency (%)	Valid percentage	Accumulated percentage
Valid			
Thoracic	4 (2.5)	2.5	2.5
Abdominal	55 (34.8)	35.0	37.6
Head and neck	19 (12.0)	12.1	49.7
Vascular	2 (1.3)	1.3	51.0
Gynecological	17 (10.8)	10.8	61.8
Urological	22 (13.9)	14.0	75.8
Traumatology	23 (14.6)	14.6	90.4
Reconstructive	15 (9.5)	9.6	100.0
Total	157 (99.4)	100.0	
System losses	1 (6)		
Total	158 (100.0)		

has been observed that a significant percentage of patients who come to the office with long-standing pain have a history of a surgical process that sometimes constitutes the only etiology⁶.

The four elements of pain processing are transduction, transmission, modulation, and perception. The chemical mediators of transduction and transmission are pain receptors including NMDA, AMPA, and metabotropic receptors. The modulation of pain transmission involves the alteration of neural transmission through pain, the dorsal horn of the spinal cord is the most frequent site for the modulation of the pain pathway, and the modulation may involve inhibition or increase in

Table 4. Type of anesthesia.

Anesthesia	Frequency (%)	Valid percentage	Accumulated percentage
Valid			
General	66 (41.8)	41.8	41.8
AGB + BEC	11 (7.0)	7.0	48.7
BEC	45 (28.5)	28.5	77.2
BSA + BEC	18 (11.4)	11.4	88.6
Endovenous (BIER)	2 (1.3)	1.3	89.9
Sedation	9 (5.7)	5.7	95.6
Plexo m. superior	7 (4.4)	4.4	100.0
Total	158 (100.0)	100.0	

Table 7. Initial VAS.

VAS	Frequency (%)	Valid percentage	Accumulated percentage
Valid			
0.00	112 (70.9)	70.9	70.9
1.00	2 (1.3)	1.3	72.2
2.00	18 (11.4)	11.4	83.5
3.00	8 (5.1)	5.1	88.6
4.00	7 (4.4)	4.4	93.0
5.00	6 (3.8)	3.8	96.8
6.00	1 (0.6)	0.6	97.5
8.00	2 (1.3)	1.3	98.7
9.00	1 (0.6)	0.6	99.4
10.00	1 (0.6)	0.6	100.0
Total	158 (100.0)	100.0	

VAS: visual analog scale.

Table 5. Type of analgesia.

Analgesia	Frequency (%)	Valid percentage	Accumulated percentage
Valid			
Neuroaxial	3 (1.9)	1.9	1.9
Intravenous	126 (79.7)	80.8	82.7
Combined	27 (17.1)	17.3	100.0
Total	156 (98.7)	100.0	
Losses			
System	2 (1.3)		
Total	158 (100.0)		

Table 8. Final VAS.

VAS	Frequency (%)	Valid percentage	Accumulated percentage
Valid			
0.00	89 (56.3)	56.3	56.3
1.00	15 (9.5)	9.5	65.8
2.00	19 (12.0)	12.0	77.8
3.00	7 (4.4)	4.4	82.3
4.00	14 (8.9)	8.9	91.1
5.00	7 (4.4)	4.4	95.6
6.00	4 (2.5)	2.5	98.1
7.00	2 (1.3)	1.3	99.4
8.00	1 (0.6)	0.6	100.0
Total	158 (100.0)	100.0	

VAS: visual analog scale.

Table 6. Presence of pain.

Pain	Frequency (%)	Valid percentage	Accumulated percentage
Valid			
Yes	72 (45.6)	45.6	45.6
No	86 (54.4)	54.4	100.0
Total	158 (100.0)	100.0	

pain. Inhibitory spinal modulation includes the release of neurotransmitters (gamma-aminobutyric acid and glycine) and the activation of descending efferent neuronal pathways (release of noradrenaline, serotonin, and endorphins in the dorsal horn)². Due to the complexity of pain processing, and the social and emotional factors that contribute to this, there is no perfect scale to measure the intensity of it; because it is a subjective emotional feeling, there is no objective sign that can accurately measure the degree of pain, a patient is feeling. On the subjective scales, the patient himself informs us about his pain, examples of which are the numerical, descriptive scales and the analogous visual scale which was used in this study⁷.

We observed that educational level influenced the perception of pain, with a greater perception of pain in patients with a higher educational level. The experience of previous situations or exposure to pain, according to Aubrun et al., influences the perception of pain⁷.

Likewise, multiple methods of administering analgesia have been handed to patients who have undergone various surgical procedures to provide immediate relief and improve pain tolerance during the recovery process. The routes of the administration of analgesia are diverse, with the intravenous route being the most used⁸.

In this study, it was observed that when administering combined analgesia from the transoperative period, patients presented a lower incidence of acute pain in the immediate post-operative period, with VAS < 4 being considered mild pain. According to a study by Aznar et al., this point is supported on the modulation of the sympathetic system produced by certain analgesic techniques such as epidural analgesia that has a favorable effect on cardiovascular complications, which are produced by sympathetic activation during the perioperative period.

Table 9. Relation of schooling level and VAS.

Schooling	EVA										Total
	0.00	1.00	2.00	3.00	4.00	5.00	6.00	8.00	9.00	10.00	
None Count % within schooling	4 100.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	4 100.0
Elementary Count % within schooling	12 54.5	0 0.0	3 13.6	5 22.7	2 9.1	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	22 100.0
Secondary Count % within schooling	50 71.4	1 1.4	10 14.3	2 2.9	3 4.3	3 4.3	1 1.4	0 0.0	0 0.0	0 0.0	70 100.0
High school Count % within schooling	21 75.0	1 3.6	1 3.6	0 0.0	2 7.1	1 3.6	0 0.0	1 3.6	1 3.6	0 0.0	28 100.0
University Count % within schooling	25 73.5	0 0.0	4 11.8	1 2.9	0 0.0	2 5.9	0 0.0	1 2.9	0 0.0	1 2.9	34 100.0
Total Count % within schooling	112 70.9	2 1.3	18 11.4	8 5.1	7 4.4	6 3.8	1 0.6	2 1.3	1 0.6	1 0.6	158 100.0

VAS: visual analog scale.

Table 10. Relation between surgery and VAS.

Surgery	n	Average	Typical deviation	Typical error	Confidence interval for the 95% average		Minimum	Maximum
					Lower limit	Upper limit		
Thoracic	4	2.0000	2.16025	1.08012	-1.4374	5.4374	0.00	5.00
Abdominal	55	1.4182	1.87272	0.25252	0.9119	1.9244	0.00	7.00
Head and neck	19	0.6842	1.15723	0.26549	0.1264	1.2420	0.00	4.00
Vascular	2	1.5000	2.12132	1.50000	-17.5593	20.5593	0.00	3.00
Gynecological	17	1.1765	1.62924	0.39515	0.3388	2.0141	0.00	4.00
Urological	22	0.5455	1.26217	0.26910	-0.0142	1.1051	0.00	4.00
Traumatology	23	1.8261	2.47996	0.51711	0.7537	2.8985	0.00	7.00
Reconstructive	15	2.2667	2.548580	0.65804	0.8553	3.6780	0.00	8.00
Total	157	1.3376	1.92339	0.15350	1.0344	1.6408	0.00	8.00

VAS: visual analog scale.

Our work has shown the importance of assessing pain early to implement strategies for managing it. It was observed significantly that a large percentage of patients undergoing surgery had less immediate post-operative pain. Therefore, it is necessary to individualize the pain management of each patient according to their pain threshold, type of surgery and comorbidities, to minimize in-hospital stay, the expense of

supplies and complications related to immediate acute pain, and subsequent chronic pain of a post-operative origin.

This study was conducted with the objective of evaluating the degree of pain presented in the immediate post-operative period, in addition to its relationship with the type of surgery, anesthetic technique, type of analgesia administered and the association of schooling,

and their perception of pain. Taking into account the results obtained, we can say that there is a relationship with the degree of pain and schooling; the greater the level of education, the greater the pain. As for the anesthetic-surgical techniques and analgesia, it was observed that patients who received combined analgesia reported a lower pain scale without requiring rescue medication. It was also observed that of the 78 patients who presented pain, only 8 (11.11%) received rescue analgesia.

Because it was an immediate evaluation study, this study was limited in its follow-up on patients, and in this way to be able to evaluate if the intensity of pain remained low or increased, and if the pain presented was handled properly.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

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