Chronic After Colorectal Surgery Determination of Pain Incidence and Risk Factors

Kolorektal Cerrahi Sonrası Kronik Ağrı İnsidansı ve Risk Faktörlerinin Belirlenmesi

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Abstract

This descriptive and cross-sectional study was conducted to determine the incidence of chronic pain after colorectal surgery and its risk factors. Data were collected using the "Patient Identification Form," "Numerical Pain Scale," and "Short Pain Inventory." Data were collected before surgery, 24, 48, and 72 hours after surgery, and 3 months after surgery. The highest average pain level was 4.02±1.63 during movement in the first 24 hours, and 27% of patients developed chronic postoperative pain 3 months after surgery. In the 3-month postoperative assessment, significant differences were found in the mean severe pain score (t=-2.552, p=0.050) in patients without surgical experience and in both severe and mild pain scores (t=-4.047, p=0.050; t=-3.199, p=0.004) in patients who received general anesthesia. Approximately one-third of patients undergoing colorectal surgery experience chronic pain postoperatively, and the risk of developing chronic pain is higher in patients undergoing surgery for the first time and those receiving general anesthesia.

Keywords: Chronic Postsurgical Pain, Pain Assessment, Colorectal Surgery, Risk Factors, Nursing.

Öz

Bu tanımlayıcı ve kesitsel çalışma kolorektal cerrahi sonrası kronik ağrı insidansını ve risk faktörlerini belirlemek amacıyla yapıldı. Veriler"Hasta Tanımlayıcı Bilgi Formu", "Sayısal Ağrı Ölçeği"ve "Kısa Ağrı Envanteri" kullanılarak toplandı. Veriler ameliyat öncesinde, ameliyattan 24, 48, 72 saat sonra ve ameliyattan 3 ay sonra toplandı. En yüksek ortalama ağrı düzeyi ilk 24 saatte hareket sırasında 4.02±1.63 idi ve hastaların %27'sinde ameliyattan 3 ay sonra kronik postoperatif ağrı gelişti. Ameliyat sonrası 3. aydaki değerlendirmede, cerrahi deneyimi olmayanlarda şiddetli ağrı ortalamasında (t=-2.552, p=0.050) ve genel anestezi alanlarda hem şiddetli hem de hafif ağrı ortalamasında (t=-4.047, p=0.050; t=-3.199, p=0.004) anlamlı fark bulundu. Kolorektal cerrahi sonrası hastaların yaklaşık üçte birinde cerrahi sonrası kronik ağrı saptanmıştır ve ilk kez ameliyat olan ve genel anestezi alan hastalarda cerrahi sonrası kronik ağrı gelişme riski daha yüksektir.

Anahtar Kelimeler: Cerrahi Sonrası Kronik Ağrı, Ağrı Değerlendirmesi, Kolorektal Cerrahi, Risk Faktörleri, Hemşirelik.

1. Introduction

According to the World Health Organization (WHO), 2022, colorectal cancers rank 4th among all cancer types with 20.6% (WHO,2022). Although colorectal surgery is the main treatment approach for colon and rectal cancers, postoperative pain is an important problem that may even lead to cancellation of surgeries (Feddern et al., 2015).

In the perioperative period, reasons related to the patient (such as gender, age, surgical experience, smoking) and surgery (such as type of surgery, incision size, duration of surgery) as well as preoperative anxiety and pain, type of analgesia, immobilization, and mobilization may cause pain (Aliyev et al., 2021; Dağıstanlı et al., 2018). Ineffective pain management may lead to prolonged hospital stay, increased readmissions, decreased patient satisfaction and gastrointestinal complications including ileus, anastomotic leakage, nausea and vomiting (Erden et al., 2023a; Regenbogen et al., 2016).

In a study examining acute pain after colorectal surgery, it was found that 50-64% of patients experienced moderate to severe pain in the first 72 hours after surgery (Lindberg et al., 2020). Uncontrolled postoperative pain may lead to chronic pain by preventing activities that support healing such as oxygenation, mobilization and oral intake and delay recovery and wound healing (Üstünel et al., 2023; Lindberg et al., 2020).

Pain lasting longer than 3 months after surgery is defined as Chronic post-surgical pain (CPSP) and is accepted as a new disease in ICD-11 (Schug et al., 2020). In the literature, the incidence of chronic pain after different surgeries is 3-85% (Perrodin et al., 2022; Rosenberger, 2022; Richebé et al., 2018; Erden et al., 2023b) and 17-32% after abdominal surgery (Rosenberger2022; Alharbi et al., 2023; Mendoza, 2004).

Post-Surgical Chronic Pain leads to a continuous stress response in the postoperative period, negatively affects the physical and mental health of the patients, impairs the quality of life, delays the return to daily life, and thus imposes a serious burden on the healthcare system and the national economy (Schug et al., 2020; Rosenberger, Pogatzki-Zahn, 2022; Richebé et al., 2018).

In order to prevent the development of chronic pain following an acute pain and to take measures that can be controlled before the pain becomes chronic (Erden & Tura 2021), it is essential to determine the incidence of chronic pain and the risk factors that predispose to the chronicization of pain (Tura & Erden, 2022; Tura & Erden 2021). It is thought that these factors will reduce the risk of CPSP by creating individual-specific analgesia algorithms. Although there are studies examining the incidence and risk factors of chronic pain after colorectal surgery in the international literature (Alharbi et al., 2023; Mendoza, 2004), no such study has been found in Turkey. In this context, this study was aimed to contribute to the literature on prevention of pain before it occurs and cause-directed analgesia in pain management algorithms.

2. Methods

Design

This descriptive and cross-sectional study was conducted to determine the incidence and risk factors of CPSP after colorectal surgery.

Study Setting

The study was conducted between January 2023 and August 2023 in 7 intensive care units with general surgery patients at a 1550-bed Training and Research Hospital.

In the clinics, data on the patient and the patient's operation reports are recorded in the "Hospital Information and Management System (HIMS)". In the clinics, pain is evaluated with the help of "Numeric Pain Scale (0-10)". Paracetamol, non-steroidal anti-inflammatory analgesics and narcotic analgesics are used for pain control of patients treated in the postoperative period in the clinics.

Population and Sample of the Study

The study consisted of colorectal surgery patients who were treated in the intensive care units between January 2023 and August 2023 and met the sampling criteria.

Sample ınclusion criterias

1. Over 18 years of age
2. Hospitalized for at least 72 hours after surgery
3. No cognitive impairment
4. Consenting to participate in the study

Sample exclusion criterias

1. Having chronic pain (pain lasting longer than 3 months)
2. Having metastatic pain
3. Continuous use of analgesics
4. Alcohol, substance addiction
5. History of abdominal surgery
6. Psychiatric diagnosis

Of the 143 patients who underwent colorectal surgery on the specified dates, 43 were excluded from the study for the reasons shown in Figure 3.1, and the study was completed with a total of 100 patients.

Measurements

Data were collected with Patient Identification Form, Numerical Pain Scale, Brief Pain Inventory (BPI).

Patient identifying ınformation form (PIIF)

This form, which was developed by the researchers by reviewing the literature (Lindberg et al., 2020; Gras et al., 2018; Alharbi et al., 2023; Feddern et al., 2015), consisted of 14 questions including the age, gender, education, past medical history, information about the surgery, presence and severity of preoperative and postoperative pain, the amount of analgesic administered to the patient in the postoperative period, and the development of postoperative complications.

Numerical rating scale (NRS)

The numeric rating scale (NRS) is a pain screening tool, commonly used to assess pain severity at that moment in time using a 0–10 scale, with zero meaning “no pain” and 10 meaning “the worst pain imaginable” (Yeşilyurt ve Faydalı, 2020).

Brief pain ınventory (BPI)

The BPI was developed by Cleeland and Ryan in 1994 to evaluate cancer pain (Cleeland & Ryan, 1994). In the postoperative pain study, the Cronbach's alpha coefficient of the BPI was found to be above 0.85 for both sub-dimensions (Mendoza et al., 2004). In the literature, there are studies evaluating chronic pain after surgery with the BPI (Jin et al., 2021., Joris et al., 2015; Mi et al., 2021; Papadomanolakis-Pakis, 2021; Benlolo et al., 2021).

The BPI assesses the severity of pain and its impact on activities of daily living. It measures the extent of pain expressed by the patient, general activity status, emotional state, relationships with other people, ability to walk, exercise, sleep and enjoyment of life caused by pain in the last 24 hours. Each item is rated on a numeric pain scale of 0-10 (0=not affected at all, 10=completely affected). The use of analgesia methods or medications and the level of describing pain in the last 24 hours are evaluated in percentages (Tura & Erden, 2023).

In the 2009 reliability and validity study conducted by Dicle et al. (Dicle et al., 2009) the Cronbach's alpha coefficient of the BPI was found to be 0.79 for pain intensity and 0.80 for inhibition. In this study, Cronbach's alpha coefficient was calculated as 0.94.

Data Collection

Patient Identifying Information Form (PIIF) was applied to the patients preoperatively. Patients who completed the first 24 hours after surgery were evaluated with the NRS at 24, 48 and 72 hours postoperatively, both at rest and during movement (mobilization, getting out of bed). Postoperative complications were followed up from the patient files until the patient was discharged. Before the patient was discharged, the patient was interviewed and informed that patient would receive a phone call 3 months after the surgery and pain would be assessed via BPI. Each phone call lasted an average of 10-15 minutes.

Ethical Principles of Research

Written permissions were obtained from the University's Non-Interventional Clinical Research Ethics Committee, the Provincial Health Directorate and the patients.

Data Evaluation - Statistical Analyses

The data were analyzed using IBM SPSS (Statistical Package for Social Science) Statistics Version 27.0 (IBM SPSS, Armonk, NY: IBM Corp. Relaesed 2018). Descriptive data are presented as numbers, percentages, means, standard deviations, medians, and minimum-maximum values. In the analysis, the independent samples t-test, one of the parametric tests, was used to compare variables with two subcategories and continuous variables, while the one-way ANOVA test was used to compare continuous variables with more than two subcategories. In all statistical tests, $p<0.05$ was considered significant.

3. Results

In Table 1, it was found that the highest mean pain level in the first 72 hours after surgery was 4.02±1.63 during movement in the first 24 hours.

Table 1. Patients' Pain Levels in the First 72 Hours Postoperatively (n=100)

Postoperative Hours	**Pain Levels**	
	Pain During Rest Mean±SD (Min-Max)	**Pain During Movement Mean±SD (Min-Max)**
0-24 hours	3.27±1.37 (0-9)	4.02±1.63 (0-10)
24-48 hours	2.33±1.43 (0-7)	2.70±1.41 (0-6)
48-72 hours	1.91±1.32 (0-5)	2.03±1.20 (0-5)

According to Table 2, the mean age of the patients was 56.36 ± 15.67 years, 65% were male, 71% of the patients underwent open surgery and 88% received general anesthesia, the mean preoperative pain level was 3.83±1.83. A significant difference was determined between the regions ($p<0.05$).

Table 2. Comparison of patients' descriptive characteristics and postoperative pain levels (n=100)

Patient Identifier Information		**Mean±SD/ (Min-Max)**					
Age		56.36 ±15.67/ (18-88)					
Preoperative pain		3.83±1.83/ (0-8)					
		Postoperative Pain Levels					
	N/%	**Pain During Rest Mean±SD**			**Pain During Movement Mean±SD**		
		0-24 hours	***24-48 hours***	***48-72 hours***	***0-24 hours***	***24-48 hours***	***48-72 hours***
Gender							
Male	65/65.0	3.37±1.45	2.60±1.39.	1.86±1.26	4.09±1.56	2.66±1.43	2.14±1.19
Woman	35/35.0	3.22±1.34	2.18±1.44	1.94±1.36	3.98±1.69	2.72±1.42	1.97±1.21
t-Test/p		.539 .591	1.386 .169	-.291 .772	.293 .770	-.221 .826	.687 .493
Surgery Performed							
Hemicolectomy	38/38.0	3.33±1.39	2.47±2.03	2.00±1.36	4.20±1.32	2.93±1.03	2.07±1.03
Low anterior	30/30.0	3.83±1.26	2.60±1.35	2.17±1.51	4.70±1.73[a]	2.90±1.37	2.03±1.09
Hartman Procedure	11/11.0	3.55±1.21	1.75±.86	1.67±1.15	3.08±1.73[b]	2.58±1.24	2.00±1.47
Abdominoperinal	6/6.0	2.75±1.13[a]	2.27±1.27	2.27±1.55	2.73±1.55[a]	2.73±1.84	2.27±1.34
Fistulectomy	5/15.0	3.50±1.37[a]	2,83±1.47	1.50±.83	4.50±2.07[b]	2.50±2.16	2.33±1.86
t-Test/p		2.267 **.044**	.835 .546	.723 .632	2.299 **.026**	.387 .885	.283 .944
Surgical Method							
Open	71/71.0	3.34±1.347	2.43±1.41	2.01±1.31	4.14±1.62	4.77±1.42	2.13±1.21
Closed	29/29.0	2.75±1.545	1.58±1.44	1.17±1.19	4.17±1.58	2.17±1.33	1.33±.88
t-Test/p		.401 .164	1,947 **,034**	2.105 .038	1,396 ,166	1.950 **.024**	2.181 **.032**

*Diabetes Mellitus, Hypertension, Coronary Artery Disease, Asthma (with 2 or more chronic diseases)

[ab]: Groups with significance according to Bonferonni test

According to the type of surgery performed, the highest mean pain level was 4.70±1.73 at the time of movement in low anterior resection surgery. There was a significant difference between the groups ($p<0.05$) and according to Bonferoni correction, this difference was found to be between low anterior and hartmann procedure and between abdominoperineal region and hartmann procedure in the first 24 hours both at rest and during movement.

The mean pain levels of patients who underwent open surgery were found to be 4.77±1.42 in the 24-48th hour and 2.13±1.21 in the 48-72nd hour during movement, which were significantly higher ($p<0.05$).

Table 3 shows the mean items of BPI at the 3rd month after surgery. Accordingly, CPSP was detected in 27% of the patients and the percentage of pain relief was 28.50±32.29.

Table 3. BPI item averages of patients at 3 months after surgery (n=27)

Inventory Items	**Number (n) Percentage (%)**
Chronic Pain	
Yes	27 (27)
No	73 (73)
	Mean±SD (Min-Max)
Severe Pain	1.86±2.15 (0-7)
Moderate Pain	1.14±1.47 (0-5)
Mild Pain	.86±1.18 (0-4)
Current Pain	.99±1.36 (0-5)
Pain Percentage	28.50±32.29 (0-100)
ADL	1.90±2.241 (0-7)
Emotional	.70±1.21 (0-5)
Walking	1.09±1.50 (0-6)
Relationships	.42±.78 (0-3)
Do not sleep	.56±.98 (0-4)
Enjoying Life	1.51±1.91 (0-7)

**ADL:Activities of Daily Living*

Table 4 shows the comparison of the descriptive characteristics of the patients and their CPSP levels 3 months later according to BPI. The mean pain level of those who received general anesthesia was 4.48±1.82; 3.20±1.15 and significance was found in both severe and mild pain (t=-4.047, p=0.050; t=-3.199, p=0.004).

Table 4. Comparison of patients' descriptive characteristics and CPSP levels after 3 months according to the brief pain inventory (n=27)

Identifying Characteristics	**Severe Pain Mean±SD**	**Moderate Pain Mean±SD**	**Mild Pain Mean±SD**	**Current Pain Mean±SD**
Gender				
Male	4.42±1.37	2.50±.67	2.17±1.11	2.42±.79
Woman	4.33±2.12	3.00±1.60	2.20±1.14	2.53±1.50
t-Test/p	.117 .908	-1.008 .323	-.076 .940	-.242 .811
Preoperative pain location				
Top dial	5.20±2.81	3.10±1.91	2.80±1.30	2.80±1.36
Sub-dial	3.82±1.60	2.55±1.08	1.64±.79	2.45±.99
Anorectal	4.00±2.07	2.67±1.11	2.17±1.01	2.00±1.00
f-Test/p	1.812 .185	.500 .613	3.409 .055	.797 .462
Surgery Performed				
Hemicolectomy	5.67±1.15	3.67±1.50	2.67±1.52	4.00±1.00
Low anterior	6.33±1.39	3.57±1.15	2.59±1.10	3.00±1.00
Hartman Procedure	4.50±1.41	3.00±2.00	2.50±1.00	3.00±2.00
Abdominoperinal	3.50±.70	1.50±.71	.50±.70	2.00±1.00
Other	3.00±2.00	2.00±1.28	2.00±1.00	2.00±1.00
f-Test/p	-.470 .643	-.911 .371	-1.357 .187	-.735 .469
Anesthesia Type				
General	4.48±1,82	2.84±1.31	3.20±1.15	2.48±1.22
Epidural	3.00±,00	2.00±.00	2.00±.00	2.50±.70
t-Test/p	4.047 **.000**	.050 .383	3.199 **.004**	-.004 .395

4. Discussion

One of the most common symptoms seen in patients after colorectal surgery is CPSP (Regenbogen, 2016; Lindberg et al., 2020). In our country, there is no study investigating the incidence of CPSP after colorectal surgery. In this context, the findings obtained were discussed in line with the literature in terms of determining the incidence and risk factors of CPSP after colorectal surgery.

In our study, it was found that the highest mean pain level was moderate during movement in the first 24 hours after surgery, and the pain level was alleviated until the 72nd hour (Table 1). Similar results were found in studies conducted with patients who underwent colorectal surgery (Lindberg et al., 2020; Gras et al., 2018).Accordingly, it can be said that the nature of acute pain is alleviated with the regression of the inflammation process of the incision wound after surgery.

In the findings of the study, it was observed that patients with preoperative pain in the anorectal region experienced moderate pain in the first 24 hours postoperatively and higher pain in the upper and lower quadrants (Table 2). In the study by Lued et al. , it was determined that patients who experienced pain in the anorectal region before surgery experienced moderate pain in the first 24 hours after surgery (Lued et al., 2021). The anal region may cause more severe pain than other regions due to its narrow structure.

In the study, it was determined that pain levels were higher in the first 24 hours after low anterior resection operations compared to other operations (Table 2). In studies conducted with these patients in the literature, it was reported that the majority of patients had high pain levels in the first 24 hours after surgery (Dreyer, 2015). The pressure in this region may cause subjective perception of pain more than the upper or lower quadrant of the abdomen.

In this study, the mean pain levels of patients who underwent open surgery were found to be higher (Table 2). In contrast to the current study, Grass et al. (2018) reported that the pain levels of patients who underwent laparoscopic colorectal surgery were significantly higher than open surgery, and patients who underwent open surgery had high pain levels only at 72 hours of mobilization (Gras et al., 2018). These findings show that the surgical method alone is not a source of pain and that other factors affecting the method (surgeon's technical skill, type of surgery, location, patient characteristics, etc.) may also affect the surgical method in terms of pain.

In this study, it was found that CPSP developed in approximately one third of the patients at 3 months after surgery (Table 3). In the literature, the rates of development of CPSP in colorectal surgery 3 months after surgery were found between 14.5% and 32.1%, similar to our study (Lindberg et al., 2020; Gras et al., 2018; Lued et al., 2021; Alharbi et al., 2023; 2015; Feddern et al., 2015). In a study conducted with 7127 patients to determine the effect of CPSP after colon surgery on quality of life, the rate of chronic pain at 3 months was calculated as 14.5% (Alharbi et al., 2023), and in another prospective colorectal surgery study with 624 patients, the incidence of CPSP was reported to be 32.1% (Jin et al., 2021). In another study conducted with laparoscopic colorectal surgery patients, this rate was 17% (Pan et al., 2020), and in another study, the incidence of CPSP after 3 months was 20.2% (Joris et al., 2015). In a 6-year epidemiologic study, it was reported that 31% of patients who underwent rectal surgery experienced chronic pain (Feddern et al., 2015). Based on these results, it was thought that the different incidence rates of chronic pain may be due to differences in the individual (demographic characteristics, cultural differences, response to surgical stress, etc.), surgery (surgical method, type of anesthesia, etc.) and postoperative pain management (type of analgesia, duration of administration, etc.).

According to studies in the literature, it has been determined that CPSP has negative psychological effects on the patient (Alharbi et al., 2023; Feddern et al., 2015; Jin et al., 2021). In these studies approximately one third of the patients experienced sleep problems and did not enjoy life, characterized by impaired mood due to pain (Jin et al., 2016). Accordingly, the personal characteristics of patients with CPSP and the diversity of

perception and interpretation of pain may increase mental and physical complaints and cause various mood disorders in patients.

According to our findings, the severe pain levels of patients who underwent surgery for the first time 3 months after surgery were found to be significantly higher than the other patients (Table 4). In contrast to our study, studies in the literature found that the history of surgery did not affect the level of chronic pain (Jin et al., 2021). Different results may be due to individual, cultural, surgical or analgesia-related differences.

In our study, the pain levels of patients who received general anesthesia were found to be significantly higher in severe and mild pain than those who received epidural anesthesia (Table 4). Studies in the literature have also reported that peripheral nerve blocks reduce the incidence of chronic pain (Gölen & Okuyan, 2022; Köken & Eyigör, 2019). Accordingly, epidural anesthesia may reduce the risk of chronic pain by providing postoperative pain control without disrupting hemodynamic stability.

5. Conclusion

In conclusion, CPSP was found in approximately one third of patients after colorectal surgery, and it was determined that patients undergoing surgery for the first time and patients receiving general anesthesia had a higher risk of developing chronic pain. In line with the data obtained from the study, the patient's demographic data, medical and surgical information, anesthesia and analgesia information should be evaluated to determine the risk of CPSP before colorectal surgery, and an individual analgesia algorithm should be created including the identified risk factors.

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