MHA MEDIHEALTH ACADEMY
Journal of Nursing Care Research
Original Article
doi: 10.51271/JNCR-0032

Evaluating the postoperative pain of video-assisted thoracoscopic sympathectomy patients by Four Pain Scales

Öznur Kavaklı[1], Ecem Özdemir[2], Doğa Şentürk[3]
[1]Department of Nursing, Gülhane Faculty of Nursing, University of Health Sciences, Ankara, Turkiye
[2]Department of Nursing, Faculty of Nursing, Ankara University, Ankara, Turkiye
[3]Department of Nursing, Cambridge University Hospitals, GPST, Cambridge, UK

Cite this article as: Kavaklı, Ö., Özdemir, E., & Şentürk, D. (2025). Evaluating the postoperative pain of video-assisted thoracoscopic sympathectomy patients by Four Pain Scales. *J Nurs Care Res, 2*(3), 69-75.

Received: 09.06.2025 ◆ **Accepted**: 04.09.2025 ◆ **Published**: 19.09.2025

ABSTRACT

Aims: The evaluation of postoperative pain levels in patients undergoing video-assisted thoracoscopic sympathectomy is a crucial requirement for the development of effective pain management protocols. The aim of this study is to identify the scale that best reflects patients' pain levels and to examine the consistency among the scales used.

Methods: This single-center study was conducted with an observational-descriptive design. The study was completed with 41 patients in the thoracic surgery clinic of a training and research hospital in the fall of 2019 and spring of 2020. The questionnaire form included questions about the descriptive and pain characteristics of the participants. Pain levels were questioned using 4 Pain Scales [These scales were Numeric Rating Scale (NRS, Visual Analog Scale (VAS), Faces Pain Scale revised (FPS-R), and Color Analog Scale (CAS)]. before and approximately 1-2 hours after the administration of postoperative painkillers. The scale that best reflected their pain was questioned.

Results: Before the administration of analgesics, the pain characteristics were assessed when patients reported experiencing postoperative pain. Accordingly, most of the participants (36.6%, n=15) stated that they had "back pain at the incision line of the anterior chest wall", 19.5% had pain in the upper anterior aspect of the chest, and 9.8% had anterior chest pain. He stated that 34.1% had pain spreading to other regions, and 6 patients had pain radiating to the back. 39% (n=16) reported stinging pain, 19.5% (n=8) tingling, and 17.1% (n=7) sharp pain. A very strong and significant positive correlation was found between NRS and VAS in four scale correlations with pre-analgesic pain level. It turned out that the best tool was the NRS.

Conclusion: In this patient group, the comparison of Four Pain Scales before and after analgesia showed that the highest mean score was obtained from the NRS, followed by the VAS, CAS, and FPS-R. However, given the absence of an objective reference standard for pain, it cannot be concluded that the NRS or any other scale represents the most accurate measurement tool. These findings therefore reflect only the relative differences among the scales and should be interpreted in light of the inherent limitations of pain assessment methods.

Keywords: Sympathectomy, pain, Pain Scale, postoperative, thoracic, nursing

INTRODUCTION

Video-assisted thoracoscopic sympathectomy (VATS) is a surgical method with various potential advantages used for the treatment of lung cancer and other pulmonary diseases (Campos et al., 2016). Compared to the traditional thoracotomy, the VATS can reduce trauma, shorten surgery and anesthesia time and decrease the incidence of cardiopulmonary complications (Kong et al., 2020). VATS is a simple and safe technique used for the treatment of primary hyperhidrosis in recent years (Campos et al., 2016).

Primary or essential hyperhidrosis is a pathological disorder characterized by excessive and uncontrolled sweating, particularly in the palms, feet, axillae and face. It may have genetic predisposition or may be caused by emotional stress or other psychological factors. Primary hyperhidrosis significantly impacts the quality of life, leading to psychological and social problems (Dias et al., 2005). Primary hyperhidrosis can be treated with medical and surgical methods (Campos et al., 2016; Vannucci et al., 2017; VATS, 2023). Treatments for primary hyperhidrosis include removal of the eccrine and apocrine glands in the armpits, and this method can have potential complications. VATS has been increasingly used in the treatment of primary hyperhidrosis. The basic principle of the VATS procedure is to interrupt the cholinergic sympathetic innervation to the eccrine glands (Stefaniak & Ćwigoń, 2013; Raposio & Caruana, 2015). Postoperative pain remains the primary clinical concern during the rapid recovery period

Corresponding Author: Öznur Kavaklı, oznur.kavakli@sbu.edu.tr

following VATS (Cok et al., 2011). Postoperative pain after VATS is an important problem, although it is less tiring than traditional thoracic surgery (Kong et al., 2020; Bolotin et al., 2000; Fiorelli et al., 2010; Duzel, 2008). Evaluation of postoperative pain by using proper instruments and analgesics to reduce or eliminate pain holds an important place in postoperative pain management (Arslan & Celebioglu, 2004).

Although Pain Assessment Scales are generally reliable, some patients may not accurately describe their pain. Therefore, various tools are utilized in pain assessment (Mark et al., 1986). Unidimensional Scales, which are employed to assess pain in the early postoperative period (days 1-3), directly measure the intensity of pain and rely on patient self-reporting. While these scales differ in terms of grading, expressions, and visual representations, they are consistent with each other in evaluating pain severity (Jensen, 2010; Temiz & Özer, 2015).

In recent years, various studies have been conducted to determine the most reliable method for pain assessment. Gurkan et al. (2020) compared four Different Pain Scales to assess postoperative acute pain intensity. The scales were found to be consistent with each other and recommended the NRS as the primary choice. Li et al. (2007) compared the psychometric properties and applicability of Four Different Pain Scales with Chinese postoperative adults: they concluded that four scales were suitable options for reporting pain intensity, but the FPS-R was the most effective. It was suggested that instruments should be selected according to individual needs or preferences for pain management.

In conclusion, investigating which Pain Assessment Scale most accurately and effectively reflects the pain levels experienced by patients will help determine which scale best represents the pain felt by specific patient groups. This study was designed to evaluate the effectiveness of Different Pain Scales used to assess postoperative pain levels in patients undergoing VATS sympathectomy, to examine the consistency among these scales, and to identify the scale that best reflects patients' pain levels.

Research Questions

- Which Pain Assessment Scale (NRS, VAS, CAS, FPS-R) best reflects postoperative pain levels in patients undergoing video-assisted thoracoscopic sympathectomy?
- What is the level of consistency and correlation among the Four Pain Scales used before and after the administration of analgesics?
- What are the most common characteristics (location, type, and distribution) of postoperative pain reported by these patients?

METHODS

Ethics Approval

The study protocol was approved by the University of Health Sciences Non-interventional Researches Ethics Committee (Date: 30.10.2019, Decision No: 19/273). Institutional permission and ethics committee approval were obtained. The study was conducted in accordance with the principles of the Declaration of Helsinki.

This single-center study was conducted with an observational-descriptive design. The study was conducted in the thoracic surgery clinic of a training and research hospital in Ankara/Turkiye between September 2019 and June 2020.

Population and Participants

Patients, who were diagnosed with hyperhidrosis, hospitalized at the thoracic surgery department and underwent VATS, constituted the population.

A power analysis was performed to determine the number of people to be included in the study. This analysis was performed using the G*power 3.1 program. The effect size was accepted as 0.50 at a high level based on the correlation analysis suggested by Cohen (1988). The power of the study was targeted to be 95% or higher. Accordingly, because of the analysis conducted for a significance level of 5% and an effect size of 0.50, it was determined that a sample size of at least 38 people should be reached (Cohen, 1988).

Voluntary hyperhidrosis patients at the age of 18 years and above, who underwent VATS, were conscious, did not have any psychiatric diseases and audial or visual problems, and had postoperative pain, were included to the study. On the other hand, the patients with color blindness and motor and sensory loss were excluded. Since the patients may find it difficult to express their pain experiences, we assumed that a clinical experience of at least six months was sufficient to evaluate pain experiences of the patients. We intended to reach at least 80% of the population but 41 patients agreed to participate.

Data Collection Instrument

The data collection instrument was composed of three parts. The first part included questions on the descriptive characteristics of the participants, including age, gender and education level. The second part had questions on the characteristics of pain, including pain site and the travel of pain. The final part included the findings about pain intensity measured by Four Unidimensional Scales before and after analgesia during the first 24 postoperative hours. These scales were NRS, VAS, FPS-R, and CAS).

All patients included in the sample group were asked to describe their pain levels/intensities one by one with Four Unidimensional Scales after they stated that they were in pain, and finally the patients were asked; "Which scale do you find best to express yourself in evaluating your current pain?" and rank the others from best to least... The front side of each scale was prepared with its own original measurement method, while the back side of all scales had a straight line of 0-100 mm (10 cm). This method was used to obtain standard numerical results and to obtain the numerical value measured on the back side of the selected part on the front side of each scale. An algology specialist doctor's opinion was obtained on this subject. Data obtained from each patient individually using four scales within 0-100 mm were recorded on the data collection form and eventually converted to a decimal system, sample scores were collected, averaged, and reflected in the findings with n-% values (**Figure**).

Numeric Rating Scale (NRS): The NRS is a horizontal line with eleven numbers, ranging from 0 (no pain) to 10 (worst pain possible). Participants were asked to indicate the number that best describes the intensity of pain. The NRS was considered as the golden standard to measure pain intensity since it is a reliable and valid instrument commonly used

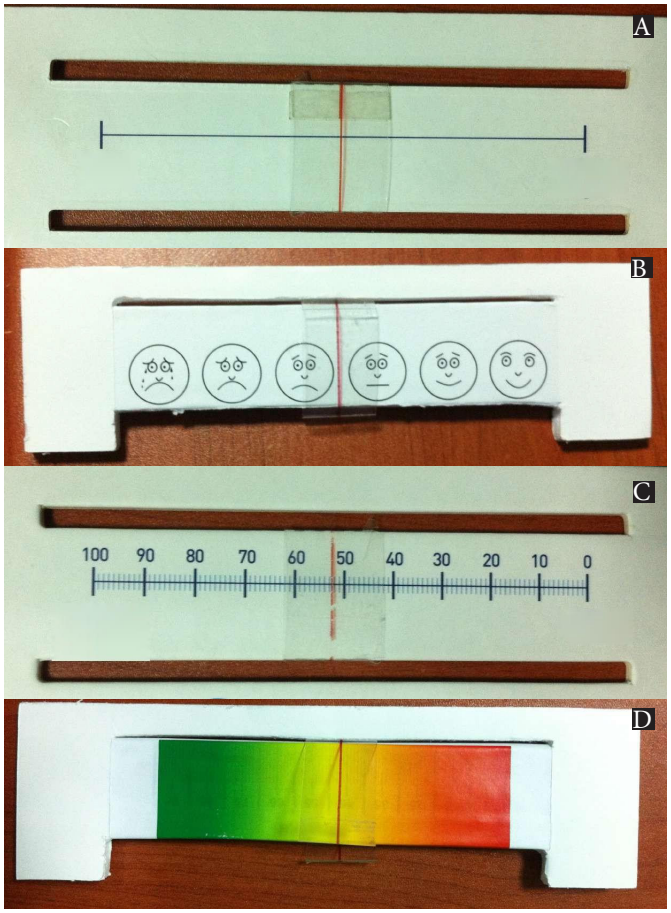

Figure. A. Visual Analog Scale, B. Faces Pain Scale revised, C. Numeric Rating Scale, D. Color Analog Scale

in clinical practices (Mark et al., 1986). NRS is a valid and reliable measurement tool for the evaluation of postoperative acute pain intensity in adults and elderly patients, as well as elderly patients with mild to moderate cognitive impairment (Zhou et al., 2011; van Dijk et al., 2012).

Visual Analog Scale (VAS): The VAS is a 10-cm line with the end points 0 (no pain) and 10 (worst pain). Participants were asked to mark the number that best describes pain intensity. The VAS is an instrument commonly used in research and clinical practices and various studies demonstrated the reliability and validity of the scale. Pain intensity measured by the VAS is significantly correlated with other verbal and numerical scales. The primary advantage of the VAS is its ratio scale properties, whereas its disadvantages include that it is time-consuming and needs abstract thinking, which makes it difficult to understand and complete, especially in older people (Li et al., 2007). This situation can particularly complicate the understanding and completion of the scale in older adults due to factors such as "cognitive decline, insufficient ability to understand and interpret numerical values, and reduced visual skills." Nurses can explain how to use the VAS in simple and understandable language, guiding patients on how to complete the scale. In addition to the VAS, they can also encourage the use of alternative scales that may be easier for older individuals to understand, such as scales representing facial expressions. This approach creates a supportive environment for patients and fosters a better caregiving atmosphere. VAS has been accepted in the literature as a valid and reliable measurement tool for the evaluation of postoperative acute pain intensity (Chou et al., 2016).

Faces Pain Scale Revised (FPS-R): The FPS-R is based on various facial depictions to evaluate the intensity of pain. It was first developed to evaluate pain in children. FPS-R is a Horizontal Scale that includes seven line-drawn faces. Since it is based on facial depictions, FPS-R does not require literacy and may be used for illiterate patients. Absence of pain is mostly shown by a smiling face whereas the worst pain is shown by a face in tears (Li et al., 2007; Yesilyurt & Faydalı, 2020).

FPS-R is accepted as a valid and reliable measurement tool for the evaluation of postoperative acute pain intensity in adult patients, including children and the elderly with mild to moderate cognitive impairment (Zhou et al., 2011; Mandysová & Kadlečková, 2015).

Color Analog Scale (CAS): The CAS is a valid and reliable tool for assessing acute pain in children 5 years of age and older. This rapid and low-cost instrument is also ideal for busy emergency department settings. The CAS was designed to augment the capabilities of the VAS and demonstrate its utility and has been suggested for pediatric use. It is also possible to use the CAS in individuals with Alzheimer's disease (Tsze et al., 2013). The CAS is 10 cm long and uses a color spectrum ranging from white (no pain) to red (worst possible pain). Disadvantages of the CAS include that colors can fade, or patients may be color blind (Bulloch et al., 2009).

Implementation

All participants were first informed about the aim and procedures of the study and written informed consent was obtained. Generally, pleura pain is experienced at the lumbar 4th vertebrae after VATS. Patients undergoing VATS are required to stay at the thoracic surgery clinic for at least 24 hours. If there is pain, analgesics are mostly administered in the 6 to 8 hours after surgery. Besides, as a part of the clinical pain management procedures, analgesics may be administrated at 8:00 and 20:00 hour if there is pain. Due to the negative effects of analgesics on kidney and liver functions, high-dose analgesics is avoided in some patients. These patients receive diclofenac sodium intramuscular. If this intervention is inadequate, (pain severity higher than 30 in NRS, Tramadol 0.1 mg/kg or paracetamol 10 mg/kg IV treatment is used.

The pain intensity of the VATS patients with pain was evaluated by using the Four Pain Scales for the first 24 postoperative hours. Scales were completed before analgesic administration, which took place at 8:00 or 20:00 hour. If the patient received analgesics other than these periods, scales were also completed. For example, if the patient underwent surgery in the afternoon and had pain at 22:00 hour, the patient was also included to the study. Before the application of analgesia, descriptive and pain characteristics information of the sample group was collected by face-to-face interview method and patients were asked to evaluate the postoperative pain intensity on Four Pain Scales: NRS, VAS, FPS-R and CAS. Analgesia was then applied to the patients. One hour after the application of analgesia, the sample group patients were visited and asked to fill in the Pain Scales again.

Statistical Analysis

The data obtained in the study were analyzed using the SPSS (Statistical Package for the Social Sciences) Windows 22.0

software. Descriptive statistical methods such as frequency, percentage, mean, and standard deviation were used to evaluate the data. The differences in the proportions of categorical variables between independent groups were analyzed using Chi-Square tests. To assess whether the research variables followed a normal distribution, kurtosis and skewness values were examined. According to the relevant literature, for variables to show a normal distribution, kurtosis and skewness values should be between +1.5 and -1.5 (Tabachnick & Fidell, 2013) or between +2.0 and -2.0 (George & Mallery, 2010). For example, before the drug application, the kurtosis value was -0.401 and the skewness value was -0.034 for the numerical scores. After the drug application, these values for the same variable were 0.542 and 1.114, respectively. Similarly, for visual scores, the kurtosis value was -0.984 and the skewness value was 0.087 before the application, and 0.414 and 0.859 after the application.

It was determined that the variables followed a normal distribution. As a result, parametric methods were used for data analysis. A paired T test was applied to compare within-group measurements, and Pearson correlation analysis was used to examine the relationships between pain scores. The correlation coefficients (r) were interpreted as follows: 0.00-0.25 very weak; 0.26-0.49 weak; 0.50-0.69 moderate; 0.70-0.89 strong; 0.90-1.00 very strong (Kalaycı, 2006, p.116).

RESULTS

When examining the demographic characteristics of the patients, the average age was found to be 23.71±6.44 years (min. 18, max. 46), with 82.9% being male and 58.1% holding a higher education degree. The characteristics of the pain experienced by the patients were assessed when they reported feeling pain after being admitted to the clinic post-surgery and while at their bedside. From the moment the pain intensified, analgesic treatments were administered according to the clinic's analgesic protocol. A large proportion of the patients (36.6%, n=15) experienced "chest wall anterior incision line back pain," 19.5% had pain in the upper right side of the chest, and 9.8% reported pain in the left anterior chest. Additionally, 34.1% of the patients experienced pain that radiated to other areas, with six patients reporting pain radiating to the back. Among the participants, 39% (n=16) described the pain as stabbing, 19.5% (n=8) reported tingling, and 17.1% (n=7) felt sharp pain.

When evaluating the scale that best represented the patients' pain, 51.2% (n=21) indicated that the NRS was the most Accurate Pain Scale, while 26.8% (n=11) preferred using the CAS. According to the correlation analysis in **Table 1**, significant and strong relationships were identified between measurements taken with Different Pain Scales before the administration of analgesic medication. Pearson correlation coefficients demonstrated that the NRS was highly correlated with other measurement methods. Specifically, the correlation coefficient between the NRS and VAS scores was r=0.856, indicating a strong relationship. Similarly, the correlation coefficient between the NRS and CAS scores was r=0.831, and the correlation between VAS and CAS scores was r=0.821, showing consistency between these methods.

In **Table 2**, the correlation analysis between Different Pain Scale measurements after the administration of analgesic medication revealed significant relationships between pain scores. Pearson correlation coefficients indicated that the NRS pain score was highly correlated with other measurement methods. Notably, the correlation coefficient between the NRS and VAS scores was r=0.859, showing a strong relationship between these two methods. After medication administration,

Table 1. Correlation analysis between pain scores before analgesic drug administration

		Numeric Rating Scale score	Visual Analog Scale score	Color Analog Scale score	Faces Pain Scale revised score
Numeric Rating Scale score	r	1.000			
	p	0.000			
Visual Analog Scale score	r	0.856**	1.000		
	p	0.000	0.000		
Color Analog Scale score	r	0.831**	0.821**	1.000	
	p	0.000	0.000	0.000	
Faces Pain Scale revised score	r	0.757**	0.764**	0.820**	1.000
	p	0.000	0.000	0.000	0.000

**<0.01; Pearson correlation analysis

Table 2. Correlation analysis between pain scores after analgesic drug application

		Numeric Rating Scale score	Visual Analog Scale score	Color Analog Scale score	Faces Pain Scale revised score
Numeric Rating Scale score	r	1.000			
	p	0.000			
Visual Analog Scale score	r	0.859**	1.000		
	p	0.000	0.000		
Color Analog Scale score	r	0.650**	0.616**	1.000	
	p	0.000	0.000	0.000	
Faces Pain Scale revised score	r	0.765**	0.651**	0.676**	1.000
	p	0.000	0.000	0.000	0.000

**<0.01; Pearson correlation analysis

the correlation coefficient between the NRS and CAS scores was r=0.650, and between VAS and CAS scores, it was r=0.616. While these values are lower compared to the previous table, they still indicate a moderate relationship between the measurement methods.

Table 3 compares the changes in pain scores before and after the administration of analgesic medication. According to the data in the table, there was a significant reduction in pain scores across four different measurement methods after medication administration. The NRS pain score decreased from a pre-administration mean of 49.976±20.057 to 22.415±13.159 post-administration, a statistically significant reduction (t=11.297, p<0.001). Similarly, the VAS pain score dropped from a pre-administration mean of 44.488±22.698 to 19.561±12.818 post-administration, showing a significant difference (t=8.336, p<0.001). The CAS score decreased from 47.854±18.821 pre-administration to 23.439±12.992 post-administration, with this reduction also being statistically significant (t=10.567, p<0.001). Lastly, the FPS-R score dropped from 47.244±19.588 pre-administration to 20.732±12.446 post-administration, and this decrease was statistically significant as well (t=10.538, p<0.001). These findings indicate that pain scores, as assessed by four different methods, significantly decreased after the administration of analgesic medication, demonstrating the effectiveness of the intervention in pain management.

DISCUSSION

The primary aim of the management of postoperative pain is to maintain patient comfort. Despite random patient selection, adequate sample size, determination of pain evaluation process and the measurement of pain intensity with valid and reliable instruments, pain management is still a problem in the postoperative care of surgical patients, who may experience moderate-to-severe pain, even in the late postoperative period (Svensson et al., 2000). Various studies have been conducted to determine the most reliable pain evaluation instrument due to the subjective characteristics of pain. However, the best pain evaluation method to reflect the exact intensity of pain is still a point of debate. A significant number of Pain Scales have been used to evaluate pain intensity. This study used Four Different Scales to measure the intensity of pain experienced by the patients who underwent VATS and found that the NRS and VAS were the best instruments to reflect postoperative pain.

Many unidimensional and multidimensional scales are utilized to assess pain intensity. Numerous scales that are validated and reliable, and based on the patient's self-report, including numerical, verbal, and visual tools, have been developed to quantify postoperative acute pain and guide treatment (Gurkan et al., 2020; Li et al., 2007; van Dijk et al., 2012; Chou et al., 2016).

In this study, Four Different Scales were used to measure the pain intensity experienced by patients undergoing VATS, and it was found that the NRS and VAS are the best tools for reflecting postoperative pain. Primary hyperhidrosis occurs in about 2% of the world's population, affects men and women equally and is more frequent in young people (Campos et al., 2016; Vannucci et al., 2017; VATS, 2023). In our study, the participants were predominantly male (82.9%) and young people.

Postoperative pain is a common complication after VATS. A study using two ports of 5- and 10-mm diameter reported that the incidence of pain in VATS patients after hospitalization was 78%. Level 2 analgesics (codeine, propoxyphene alone or in combination with propoxyphene) were used to control pain in the study (Campos et al., 2016). Our study also found that the same group of patients undergoing VATS surgery experienced moderate pain at most, and most of the participants in our study (36.6%, n=15) reported "anterior chest wall incision line back pain", 19.5% reported pain in the upper anterior part of the rib cage, and 9.8% reported pain in the anterior left side of the chest. In a study of 283 patients undergoing thoracic sympathectomy, pain intensity was analyzed with VAS and the recurrence of sweating in the primary location was evaluated. The study reported a high frequency of side effects such as intercostal pain and compensatory sweating (Stefaniak & Ćwigoń, 2013). In our study, it was determined that 34.1% of the participants had radiating pain to other areas and 6 patients felt pain radiating to their back. 39% (n=16) of the participants reported stinging pain, 19.5% (n=8) tingling, and 17.1% (n=7) sharp pain.

A similar prospective clinical study, which aimed to determine the psychometric properties and applicability of Four Pain Scales in 173 Chinese patients aged from 18 to 78 years, found that the Four Pain Scales, namely VAS, NRS, FPS-R and VDS had good reliability and validity when used with Chinese adults. The study reported that the intraclass correlation coefficients of the four scales across current, worst, least and average pain on each postoperative day were high (0.673-0.825) and all scales were sensitive in evaluating analgesic efficacy (Li et al., 2007). Similarly, the comparison of the correlation between the Four Pain Scales before analgesics in our study revealed highly strong, positive and statistically significant relationship between the NRS and VAS. On the other hand, we found a strong, positive and statistically strong relationship between the NRS, CAS and FPS-R. Correlations were also the same after analgesics.

Another study on 64 patients, who were hospitalized in the cardiovascular surgery intensive care unit (ICU) in Turkiye, assessed the preferences of patients for Three Pain Scales. The study concluded that VRS may be integrated with the currently used pain scales and the preferences of the patients on pain scales should be taken into consideration (Karahan et al., 2012). In our study, on the other hand, 51.2% (n=21) of the participants stated that the NRS was the best instrument to express pain intensity, which was followed by the CAS with a percentage of 26.8% (n=11).

Table 3. Mean pain scores before and after analgesic drug application

	Before analgesic drug application		After analgesic drug application				
	Mean	SD	Mean	SD	n	t	p
Numeric Rating Scale score	49.976	20.057	22.415	13.159	41	11.297	0.000
Visual Analog Scale score	44.488	22.698	19.561	12.818	41	8.336	0.000
Color Analog Scale score	47.854	18.821	23.439	12.992	41	10.567	0.000
Faces Pain Scale revised score	47.244	19.588	20.732	12.446	41	10.538	0.000

Aziato et al. (2015) collected qualitative data from 17 patients and 25 nurses for pain assessment in postoperative adult patients, and quantitative data were collected from 150 patients who received postoperative care. In addition to the NRS and FPS-R, the researchers used the Colored Circle Pain Scale (CCPS) as a new pain scale. All scales were sensitive to changes in the intensity or level of pain experienced before and after analgesia, and the researchers concluded that sociocultural factors should be taken into account due to the subjective nature of pain. It is particularly emphasized that nurses need to understand the sociocultural context of patients in order to effectively learn appropriate pain assessment tools and pain management techniques. In another study, a total of 147 patients from different surgical clinics were included. As a result of the study; all pain scales had a strong positive linear relationship with each other, and the most preferred scale was found to be the VRS (Yurtseven et al., 2021). Similarly, Bas and Ayhan (2024) evaluated the pain intensity of patients undergoing open heart surgery using four different pain scales and compared patient preferences. According to the study, the scale preferences of the patients were as follows: NRS, VDS, VAS and Thermometer Pain Scale. It was observed that all scales gave similar results in terms of pain intensity and scores, and it was recommended that the scale selection be made according to patient preferences and individual characteristics.

Similarly, the comparison of the scores obtained from the Four Pain Scales before and after analgesia in our study showed that the highest mean score was obtained from the NRS, which was followed by VAS, CAS and FPS-R, respectively. Besides, the analysis of the four scales revealed that the intensity of pain before analgesia decreased after analgesic administration. Although the scores obtained from the four scales did not differ significantly, the NRS was the instrument with the best pain evaluation.

Limitations

The study was conducted at a single center and the number of participants was limited. Routine treatment of pain may differ in different clinical settings. Analysis of the pain treatment protocol of the thoracic surgery department in this study revealed that traditional pain management methods were performed on patients with similar characteristics, including diagnosis, type of surgery and age group. This study reflected the characteristics of a specific patient group. Further studies with higher sample sizes in different centers might be conducted.

CONCLUSION

In the study, patients' pain was assessed using Four Different Pain Scales before and after analgesia. The findings indicated that the highest mean score was obtained from the NRS, followed by the VAS, CAS, and FPS-R, respectively. However, due to the absence of an objective reference standard for pain, it cannot be concluded that the NRS or any other scale represents the most accurate measurement tool. Therefore, these results reflect only the relative differences among the scales and should be interpreted in light of the inherent limitations of pain assessment methods. It is recommended that changes in the intensity of postoperative acute pain be evaluated using a measurement tool that is easily understood, feasible, and preferred by patients. Healthcare professionals are advised to select the scale most appropriate for their patient population, and further studies are warranted to clarify this issue.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the University of Health Sciences Non-interventional Researches Ethics Committee (Date: 30.10.2019, Decision No: 19/2735).

Informed Consent

Written informed consent was obtained from the patient, his/her parents and/or legal guardians.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

Data Sharing Statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request. Availability of data and materials and data transparency are available.

Software Application or Code

No computer program or software was used in the research, only research data was analyzed with SPSS program.

REFERENCES

Arslan, S., & Celebioglu, A. (2004). Postoperative pain management and alternative applications. *Int J Human Sci, 1*(1), 1-7.

Aziato, L., Dedey, F., Marfo, K., Asamani, J. A., & Clegg-Lamptey, J. N. (2015). Validation of Three Pain Scales among adult postoperative patients in Ghana. *BMC Nursing, 14*, 42. doi:10.1186/s12912-015-0094-6

Bas, N. S., & Ayhan, H. (2024). Comparison of Four Different Pain Scales and patient preferences in the evaluation of pain severity after open cardiac surgery. *Int J Caring Sci, 17*(2), 921-932.

Bolotin, G., Lazarovici, H., Uretzky, G., Zlotnick, A. Y., Tamir, A., & Saute, M. (2000). The efficacy of intraoperative internal intercostal nerve block during video-assisted thoracic surgery on postoperative pain. *Ann Thorac Surg, 70*(6), 1872-1875. doi:10.1016/S0003-4975(00)01757-4

Bulloch, B., Garcia-Filion, P., Notricia, D., Bryson, M., & McConahay, T. (2009). Reliability of the CAS color analog scale: Reproducibility of scores in traumatic and nontraumatic injuries. *Acad Emerg Med, 16*(5), 465-469. doi:10.1111/j.1553-2712.2009.00404.x

Campos, J. R. M., Kauffman, P., Gomes, O. Jr., & Wolosker, N. (2016). Video-assisted thoracic sympathectomy for hyperhidrosis: review. *Thorac Surg Clin, 26*(3), 347-358. doi:10.1016/j.thorsurg.2016.04.010

Chou, R., Gordon, D. B., de Leon-Casasola, O. A., Rosenberg, J. M., Bickler, S., Brennan, T., … & Wu, C. L. (2016). Management of postoperative pain: a clinical practice guideline from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists. *J Pain, 17*(2), 131-157. doi:10.1016/j.jpain.2015.12.008

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Lawrence Erlbaum.

Cok, O. Y., Eker, H. E., Fındıkcıoglu, A., Akın, Ş., Arıbogan, A., & Arslan, G. (2011). Clinical research, perioperative management in sympathectomy with video-assisted thoracoscopic surgery: retrospective clinical research. *J Turk Soc Anesthesiol Reanimat, 39*(5), 232-240. doi:10.1016/j.ejcts.2009.07.040

Dias, M. D. L., Burlamaque, A. A., Bagatini, A., Ribas, F. A., & Gomes, C. R. (2005). Simpatectomia por videotoracoscopia no tratamento da hyperhidrosis palmar: implicações anestésicas. *Revista Brasil Anestesiol, 55*(3), 361-368.

Duzel, V. (2008). Comparison of postoperative pain assessments of nurses and patients [Master's thesis, Cukurova University Institute of Health Sciences, Department of Nursing].

Fiorelli, A., Vicidomini, G., Laperuta, P., Busiello, L., Perrone, A., Napolitano, F., ... & Santini, M. (2010). Preemptive local analgesia in video-assisted thoracic surgery sympathectomy. *Eur J Cardio Thorac Surg, 37*(3), 588-593. doi:10.1016/j.ejcts.2009.07.040

George, D., & Mallery, M. (2010). SPSS for Windows step by step: a simple guide and reference, 17.0 update (10th ed.). Pearson.

Gurkan, A., Aldemir, K., Andsoy, I. I., & Gul, A. (2020). Comparison of Four Different Pain Scales in the evaluation of postoperative acute pain intensity. *Cukurova Med J, 45*(4), 1562-1571. doi:10.17826/cumj.741465

Jensen, M. P. (2010). Measurement of pain. In S. M. Fishman, J. C. Ballantyne, & J. P. Rathmell (Eds.), Bonica's management of pain (pp. 251-270). Williams & Wilkins.

Kalaycı, Ş. (Ed.). (2006). SPSS applied multivariate statistical techniques. Asil Publishing Distribution.

Karahan, A., Yıldırım, F., Abbasoglu, A., Akkuzu, G., & Akyüz, N. (2012). Comparison of Three Rating Scales for assessing pain intensity in an intensive care unit. *Turk J Thorac Cardiovas Surg*, 20(1), 39-44. doi:10.5606/tgkdc.dergisi.2012.008

Kong, M., Li, X., Shen, J., Ye, M., Xiang, H., & Ma, D. (2020). The effectiveness of preemptive analgesia for relieving postoperative pain after video-assisted thoracoscopic surgery (VATS): a prospective, non-randomized controlled trial. *J Thorac Dis, 12*(9), 4930-4940. doi:10.21037/jtd-20-2500

Li, L., Liu, X., & Herr, K. (2007). Postoperative pain intensity assessment: a comparison of four scales in Chinese adults. *Pain Medicine, 8*(3), 223-234. doi:10.1111/j.1526-4637.2007.00296.x

Mandysová, P., & Kadlečková, Z. (2015). The performance of three pain intensity scales and their preferences among Czech women with acute postoperative pain. *Centr Eur J Nurs Midwifery, 6*(2), 298-305. doi:10.15452/CEJNM.2015.06.0019

Mark, J., Paul, K., & Sanford, B. (1986). The measurement of clinical pain intensity: a comparison of six methods. *Pain, 27*(1), 117-126. doi:10.1016/0304-3959(86)90228-9

Raposio, E., & Caruana, G. (2015). Video-assisted thoracic sympathicotomy for the treatment of palmar and axillary hyperhidrosis: a 17-year experience. *Surgical Laparos Endos Percut Techniq, 25*(5), 417-419. doi:10.1097/SLE.0000000000000126

Stefaniak, T. J., & Ćwigoń, M. (2013). Long-term results of thoracic sympathectomy for primary hyperhidrosis. *Polski Przegląd Chirurgiczny, 85*(5), 247-252. doi:10.2478/pjs-2013-0038

Svensson, I., Sjöström, B., & Haljamäe, H. (2000). Assessment of pain experiences after elective surgery. *J Pain Symp Manag, 20*(3), 193-201. doi:10.1016/S0885-3924(00)00174-3

Tabachnick, B. G., & Fidell, L. S. (2013). Using multivariate statistics (6th ed.). Pearson.

Temiz, Z., & Özer, N. (2015). Comparison of postoperative pain severity using four different pain scales. *Anat J Nurs Health Sci, 18*, 4. doi:10.17049/ahsbd.64890

Tsze, D. S., von Baeyer, C. L., Bulloch, B., & Dayan, P. S. (2013). Validation of Self-Report Pain Scales in children. *Pediatrics, 132*(4), e971-e979. doi:10.1542/peds.2013-1509

van Dijk, J. F., van Wijck, A. J., Kappen, T. H., Peelen, L. M., Kalkman, C. J., & Schuurmans, M. J. (2012). Postoperative pain assessment based on numeric ratings is not the same for patients and professionals: a cross-sectional study. *Int J Nurs Stud, 49*(1), 65-71. doi:10.1016/j.ijnurstu.2011.07.005

Vannucci, F., & Araújo, J. A. (2017). Thoracic sympathectomy for hyperhidrosis: from surgical indications to clinical results. *J Thorac Dis, 9*(Suppl 3), S178-S192. doi:10.21037/jtd.2017.s3-ijh

VATS sympathectomy for hyperhidrosis. (2023, April 30). Multimedia manual of cardio-thoracic surgery. https://mmcts.org/tutorial/1603

Yesilyurt, M., & Faydalı, S. (2020). The use of one-dimensional scales in pain assessment: a review. *Anat J Nurs Health Sci, 23*(3), 444-451. doi:10.17049/ataunihem.508877

Yurtseven, S., Dogan, S. D., Arslan, S., Nazik, E., & Yuksekkaya, S. E. (2021). Assessment of postoperative pain intensity using Different Pain Scales. *Turk Clin J Nurs Sci, 13*(1), 1-7.

Zhou, Y., Petpichetchian, W., & Kitrungrote, L. (2011). Psychometric properties of pain intensity scales comparing among postoperative adult patients, elderly patients without and with mild cognitive impairment in China. *Int J Nurs Stud, 48*(4), 449-457. doi:10.1016/j.ijnurstu.2010.07.017