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Correlation between Various Factors and Pain in Gynecological Cancer Patients within the First 24 Hours Post-Operation: A Study in an Urban-Based Tertiary Medical Center

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ABSTRACT

OBJECTIVE: To investigate various pain factors in patients with gynecological cancer who have undergone different types of elective hysterectomy.

METHODS: In this retrospective study, data on pain assessment were collected from gynecological cancer patients who underwent elective total abdominal hysterectomy or total laparoscopic hysterectomy surgeries (with associated surgery) between January 2019 and December 2022 at Vajira Hospital. The data were gathered starting from 24 hours after the procedures.

RESULTS: The pain assessment was evaluated using the Numerical Rating Scale (ranging from 0 to 10, representing low to severe pain) during the first 24 hours after the surgery. The results revealed that several factors, such as cancer location, prior surgical history, and body weight, influenced the intensity and onset of pain. However, different types of surgery did not have a significant impact on pain assessment. Moreover, patients with cancer lesions in the endometrium experienced an early onset of severe pain. Additionally, patients without previous surgical experience and those who are obese should receive additional attention in terms of pain management.

CONCLUSION: This study sheds light on evidence-based factors that influence pain intensity and/or pain onset, including cancer location, prior surgical history, and body mass index. Understanding these factors can contribute to more effective pain management strategies for gynecological patients' post-surgery.

KEYWORDS: gynecological cancer, pain, pain factor, pain management

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INTRODUCTION

Cancer has become the second leading cause of death worldwide in recent years[1]. According to a 2020 report, cervical and ovarian cancers ranked as the second and sixth most prevalent cancers among Thai women, respectively[2]. Both cancers fall under the category of gynecological cancer, which typically involves multiple organs such as the vagina, cervix, uterus, fallopian tubes, and ovaries. Fortunately, these cancers are largely manageable, with hysterectomy being a commonly employed treatment method[3].

Hysterectomy can be performed through various approaches, including transabdominal hysterectomy (TAH) or open abdominal surgery, transvaginal hysterectomy (TVH), or laparoscopic surgery with a laparoscope (TLH) (with associated surgery). TVH and TLH (with associated surgery) are less invasive procedures that result in minimal postoperative pain and faster recovery. However, major hysterectomies are typically performed using TAH due to better disease visibility and procedural simplicity[4-7]. As a result, TAH surgeries typically last one to two hours. It is important to note that patients undergoing TAH may experience moderate to severe postoperative pain, which typically occurs within the first 24 hours after the procedure[8]. Postoperative pain in this context is primarily somatic nociceptive inflammatory pain, which occurs when nociceptors are activated by inflammatory stimuli released by injured cells and local white blood cells at the surgical site. The degree of pain experienced is also influenced by the nature and duration of the operation[9-10].

To assess pain levels, this study utilized the Numerical Rating Scale (NRS), which ranges from 0 to 10 and represents no pain to severe pain. The NRS takes into account various factors such as patient knowledge, pain characteristics, location, onset, duration, and intensity[11]. When the pain score exceeds three (threshold > 3), common treatment options include non-pharmacological therapies or drug administration, such as nonsteroidal anti-inflammatory drugs or opioids. Therefore, understanding postoperative pain and examining its influencing factors is crucial[12-13].

Previous studies have suggested that several factors may contribute to moderate to severe postoperative pain in patients, including high intraabdominal pressure (> 12 mmHg), longer surgery duration (> 3 hours), advanced age (65 years), body mass index, and adequate postoperative analgesia. Non-pain-related variables may include previous surgical experiences, type of surgery, preoperative prolonged pain, analgesic prophylaxis, and the patient's physical condition under anesthesia. However, there is still controversy surrounding the key factors contributing to postoperative pain, particularly within the first 24 hours following surgery, leaving significant gaps in information[8,14-17].

The present study aims to investigate the parameters that influence postoperative pain in patients who undergo gynecological surgery within the initial 24-hour period. The findings of this study provide valuable information for the effective management of postoperative pain.

METHODS

This retrospective study received approval from the institutional review board of the Faculty of Medicine Vajira Hospital (COA 024/2565). Data on pain assessment were collected from 162 gynecological cancer patients who underwent elective TAH or TLH surgery between January 2019 and December 2022 at the Faculty of Medicine Vajira Hospital in Bangkok, Thailand. Exclusion criteria were applied, including incomplete patient information, lack of pathological diagnosis confirmation, and absence of nursing care records.

The NRS, ranging from 0 to 10, was utilized in this study to assess pain levels at four-hour intervals during the first 24 hours following surgery. A score of "0" indicates the absence of pain, while a score of "10" represents the worst possible or most severe pain experienced by patients.

Pain levels were analyzed based on various patient factors, including age, body mass index (BMI), type and duration of hysterectomy (with associated surgery), histological findings, pain onset, and previous surgery history. Data analysis was conducted using SPSS version 24.0 for Windows OS. To fulfill the analytical objectives, the following statistical tests were employed: simple t-test, Mann-Whitney U test, Kruskal Wallis test, Chi-Square test, and correlation coefficient test. Numerical data were presented as mean ± SD or median (25^{th} and 75^{th} percentile), while qualitative data were described in terms of frequency and percentage. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

The study included a total of 162 female patients with a mean age of 56 ± 14.38 years. The average BMI indicated a normal weight for most patients, with an average value of approximately 26. However, around 30% of patients were classified as overweight, while approximately 17% were categorized as obese. The majority of patients (80%) underwent TAH, with an average surgery duration of approximately four hours. The most common cancer sites among patients were the endometrium, cervix, and ovary, accounting for 45.7%, 32.7%, and 21.6% of cases, respectively. Regarding previous surgical history, 43.2% of patients had never undergone surgery, while the remaining patients had undergone procedures under either local or general anesthesia in the past.

Based on the pain assessment records, the majority of patients experienced their initial pain response approximately 130 minutes (2 hours) after surgery, with a pain score of "3 out of 10" on the pain scale. Subsequently, most patients reported their worst pain scores of "5 out of 10" approximately 267 minutes (4.45 hours) following the surgery. Morphine was administered to alleviate pain in all patients. Each patient had 6 to 8 pain response records (see table 1 for more details).

Regarding the different types of procedures, there was no significant difference in the first pain onset (127.5 and 137.5 minutes, p = 0.533) or worst pain onset (270 and 250 minutes, p = 0.880) between patients who underwent elective TAH or TLH. Additionally, the pain scores between the TAH and TLH groups did not differ significantly at the first pain onset (3 out of 10 in both groups, p = 0.130) or worst pain onset (5 vs. 4 score, p = 0.180) during this observation (table 2).

To examine the relationship between the locations of cancer, pain onset, and pain score, we compared patients with cancer in three different locations. The findings revealed no statistically significant differences in pain onset or score. However, patients with endometrial cancer experienced their initial pain sooner than those with ovarian cancer and cervical cancer. Conversely, the worst pain onset was significantly delayed in the cervical cancer group compared to the ovarian cancer group (435 vs. 195 minutes, respectively), with a p-value less than 0.05. Furthermore, the cervix cancer group had the highest pain score among the different locations, scoring 7 out of 10 compared to 4.5 to 5 out of 10 in the other locations. Detailed data can be found in Table 3.

The relationship between past surgical history and pain perception is believed to have an impact. In this study, patients were categorized into three groups based on their surgical history: 1) those who had no prior surgery, 2) those who had surgery under local anesthesia, and 3) those who had surgery under general anesthesia. Interestingly, patients who had undergone surgery with local anesthesia had significantly lower pain scores (3 out of 10) compared to patients who had surgery under general anesthesia (5 out of 10) and patients who had no previous surgery (6 out of 10) (p < 0.05 and p = 0.001, respectively). However, there were no significant differences in the onset time of pain among these patient groups. Detailed information can be found in Table 4.

Table 1 Patient demographic data

Variable	Value (%)
Age (year)	54.56 ± 14.38
Weight (kg) and Height (cm)	61.58 ± 14.46 and 155.41 ± 6.25
Body Mass Index	25.48 ± 5.78
Underweight	13 (8.0)
Normal weight	71 (43.8)
Overweight	50 (30.9)
Obesity	28 (17.3)
Duration procedure (min)	250.70 ± 86.09
Procedure	
Transabdominal hysterectomy (with associated surgery)	130 (80.2)
Laparoscopic hysterectomy (with associated surgery)	32 (19.8)
Site of cancer	
Cervix	35 (21.6)
Endometrium	74 (45.7)
Ovary	53 (32.7)
Histologic type	
Cervix, Squamous cell carcinoma	22 (13.6)
Cervix, Adenocarcinoma	9 (5.6)
Cervix, Adenosquamous carcinoma	4 (2.5)
Endometrium, endometrioid carcinoma	60 (37.0)
Endometrium, serous carcinoma	6 (3.7)
Endometrium, clear cell carcinoma	4 (2.5)
Endometrium, carcinosarcoma	5 (3.1)
Endometrial stromal sarcoma	2 (1.2)
Ovary, clear cell carcinoma	16 (9.9)
Ovary, endometrioid carcinoma	7 (4.3)
Ovary, serous carcinoma	19 (11.7)
Ovary, other	8 (4.9)
Time of onset after surgery (min)	130 (105 , 170)
First pain score (0 to 10)	3 (3, 5)
Time of worst-pain onset (min)	267.50 (133.75, 712.50)
Maximal pain score (0 to 10)	5 (3, 8)
Surgery history	
No previous surgery	70 (43.2)
Local anaesthesia	27 (16.7)
General anaesthesia	65 (40.1)
Morphine use	162 (100.0)
Pain at others site of body	10 (6.2)
Frequency of pain assessment after surgery	7 (6, 8)

Abbreviations: cm, centimeter; kg, kilogram; min, minute
Data were represented based on type of data. Numerical data were represented by mean ± SD or median (25^{th} and 75^{th} percentile). Qualitative data were described by frequency and percentage.

Table 2 Surgical procedure and pain reflexion

Pain assessment	Procedure		P-value
	TAH	TLH	
First pain onset (min)	127.50 (105.00, 166.25)	137.50 (106.25, 180.00)	0.533
Score at first onset	3 (3, 5)	3 (2.25, 3.75)	0.126
Worst pain onset (min)	270.00 (127.50, 720.00)	250.00 (153.75, 675.00)	0.880
Score at worst pain	5 (3, 8)	4 (3, 7)	0.180

Abbreviations: min, minute; TAH, transabdominal hysterectomy; TLH, hysterectomy with laparoscope
Data were analysed by Mann-Whitney U test and represented by median (25th and 75th percentile).

Table 3 Cervical cancer site and pain reflexion

Pain assessment	Site of cancer			P-value		
	Cervix	Endometrium	Ovary	Cervix vs. Endometrium	Cervix vs. Ovary	Endometrium vs. Ovary
Time (min)						
First pain onset	140 (105, 180)	127.5 (105, 170)	130 (105, 175)	0.449	0.635	0.858
Worst pain onset	435 (165, 900)	257.5 (143, 656)	195 (120, 627.5)	0.092	0.047	0.514
Pain score (0 to 10)						
Score at first onset	3 (2, 5)	3 (2.75, 5)	3 (3, 5)	0.957	0.359	0.264
Score at worst pain	7 (3, 10)	4.5 (3, 7.25)	5 (3, 7)	0.101	0.090	0.759

Abbreviation: min, minute
Data were analysed by Mann-Whitney U test and represented by median (25th and 75th percentile).
P-value ≤ 0.05 is considered as statistical significance.

Table 4 Surgical history and pain reflexion

Pain assessment	Surgical history			P-value		
	None	LA	GA	None vs. LA	None vs. GA	LA vs. GA
Time (min)						
First pain onset	127.5 (105, 180)	145 (110, 180)	125 (105, 168)	0.366	0.497	0.159
Worst pain onset	325 (134, 713)	205 (145, 690)	225 (130, 728)	0.442	0.449	0.871
Pain score (0 to 10)						
Score at first onset	3 (3, 5)	3 (2, 4)	3 (3, 5)	0.069	0.762	0.050
Score at worst pain	6 (4, 8)	3 (3, 6)	5 (3, 7)	0.001	0.088	0.030

Abbreviations: GA, patient with past surgery with general anesthesia under their procedure; LA, patient with past surgery with local anesthesia under their procedure; min, minute
Data were analysed by Mann-Whitney U test and represented by median (25th and 75th percentile).

Body weight and height can be factors that impact postoperative pain management. Patients classified as obese had significantly higher pain scores at the onset of pain compared to both underweight and overweight groups (p = 0.026 and p = 0.007, respectively). They also showed a trend towards statistical significance when compared to the normal BMI group (p = 0.058). Furthermore, patients classified as obese experienced their initial discomfort more quickly than those who were overweight (p = 0.027). However, there were no significant differences in the onset and severity of worst pain among the different BMI groups. Detailed information can be found in Table 5.

Despite our efforts, this observation did not yield any significant factors that exhibited a strong correlation with pain score. However, we did identify a negative correlation between patient age and the severity of worst pain experienced (correlation coefficient = -0.220, p = 0.005, data not shown).

DISCUSSION

This study aimed to report the pain scores and associated factors during the first 24 hours following elective hysterectomy (with associated surgery) in gynecological cancer patients. The overall pain scores based on the NRS were 3 out of 10 (indicating low pain) at initial pain onset and 5 out of 10 (indicating moderate pain) at worst pain onset (table 1). These findings are consistent with previous reports on postoperative pain after elective gynecological, orthopedic, and general surgeries[14,18].

The use of morphine in all patients after surgery limited the pain intensity to mild-to-moderate levels. Morphine acts by binding to mu-opioid receptors in the central and peripheral nervous systems, activating descending inhibitory pathways and reducing pain transmission[18-20]. The analysis of pain-associated factors revealed that the type of surgery (TAH and TLH (with associated surgery)) did not affect pain scores or pain onset duration in this study (table 2). A similar report also demonstrated no significant difference in pain scores between these two types of operations[21]. However, the presence of diverse cancer lesions in different locations may play a role in pain perception, rather than the specific surgical procedures. This study revealed that patients with ovarian cancer experienced the worst pain onset earlier than those with cervical cancer and endometrial cancer. The worst pain in patients with ovarian cancer occurred approximately 3 hours after surgery, while in other cancer sites, it occurred between 4 and 7 hours post-surgery. However, there was no difference in the level of pain intensity among patients with various cancer locations in this observation (table 3). Additionally, pain levels may be associated with various factors specific to different cancer sites, such as etiology, individual symptoms, and pathological mechanisms[22-23].

Patients' previous surgical experiences emerged as a significant contributing factor to pain in this study. Patients with no prior surgical experience had the highest worst pain scores, particularly when compared to patients who had previous surgery with local anesthesia (pain scores of 6 and 3 out of 10, respectively). Moreover, patients with prior surgical experiences also exhibited different pain scores between the groups who had undergone procedures with local anesthesia and general anesthesia (pain scores of 3 and 5 out of 10, respectively). However, the timing of first pain onset and worst pain onset did not differ significantly (table 4). Thus, previous surgical history may influence pain scores, especially in patients with no prior surgical experience who may develop pre-surgery anxiety or stress, which can affect pain responses[17,24].

The weight and height of patients were also analyzed to assess their impact on pain scores and pain onset. Patients were categorized based on their BMI. The results indicated that patients with obesity had higher pain scores at the onset of pain compared to the overweight and underweight groups. However, the worst pain scores did not differ significantly among the various BMI groups (table 5). Several studies have also demonstrated that obesity is associated with increased self-reported pain intensity and severity compared to individuals with normal BMI[25-26]. Additionally, another study showed that patients with obesity exhibited increased pain sensitivity after surgery[27].

Other factors, including surgery duration and histological type, did not significantly impact pain intensity or pain onset. Furthermore, a negative correlation between age and pain scores was observed, although the limited number of patients in each category based on diverse factors can be considered a limitation of this study.

Table 5 BMI and pain reflexion

Pain assessment	BMI				P-value					
	Underweight (A)	Normal (B)	Overweight (C)	Obesity (D)	A vs. B	A vs. C	A vs. D	B vs. C	B vs. D	C vs. D
Time (min)										
First pain onset	120 (100, 150)	120 (105, 170)	145 (118, 200)	120 (90, 166)	0.487	0.124	0.857	0.118	0.289	0.027
Worst pain onset	195 (115, 558)	280 (150, 690)	257.5 (143, 724)	292.5 (120, 818)	0.373	0.535	0.709	0.689	0.677	0.872
Pain score (0 to 10)										
Score at first onset	3 (2, 3.5)	3 (3, 5)	3 (2, 4)	4 (3, 7)	0.193	0.560	0.026	0.226	0.058	0.007
Score at worst pain	3 (2.5, 8)	5 (3, 8)	4.5 (3, 7)	6 (4, 8.75)	0.322	0.730	0.249	0.215	0.499	0.103

Abbreviations: BMI, body mass index; min, minute
Data were analysed by Mann-Whitney U test and represented by median (25^{th} and 75^{th} percentile).
P-value ≤ 0.05 is considered as statistical significance.

CONCLUSION

This study aimed to identify evidence-based factors that influence pain intensity and onset, including cancer location, previous surgical experience, and BMI. Understanding these factors is crucial for effectively managing postoperative pain in gynecological patients.

CONFLICT OF INTEREST

The authors declare no competing interests.

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DATA AVAILABILITY STATEMENT

The datasets are available from the corresponding author on reasonable request.

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