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Shivering image in post laparotomy patients with regional anesthesia at Prof. Dr. Margono Soekarjo Purwokerto Hospital

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ABSTRACT. Shivering is a common complications that often occurs in patients after undergoing general or regional anesthesia. This condition not only causes discomfort for patients but can also result in oxygen consumption, carbon dioxide production, and disruption of hemodynamics. The study aims to determine the description of shivering in post-laparotomy gynecology oncology patients with regional anesthesia at Prof. Dr. Margono Soekarjo Purwokerto Hospital. This study used a quantitative research method by analyzing descriptive statistical frequencies with a sample size of 40 respondents. The results showed that 9 respondents (22.5%) experienced grade 2 shivering, 8 respondents (20.0%) experienced grade 3 shivering, 6 respondents (15.0%) experienced grade 1 shivering, and 1 respondent (2.5%) experienced grade 4 shivering. With the right treatment steps, the risk of shivering can be minimized, so that post-operative patient recovery is faster and post-operative comfort is increased.

1. INTRODUCTION

Laparotomy is a surgical procedure that involves a large incision to gain access to the abdominal cavity (1). Laparotomy is a surgical procedur to open the abdoment in which an incission is made in the lining of the abdoment to access problematic organs, including bleeding, cancer, perforation, and occlusion (2). According to the World Health Organization (WHO) in 2017, there were 90 million laparotomy patients in all hospitals in the world, in 2018 there was a significant increase of 98 million cases. There is an increase of 10% every year. In 2020, there will be 6 million laparotomy patients with gynecological oncology in the world. In Indonesia in 2018, laparatomy ranked 5th, recorded out of 1.2 million people who performed surgery, 42% of which were laparatomy surgeries (3).

Research conducted by Purnawan in 2016 estimated that the use of general and regional anesthesia in Indonesia reaches around 4.67 million annually. In the study conducted in Greece, the survey was carried out in 128 anesthesia department during the period from March to June 2012, showed that 54.5% of surgeries used general anesthesia and 45.5% regional anesthesia, and the most commonly used type of anesthesia was Spinal type regional anesthesia, reaching about 51.9% (4). From the results of an exploratory study conducted by researchers on January 15-16, 2024 at Prof. Dr. Margono Soekarjo Purwokerto Hospital, there are 247 patients who have undergone obstetric laparotomy surgery from October to

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December 2023 with a diagnosis of cystic ovarian neoplasm (NOK), Cervix Cancer, Endometriosis and uterine myomas. Obstetric laparotomy using general anesthesia for 130 patients and using regional anesthesia for 117 patients. The laparotomy process requires anesthesia. In general, anesthesia is divided into general anesthesia, regional anesthesia, and local anesthesia (5). General anesthesia service is a loss of consciousness without pain that is reversible due to the administration of drugs, as well as manipulating pain in the human body (6).

Regional anesthesia is a break in nerve impulses from and to certain areas of the body. Regional anesthesia techniques keep patients fully conscious so that post-operative recovery is more optimal, and they can mobilize as early as possible (7) The types of regional anesthesia include spinal anesthesia, epidural anesthesia, and caudal block (8). In this study, the researcher focused on the incidence of shivering in post-laparotomy patients with regional anesthesia. Different from previous studies, where research was conducted on cases of general anesthesia and regional anesthesia in intra and post-operative patients in general.

Anesthesia procedures can cause complications in both intra and post-anesthesia patients. Spinal anesthesia complications that can occur include PONV (Post Operative Nausea Vomiting), shivering, hypotension, and hypothermia (Longdong et al., 2018). Spinal anesthesia reduces the threshold for vasoconstriction and shivering by approximately 0.6°C (10). Shivering post-anesthesia is influenced by age, gender, operating room temperature, American Society of Anesthesiology physical status classification (ASA), nutrition, length of surgery, intraoperative bleeding, and Body Mass Index (BMI). The surgical process with a long time, results in anesthesia action becoming more prolonged (11).

Research conducted in Jatiwinangun Surgical Hospital, Purwokerto showed that the number of shivering patients after regional anesthesia was 24.5% (Setiadi et al., 2023). Meanwhile, the incident of shivering after regional anesthesia at Dr. RM Pratomo Hospital as done by (12), showed that out of 75 patients, 26 people (34.7%) did not experience shivering, and 30.7% experienced grade 1 shivering, and 24.0% experienced grade 2 shivering. Meanwhile, research on shivering after spinal anesthesia at Leuwiliang Regional Hospital Bogor, show the incidence of grade 1 shivering was 29.3%, and grade 2 shivering was 58.7% (Taufik, et.al. 2022). Data on gynecologic oncology laparotomy at Prof. Dr. Margono Soekarjo Purwokerto Hospital from October to December 2023 amounted to 247 patients. On average, there are 39 gynecologic oncology laparotomy patients per month with regional anesthesia. Based on the above assumptions, researchers are interested in conducting research on the characteristics of oncology gynecological laparotomy patients, namely age, BMI, amount of bleeding, length of surgery, body temperature and the incidence of post-laparotomy shivering with regional anesthesia.

2. METHOD

The researcher has obtained permission from the Director of Prof. Dr. Margono Soekarjo Hospital number 420/03065 and passed ethical clearance by the Research Ethics Commission of Prof. Dr. Margono Soekarjo Purwokerto Hospital number 420/03062. This study uses a quantitative type with an observational descriptive approach with a cross-sectional research design. Sampling uses a sampling quota of 40 respondents. The purpose of this study was to determine the characteristics of patients (age, body mass index), duration of surgery, amount of intraoperative bleeding, body temperature, and shivering in post-laparotomy gynecological oncology patients with regional anesthesia. The study was conducted from November 2023 to August 2024, with data collection time in April 2024. Data collection in this study was taken from the patient's medical records, including age, height, weight, duration of surgery and the amount of intraoperative bleeding. For BMI measurement using

the way weight in kilograms is divided by the square of height in meters. For body temperature measurement using a tympani thermometer, it is measured in the patient's ear after the patient enters the post anesthesia care unit. For the amount of bleeding using the formula of the amount of intraoperative bleeding divided by the estimated blood volume multiplied by 100%. For the incidence of shivering, the shivering scale was used according to Alfonsi to assess the level of shivering in post operative patients. The following is the Alfonsi scale used by the author in this study: grade 0: no shivering, grade 1: the presence of piloraxis, vasoconstriction, cyanosis without cause and without skeletal muscule activity, grade 2: musculus activity in one musculus group, grade 3: musculus activity in more than one musculus group, but not comprehensively, grade 4: full-body musculus activity. By using the Alfonsi scale, it is expected to be able to obtain the shivering scale accurately and when there is research at different times, it can give similar results. All data collected were analyzed using IBM SPSS 25, to determine age frequencies, BMI, duration of surgery, intraoperative bleeding amount, body temperature and shivering events.

2.1 Population and Sample

The patient population data in this study amounted to 39 patients. According to (14) quota sampling is a sampling technique by determining the number and certain criteria as targets that must be met. In this study, the number of samples was 40 respondents post obstetric laparotomy with regional anesthesia.

In this study, the inclusion criteria were patients who agreed and had signed an informed consent to become research respondents, gynecologic oncology post-laparotomy patients with regional anesthesia, and ASA I, II, III respondents. The exclusion criteria included patients who were uncooperative and did not agree during data collection, an emergency occurred during laparotomy, laparotomy with general anesthesia, laparotomy patients with regional anesthesia, and were given general anesthetic drugs, Tramadol, and Pethidine intra-operatively.

2.2 Methods and means of data collection

Data were collected from April 1 to April 30, 2024, involving 40 post-laparotomy respondents with regional anesthesia who had agreed and signed the informed consent form. Respondent data consisted of primary and secondary data. Data were taken by observing post-laparotomy respondents with regional anesthesia in the PACU and from patient medical records.

Researchers took data from patient medical records containing age, weight, height, amount of intraoperative bleeding, and length of surgery in the respondent's medical records. After the patient completed the operation and entered the PACU, the researcher observed the occurrence of shivering using the shivering criteria from Alfonsi and measured body temperature using the Yuwell tympanic thermometer type YHT101. Data collection from patients entering the PACU until 10 minutes in the PACU. The researcher documented the results of the observations and checked the completeness of the data from each respondent.

2.3 Data Analysis

After the data is collected, observation data and characteristic data are edited, coded, scored, entered, tabulated, and cleaned. This study uses univariate descriptive data analysis. In general, univariate data analysis is presented in the form of tables, percentages, and frequencies (14). The researcher conducted the percentage analysis using SPSS 25

descriptive frequency analysis. To find out the percentage and frequency using the method of frequency the number of groups divided by the total research sample multiplied by 100%.

3. RESULTS AND DISCUSSION

The number of respondents was 40 people of female gender with post-laparotomy gynecology oncology. The researcher documented age, body mass index, duration of surgery, amount of blood loss during surgery, and body temperature with an auricular thermometer and documented the results of observations of shivering events. Data and results of observations of shivering events from respondents who had given their consent to conduct research and based on the inclusion criteria in this study, namely respondents with post-laparotomy gynecology oncology with regional anesthesia.

3.1 Research results

The following are the results of research that the author has studied.

Table 1. Frequency Distribution of Characteristics of Patients Post Laparotomy Regional Anesthesia.

Characteristics	f	%
Age		
Mature	16	40.0
Pre-Elderly	18	45.0
Elderly	6	15.0
Total	40	100,0
BMI		
Severe Underweight	2	5.0
Mild underweight	5	12.5
Ideal	24	60.0
Overweight	6	15.0
Obese	3	7.5
Total	40	100,0
Amount of bleeding		
I : < 15%	34	85.0
II : 15 – 30%	6	15.0
Total	40	100,0

Based on table 1, the largest number of respondents in the study were pre-elderly with 18 respondents (45.0%), mature 16 respondents (40.0%), and elderly 6 respondents (15.0%). While in the BMI table, the largest number of respondents were in the ideal BMI with a total of 24 respondents (60.0%), overweight 6 respondents (15.0%), mild underweight 5 respondents (12.5%), obese 3 respondents (7.5%), and severe underweight 2 respondents (5.0%). The largest number of bleedings was in bleeding <15% with a total of 34 respondents (85.0%) and bleeding 15-30% in 6 respondents (15.0%).

Table 2. Frequency distribution of duration of surgery and body temperature of post-laparotomy patients.

Characteristics	Mean	Min	Max	N	%
Operation time	101.38	60	150	40	100
Body temperature	35.7°C	35.0°C	36.6°C	40	100

Based on table 2, the mean duration of surgery was 101.38 minutes, with the fastest laparotomy duration of 60 minutes and the longest duration of surgery of 150 minutes. In the body temperature table, post-laparotomy respondents had a body temperature between 35.0°C and 36.6°C with an average body temperature of 35.7°C.

Table 3. Frequency distribution of shivering post laparotomy with regional anesthesia.

Characteristics	*f*	%
Shivering		
No shivering	16	40.0
Grade 1	6	15.0
Grade 2	9	22.5
Grade 3	8	20.0
Grade 4	1	2.5
Total	40	100

In table 3, the highest incidence of shivering was in grade 2, namely 9 respondents (22.5%), then grade 3 was 8 respondents (20.0%), grade 1 was 6 respondents (15.0%), and grade 4 was 1 respondent (2.5%).

3.2 Discussion

In table 1, most of the respondents were pre-elderly (45-59 years old), which was 18 respondents (45.0%). At the age of 40-60 years is a transition period, at that age there will be changes in health and physically, with age the function of the human body will decrease or degenerate. In women over 45 years old, there is a decrease in body function, in women sometimes uterine fibroids can occur (15).

In table 1, the ideal body mass index is the most dominant at 60%. In a study conducted by (16), in respondents with a BMI of <18.5 kg/m², shivering was 40% higher than in respondents with a BMI of >18.5 kg/m². In the body, fat functions for energy reserves (17). The body mass index of >18.5 kg/m² has better heat protection, namely from fat in the body, therefore a high body mass index can retain heat better than a body mass index of <18.5 kg/m² caused by excess energy reserves (18).

In table 1, intraoperative bleeding in this study was most common in bleeding <15% by 34 respondents (85.0%). Significant blood loss during surgery can lead to a decrease in blood volume (hypovolemia) (19). This affects the body's metabolism and decreases heat production so that hypothermia can occur (20). Blood loss during intraoperative surgery will increase the incidence of shivering. Laparotomy, hysterectomy, and cystectomy are closely associated with more intraoperative bleeding compared to vaginal hysterectomy (15).

In table 2, the duration of the surgery is between 60 minutes to 150 minutes, the time required for the surgical procedure to be vasied, depending on the type of surgery, the complexity of the case, the expertise of the surgical team and the patient's condition. The duration of the surgery is an important factor in relation to the risk of complications. Surgical

complications with a duration of more than 2 hours will have a 2 times greater risk of postoperative surgery than surgery of less than 2 hours (21). According to (22), the long duration of surgery has a strong correlation with the incidence of postoperative shivering, especially through the mechanism of intraoperative hypothermia and the effects of anesthesia. The long duration of surgery increases the risk of significant body temperature drop due to longer exposure to the cold temperature of the operating room (23). The incidence of postoperative hypothermia and shivering with a long operative duration was higher and recovery in PACU would be longer compared with postoperative responders with normothermy (17).

In table 2, the postoperative temperature range is 35.0°C to 36.6°C with a mean of 35.7°C. The respondent's body temperature decreased between 0.1°C and 1.5°C from normal body temperature. This is in accordance with research from (24), namely patients experience postoperative hypothermia of 58.3%. Hypothermia and shivering can occur in patients undergoing surgery, such as exposure to operating room temperature, the effects of anesthetic drugs, and the release of the hormone adrenaline (25). A drop in body temperature can cause damage to organ function, and can pose a risk of death. If shivering is caused by anesthetic drugs, the anesthetic agent will suppress the body's metabolism producing body heat, so there will be a decrease in body temperature (11).

In table 3, out of 40 respondents, 16 respondents (40.0%) did not experience shivering. The highest number of shivering events occurred in respondents with shivering grade 2 of 9 respondents (22.5%). This is not in accordance with the study of (12)), which is that of 75 postoperative respondents with regional anesthesia no shivering occurred by 34.7% and the highest incidence of shivering in grade 1 shivering was 30.7%. This study is not in accordance with the research of (13), namely the largest incidence of post-anesthesia shivering in grade 3 shivering at 58.7%. This is also not in line with the research of (26) in a study at Cilacap Hospital, the incidence of shivering is 40.6%.

Shivering post anesthesia is affected by age, gender, operating room temperature, ASA physical status classification, nutrition, length of surgery, intraoperative bleeding and body mass index. The surgical process takes a long time, resulting in the anesthesia being prolonged (7)). The occurrence of shivering can increase the oxygen demand in the body, increase the risk of excess carbon dioxide in the blood, increase lactic acid and the release of catecholamines.

Regional anesthesia causes a sympathetic block, a block against pain and temperature so that the muscles become relaxed. Regional anesthesia lowers the body temperature limit from normal temperature, causing peripheral vasoconstriction (7). In maintaining body temperature from cold exposure, the body responds with peripheral vasoconstriction, involuntary intra/post-anesthesia involuntary muscle activity. This involuntary activity often occurs on the face, jaw, extremities of the body and sometimes the entire body (11).

The process of shivering begins with thermoreceptors detecting a decrease in body temperature and environmental temperature. The information is sent to the hypothalamus. When the body temperature drops, the hypothalamus activates a response to produce heat. The hypothalamus sends signals through the sympathetic nervous system to the muscles of the whole body, causing skeletal muscles to contract rhythmically and rapidly. This muscle contraction generates heat through increased metabolic activity in the muscles. This process is known as muscle thermogenesis or heat production through muscle activity. Humans are homeothermic, i.e. maintain tissue temperature at a relatively constant value (27). The main organs in maintaining the body's thermoregulation involve the hypothalamus, skin, musculoskeletal, sweat glands, flat vessels, endocrine and nerves (28). In contrast to generala anesthesia in affecting the body's thermoregulatory mechanisms, where the hypothalamus does not respond well to changes in body temperature, there is a complete systemic vasodilation, there is a decrease in body metabolism so that heat production is reduced (29).

In this study, all respondents were women. There was a difference in response between male and female respondents to cold temperatures, where female respondents shivered faster than male respondents. Female respondents prefer warmer areas and feel uncomfortable in cold environments (30). This suggests that women are more sensitive to changes in body temperature during anesthesia, so they are more likely to experience shivering as the body's mechanism for raising temperature (31).

According to (32), postoperative monitoring of laparotomy with regional anesthesia is monitoring vital signs, sensory and motor evaluation, pain monitoring, postoperative Nausea and Vomiting (PONV) prevention, urine monitoring, respiratory monitoring, Post-Dural Puncture Headache (PDPH) monitoring, monitoring of shivering events.

According to (28), the treatment of shivering, among others, is the administration of warm liquid infusions during surgery to maintain body temperature, active warming with a warm blanket for 15 minutes serves to maintain normal core body temperature, administration of Ketamine 0.25 mg/kg body weight, administration of Dexamethasone 4 mg, administration of intravenous MgSO4 50 mg/kg body weight, Tramadol injection 0.5 mg/kg body weight, Pethidin injection 0.5 mg/kg body weight. With the right measures, the risk of shivering can be predicted, so that postoperative patient recovery is faster and improves postoperative comfort (33).

CONCLUSION

From the results of the study on the description of shivering in respondents of post-laparotomy gynecology oncology with regional anesthesia at Prof. Dr. Margono Soekarjo Purwokerto Hospital, several conclusions can be drawn: the characteristics of patients totaling 40 respondents include the highest age, namely pre-elderly respondents of 18 respondents (45.0%), and the highest BMI status is ideal BMI of 24 respondents (60.0%). The average duration of surgery in this study was 101 minutes, the fastest surgery was 60 minutes, and the longest surgery was 150 minutes. The most bleeding was bleeding <15% by 34 respondents (85.0%) and bleeding 15-30% by 6 respondents (15.0%). There is a decrease in body temperature up to 1.5°C and 36.6°C with a mean of 35.7°C. The most frequent shivering incidents in this study were grade 2 shivering with 9 respondents (22.5%). The results of this study show that shivering management in post-laparotomy patients with regional anesthesia is important to improve comfort and accelerate patient recovery. Implementation of pharmacological and non-pharmacological protocols, when necessary, to reduce the negative impact of shivering on hemodynamic stability and patient comfort. This study has several limitations, including a limited sample so the results may not be fully representative of the broad population. In addition, other factors that affect shivering, such as variations in ambient temperature and individual differences in tolerance to cold, have not been taken into account in detail. These shortcomings can affect the generalization of findings and indicate the need for further research with more comprehensive methods.

SUGGESTION

The results of this study are expected to be a reference in the development of standard operating procedures (SOPs) and apply evidence-based interventions that have been proven effective in reducing the incidence of postoperative chills in hospitals. This study provides practical guidance for anesthesiologists to identify the factors that can cause chills, apply anesthesia techniques that minimize the risk of shivering, and monitor and manage shivering

effectively. For the next researcher, it is expected to focus on specific and latest interventions for shivering prevention and shivering treatment with the latest techniques.

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