

Heating Pads and Early Mobilization for reducing Postoperative Shoulder Pain and enhancing Recovery of Women undergoing Gynecological Laparoscopic Surgery

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Abstract: Background: shoulder pain is a common complaint following gynecological laparoscopic surgery. **Aim of this study:** was to evaluate the effect of heating pads and early mobilization for reducing postoperative shoulder pain and enhancing recovery of women undergoing gynecological laparoscopic surgery. **A quasi experimental design** was adopted in the present study. **Setting:** The study was conducted at the gynecological unit at the obstetric department at Benha University Hospital during the period from March, 2015 to June, and 2015. **Subjects:** a systematic random sample of 343 women undergoing gynecological laparoscopic surgery was randomly allocated into two groups. Heating pads and early mobilization group and control group. **Tool:** Three tools were used to collect the necessary data, structured interviewing questionnaire sheet, postoperative quality of recovery score: the (QoR-40), and numerical pain rating scale was used for clinical evaluation of pain severity. **Results:** postoperative shoulder pain in heat pads and early mobilization group was significantly less than in the control group at different time of assessment at the immediate 4 hours after surgery and at 6, 12, and 24 hours ($p < 0.001$). The postoperative recovery score was significantly higher in heat pads and early mobilization group. **Conclusion;** heat pads application and early mobilization reduce postoperative shoulder pain and enhance recovery of women undergoing gynecological laparoscopic surgery.

Key words: Postoperative, Shoulder Pain, Heat Pad, Early Mobilization, Gynecological Laparoscopy, Recovery.

I. Introduction

Laparoscopy is a direct visualization of the peritoneal cavity, ovaries, outside of the tubes, and uterus by using a laparoscope. Gynecological laparoscopy is a commonly performed procedure⁽¹⁾. Gynecological laparoscopic surgery is associated with insertion of carbon dioxide gas in the abdominal wall, which is connected to the diaphragm of the shoulder and other organs of the body via the phrenic nerve⁽²⁾.

Shoulder pain is a common complaint following gynecological laparoscopic surgery, such type of pain is known as gas pain⁽¹⁾. The pain is felt initially underneath the abdomen and then it moves up to the shoulder. Although the pain is transient in most cases, it usually lasts about two or three days⁽³⁾. It can appear after several months of the surgery, and may cause more discomfort to the woman than the pain at the incision sites⁽⁴⁾. This type of pain contributes to women morbidity by increasing analgesic requirements. Increasing analgesic intake was recognized as the most important factor in protracting the resumption of women recovery⁽⁵⁾.

Several strategies were initiated in order to reduce shoulder pain as, intraperitoneal local anesthesia, pulmonary recruitment maneuver, drainage, gas less laparoscopy, mini laparoscopy, and intraperitoneal saline^(6,7,8,9). However the utilization of those strategies carbon dioxide remain within the peritoneal cavity for few days, so utilization of additional strategies should be used in order to reduce shoulder pain and enhance women recovery after gynecological laparoscopic surgery.

For an effective care to be provided to women, developments regarding pain management and updated pharmacological and non-pharmacological approaches regarding pain management and pain should be followed. Also these techniques may help reducing pain and it must be encouraged as a part of the comprehensive pain management efforts. For this reason, abilities and preferences of the women regarding the use of non-pharmacological methods should be taken into consideration; it should be underlined for the women that these are used together with medical and pharmacological treatments and the use of non-pharmacological methods should be included to the care plan when women is appropriate and willing⁽¹⁰⁾.

An application of heat, in various forms, is popular pain relieving strategy. It is easy to use, inexpensive, require no prior practice, and have minimal negative side effects when used properly. Although there are no RCTs on the use of heat for relieving shoulder pain, these modalities have been studied for their effects on pain induced under experimental conditions⁽¹¹⁾. Heat sources include a hot water bottle, heated rice-filled sock, warm compress (wash clothes soaked in warm water and wrung out), electric heating pad, warm blanket, and warm bath or shower. In addition to being used for pain relief, heat is used to relieve chills or trembling, decrease joint stiffness, reduce muscle spasm, and increase connective tissue extensibility⁽¹²⁾.

Early postoperative mobilization of patients soon after surgery, now a fundamental part of nursing care, wasn't common practice until the middle of the past century. In an article published in 1949, D. J. Leithauser,⁽¹³⁾ a Detroit surgeon, stated, "Ten years ago early mobilization was considered a 'crackpot' idea. Today, it is recognized and is rapidly approaching a 'must' procedure following a surgical operation." Indeed, the practice of having patients walk as soon as possible after surgery constituted a major change in patient care, based on the new evidence of the benefits of exercise and

its positive impact on patient recovery. Since then, facilitating ambulation has been considered an important part of excellent nursing care, particularly in postoperative patients⁽¹⁴⁾.

Significance of the Study:

The gynecological laparoscopic surgery has been successfully introduced into practice as; this minimally invasive surgery is associated with low morbidity. Frequency of pain after laparoscopic surgery varies from 35.0 to 80.0 %⁽¹⁵⁾. Reducing this pain to the level, which narcotic analgesic is no longer required is an important step toward performing laparoscopy as a day case procedure and enhancing women recovery. Moreover, because of the exact mechanism of post laparoscopic shoulder pain (PLSP) remains unclear⁽¹⁶⁾, so, the aim of the present study was to evaluate the effect of heat pads application and early mobilization on reducing postoperative shoulder pain and enhancing women recovery after gynecological laparoscopic surgery.

Aim of the Study:

The aim of the present study was to evaluate the effect of heat pads application and early mobilization on reducing postoperative shoulder pain and enhancing women recovery after gynecological laparoscopic surgery.

Research Hypothesis:

Women who use heat pads and early mobilized after gynecological laparoscopy will experience less shoulder pain and better recovery than those who don't.

II. Material and Methods:

Design:

A quasi experimental study design was utilized to conduct the current study.

Setting:

The present study was conducted at the gynecological unit affiliated to obstetric and gynecologic department, Benha University Hospital.

Sampling:

A-Type: A systematic random sample. Women recruited in the present study were selected in a systematic randomly manner, as they were selected from the prepared operational laparoscopic list, women with odds numbers was selected to be included in the study till attain the sample size.

B-Size:

Sample size was calculated based on the previous year census report of the obstetrics and gynecology department at Benha University Hospital. The total number of women undergoing gynecological abdominal laparoscopic surgery was 2400 women (*Benha University Hospital Census, 2014*)⁽¹⁷⁾. Sample size was calculated utilizing the following formula⁽¹⁸⁾.

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n= sample size

N= total population number (2400).

e= margin error (0.05)

A total 343 of women undergoing gynecological abdominal laparoscopic surgery were recruited in the current study. They were randomly allocated into two groups: group (1), the control group included 160 women; they had ordinary postoperative nursing care. While, group (2), the study group included 184 women who utilized heating pads and early mobilization measures for reducing shoulder pain after gynecological abdominal laparoscopic surgery.

C-Technique:

The control group related intervention and assessment were firstly collected at the first half of time of data collection (1st 2 months). This was applied to avoid and reduce bias during sample collection. The study group related intervention and assessment were collected at the second half of time of data collection (2nd 2 months).

D-Criteria:

Inclusion Criteria:

Free from medical disorders.

Exclusion Criteria:

Morbid obese women with body mass index more than 30kg/m², and who are restricted from movement after surgery.

Tools of Data Collection:

Three tools were utilized for data collection.

Tool (1): Structured Interviewing Questionnaire Sheet:

It was developed by the researcher after reviewing related literatures; it was consisted of two parts

Part 1: concerning with data regarding general characteristics such as; age, educational level, residence height, weight and body mass index etc.

Part2: concerning with basal characteristics of the current gynecological laparoscopic surgery including purpose and duration.

Tool (II): Postoperative Quality of Recovery Score: the (QoR-40):

It was adopted from **Myles et al. (2000)**⁽¹⁹⁾, and it was used to evaluate the quality of woman recovery after 24 hours of post gynecological laparoscopic surgery. It consisted of 40 items, the items were grouped according to various aspects (dimensions) of recovery: emotional state (9items), physical comfort (12items), psychological support (7items), physical independence (5 items), and pain (7items). It was evaluated using a Likert-5 point scale, it was scored for positive item as from "1= none of the time, 2=some of the time, 3= usually, 4=most of time, and 5=all of the time. For negative items the scoring was reversed.

Tool (III): Numerical Pain Rating Scale (NRS)

It was constructed by **Williamson & Hoggart (2005)**⁽²⁰⁾. It was used to assess pain, women were instructed to choose a number from 0 to 10 that best describes their current pain. 0 would mean 'No pain' and 10 would mean 'sever pain'. It was scored as no pain (0), mild pain (1-3), moderate (4-7), and sever pain (8-10).

Content Validity:

The tool validity test was done through five panels of expertise in the field of maternity nursing to test the content validity. Modification was carried out according to the panel's judgment on the clarity of sentences and appropriateness of content. The percentage of consensus among experts regarding the structured interviewing questionnaire was 96.0%, postoperative quality of recovery score was 98.0%, and numerical pain rating scale was 98.0%.

Pilot Study:

A pilot study was conducted on 10.0% of the total sample to test the reliability of the present study tools study, it was found that; and internal consistency for the interviewing questionnaire was ($r = 0.92$ and $\alpha = 0.93$ respectively). Postoperative quality of recovery score related Cronbach's alpha were ($\alpha = 0.91$). In addition numerical pain rating scale was Test-retest reliability and internal consistency for numerical rating scale was high ($r = 0.95$ and $\alpha = 0.89$).

It also helped to estimate the time needed for data collection. It was estimated to be 20 minutes for each woman. Women included in the pilot study were excluded from the sample of the study.

Ethical Considerations:

The present study was conducted under the approval of the Faculty of Nursing Ethical Committee, Benha University. Participants were given explanations about the purpose of the study, and they were also informed that they could withdraw from the study at any time before the completion of the study. Participants who agreed to complete in this study were asked to sign a consent form. Confidentiality of participants' information was assured and the data were accessed only by the investigators involved in the study.

Field of Work:

Data were collected from the beginning of March, 2015 till the end of June, 2015. Immediately after the ethical approval was obtained; all women signed an informed consent after full explanation of the aim of the study. For women undergoing the present study, the researchers reassured that they had the same: technique of surgery, doses of anesthetic drugs, and intra-operative measures to drain CO₂ gas from the abdominal wall.

For both study and control groups; pain score was evaluated at different time, at 4, 6, 12 and 24 hours after laparoscopic surgery. A basal characteristic of shoulder pain was evaluated after first 4 hours after surgery, in order to ensure relieving effect of anesthesia. It was evaluated utilizing numerical pain rating scale. Postoperative quality of recovery score was evaluated after 24 hours of laparoscopic surgery. Women in the control group had the ordinary postoperative nursing care. For heat pads and early mobilization group, utilized heat pads was prepared by the research by putting hot bran flour into a cotton cloth and was tested to determine its temperature before placing it on the shoulder. Women were asked to place the prepared heat pad at the site of shoulder pain immediately after early postoperative 4 hours for a period of 5-10 minutes. Each woman was asked to place heat pads when needed. In addition each woman was encouraged for early mobilization as soon as she can move in bed or walk. Women's mobilization included (change body posture, take her legs toward her body, and early walking).

Statistical Analysis:

Data analysis was performed using IBM SPSS statistical software version 17. The data were explored. Descriptive statistics with mean and standard deviation (SD) for continuous variables and frequency for categorical variables were analyzed. Qualitative variables were compared using chi square test (χ^2) as the test of significance and independent, (t) test was used to compare the mean score between two groups. The p-value is the degree of significance. A significant level value was considered when the p-value ≤ 0.05 and a highly significant level value was considered when the p-value ≤ 0.001 , while the p-value > 0.05 indicates non-significant results.

III. Results:

Table (1): illustrates the general characteristics of women under the study. It was noticed a homogeneity between the two groups with no statistically significant regarding age, educational level, residence, occupation, weight, height, and body mass index.

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Table (2): clarifies that, there was no statistically significant difference between the two groups regarding the basal characteristics of gynecological laparoscopic surgery concerning purpose and duration whereas ($p>0.05$).

Table (3): illustrates the basal characteristics of shoulder pain immediately postoperative, it was presented that, there was no statistically significant difference between heat pads and control group regarding sites of pain, pain intensity, and factors aggravate and relieve pain ($p>0.05$).

Table (4): presents the shoulder pain score at different time interval at 6,12, and 24 hours after laparoscopic surgery, and revealed that, pain score was less than among the heat pads and early mobilization group as compared with the control group with a highly statistically significant difference ($p<0.001$).

Table (5): presents the mean score of postoperative quality of recovery score among women under the study. It was observed that, the postoperative quality of recovery score was higher among the heat pads and early mobilization group as compared with the control group with a highly statistically significant difference ($p<0.001$).

Table (1): Distribution women under the study regarding their personnel characteristics (n=343).

Variable	Heat pad group N= 183		Control group N=160		Analytic test		P value
	No	%	No	%	Chi square test	Independent t test	
Age in years					4.29		>0.05
20-	45	24.6	55	34.4			
30-	123	67.2	91	56.9			
40-50	15	8.2	14	8.7			
Mean \pm SD(Mean \pm SD)	25.30 \pm 2.67		25.07 \pm 3.00			.729	>0.05
Educational level					5.23		>0.05
Illiterate	17	9.3	27	16.9			
Read and write	6	3.3	7	4.4			
Secondary	87	47.5	64	40.0			
University	73	39.9	62	38.7			
Residence					.188		>0.05
Urban	27	14.8	21	13.1			
Rural	156	85.2	139	86.9			
Occupation					.270		>0.05
House wife	114	62.3	104	65.0			
Working	69	37.7	56	35.0			
Body weight (Mean \pmSD)	70.75 \pm 8.92		71.03 \pm 8.83			.283	>0.05
Height (Mean \pmSD)	163.30 \pm 5.56		163.78 \pm 5.54			.800	>0.05
Body mass index (Mean \pmSD)	26.42 \pm 2.52		26.31 \pm 2.47			.430	>0.05

Table (2): Distribution women under the study according to the basal characteristics of laparoscopic surgery (n=343).

Variable	Heat pad group N= 183		Control group N=160		Chi square test	P value
	No	%	No	%		
Purpose of gynecological laparoscopy					1.23	>0.05
Diagnostic	109	59.6	105	65.6		
Curative	74	40.4	55	34.4		
Duration of gynecological laparoscopy in minutes					.620	>0.05
45-	45	24.6	35	21.9		
50-	74	40.4	71	44.4		
60-70	64	35.0	54	33.7		

Table (3): Distribution of women under the study as regards to the basal characteristics of shoulder pain immediately postoperative (n=343).

Variable	Heat pad group N= 183	Control group N=160	Chi square test	P value
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	No	%	No	%		
Site of pain						
Right shoulder	32	17.5	20	12.5	2.87	>0.05
Left shoulder	69	37.7	55	34.4		
Both shoulder	82	44.8	85	53.1		
Pain intensity						
No	0	.0	0	.0	.721	>0.05
Mild	5	2.7	6	3.7		
Moderate	92	50.3	74	46.3		
Sever	86	47.0	80	50.0		
Factors aggravate pain						
Nothing	78	42.6	76	47.5	3.62	>0.05
Breathing	74	40.4	68	42.5		
Eating	15	8.2	7	4.4		
Drinking	16	8.8	9	5.6		
Factors decrease pain						
Nothing	56	30.6	58	36.3	1.29	>0.05
Analgesic	99	54.1	81	50.6		
Walking	28	15.3	21	13.1		

Table (4): Distribution women under the study concerning shoulder pain at different time of assessment (n=343).

Variable	Heat pad group N= 183		Control group N=160		Chi square test	P value
	No	%	No	%		
1st 6 hours shoulder pain intensity					108.33	<0.001**
No	28	15.3	0	.0		
Mild	76	41.5	12	7.5		
Moderate	69	37.7	92	57.5		
Sever	10	5.5	56	35.0		
Pain intensity after 12 hours from laparoscopic surgery					207.44	<0.001**
No	46	25.1	0	.0		
Mild	89	48.7	4	2.5		
Moderate	44	24.0	64	40.0		
Sever	4	2.2	92	57.5		
Pain intensity after 24 hours from laparoscopic surgery					204.49	<0.001**
No	87	47.5	0	.0		
Mild	82	44.8	34	21.3		
Moderate	14	7.7	41	25.6		
Sever	0	.0	85	53.1		

** Highly statistical significant difference level at <0.001

Table (5): Mean score of post operative quality of recovery score among women under the study (n=343).

Variable	Heat pad group N= 183	Control group N=160	Independent t test	P value
	Mean ±SD	Mean ±SD		
Emotional state	32.72±2.78	23.42±3.38	27.55	<0.001**
Physical comfort	49.35±3.81	32.48±2.72	47.51	<0.001**
Psychological support	29.81±2.68	21.22±2.56	30.30	<0.001**
Physical independence	21.09±1.80	16.53±1.74	23.78	<0.001**
Pain	30.71±1.93	24.47±2.57	25.10	<0.001**

** Highly statistical significant difference level at <0.001

IV. Discussion

Gynecological laparoscopic postoperative shoulder pain relieving and enhancing women recovery is an essential goal to be able to perform gynecological laparoscopic surgery as a day case procedure and thus help the women to go home early in a stable condition with no or minimal assistance and reduce the hospital stay. In the present study, no significant differences were found among the heat pads early mobilization and the control groups in terms of age, educational level, residence, occupation, body weight, height, and body mass index.

These findings are in the same line with *Abdelazim et al. (2013)*⁽²¹⁾ who conducted a study to detect the effect of intra-peritoneal instillation of local anesthesia with or without NSAIDs on pain relief after gynecological laparoscopy, they pointed out that, there was no significant difference between the study and the control group regarding their age, weight, height, and body mass index. In addition, the present study revealed that the women were matched regarding basal characteristics of the laparoscopic surgery including duration and purpose.

These findings were agreed with *Rafaie and Khatab (2005)*⁽²²⁾ who conducted a study to evaluate the effect of preincisional infiltration and intraperitoneal instillation of bupivacaine on early relief of pain after diagnostic laparoscopy, they found that, there was no significant difference was found between the study and the control groups regarding the time, and the purpose of laparoscopic surgery.

Laparoscopic surgical procedures belong to those with the highest incidence of moderate to severe pain for 24 hours postoperatively⁽²³⁾. However, there are different strategies were advocated to drain CO₂ after gynecological laparoscopic surgery, several literatures of review pointed out that, the shoulder pain is remained for a period of a few days^(24,25). The present study is the first study in Egypt conducted to evaluate the effect of postoperative non pharmacological strategies as heat pads and encouraged early mobilization to reduce shoulder pain and improve recovery.

In the present study, the score of shoulder pain was evaluated at time intervals; basae line pain chacteritics was evaluated at the immediate 4 hours after surgery ,6, 12, and 24hours, it was presented that, there were reduced among heat pads and early mobilization group. These findings support the study hypothesis; that application of heat pads and early mobilization relieve shoulder pain. In addition these study findings are in accordance with *Arslan & Celebioğlu,(2004)*⁽²⁶⁾ who pointed out that hot treatment moves the reflex arcs that inhibit the pain by means of heat receptors and reduces pain by vasodilatation effect. It is cheap and easy to use and it has a minimum amount of side effects when used regularly.

This may be due to the physiological effects of heat application to increase blood flow and metabolism, and increased elasticity of connective tissue⁽²⁷⁾. Neural transduction of heat is mediated by Transient Receptor Potential Vanilloid 1 (TRPV1) receptors, which are ion channels activated by noxious heat. The TRPV1 receptors are present in primary afferent neurons, the spinal cord, and throughout the brain. Activation of TRPV1 receptors within the brain may modulate antinociceptive descending pathways⁽²⁸⁾.

It is well known that, postoperative laparoscopic shoulder pain affects the woman's recovery⁽²⁹⁾. This may be due to that, the shoulder pain had interfered with woman's performance after laparoscopy. The present study demonstrated that, postoperative recovery was enhanced among the heat pads and early mobilization group; the quality of recovery score was higher among the heat pads group as compared with the control group.

These findings are in agreement with *Kibler et al. (2012)*⁽³⁰⁾, who carried out a study to evaluate the effect of a quality improvement project to increases postoperative ambulation and decreases patient complications .Their own reports and observations indicated that early, and frequent postoperative ambulation improves both patient and provider satisfaction and has decreased postsurgical paralytic ileus, improved patient progress, and facilitated appropriate patient discharges.

Conclusion

Based on the current study findings, it can be concluded that, the application of heat pads and early mobilization is an effective non-pharmacological interventions for reducing postoperative shoulder pain and improving recovery among women undergoing gynecological laparoscopic surgery.

Recommendations:

The application of heat pads and early mobilization is an effective non-pharmacological intervention for relieving shoulder pain and improving postoperative recovery, which need to be evaluated in further research study.

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