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Effects of Postoperative Care Program on Leg Pain and Functional Performance after Lumbar Spine Surgery

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Abstract

Main objective: To investigate the effects of postoperative care program on leg pain and functional performance after lumbar spine surgery at Nakhon Phanom Hospital.

Method: This was experimental research used a pretest-posttest for the 2 groups, which was done before and after to determine the effects of postoperative care program on leg pain and functional performance after lumbar spine surgery. This study performed on 40 patients who received lumbar spine surgery. Data was collected using the numerical rating scale and the postoperative functional performance questionnaire.

Results: The findings showed that the experimental group who received postoperative care will have reduced leg pain and better postoperative functional performance improvement than the control group ($p<0.005$ and $p<0.001$, respectively).

Conclusion and recommendation: Postoperative care program in combine with medical treatment reduced leg pain and yielded beneficial effects on some aspects of postoperative functional performance among lumbar spine surgery.

Keywords: *Postoperative care program, Leg pain, Postoperative functional performance, Lumbar spine surgery.*

Introduction

Lumbar spinal surgery is a treatment for spinal diseases patients experiencing back pain and acute leg pain from lumbar herniated nucleus pulposus [1,2] resultant of surgery for removal of the rear of the spine. The spinal cord is opened to reduce compression on the spinal cord [1]. Consequently, patients suffer from surgical pain post-surgery. Postoperative symptoms are caused by nerve injury resulting in acute back pain running to one leg or both. [3,4,5,6] Moreover, statistics have shown that spinal surgery in the United States in 2006 was 169 cases per 100,000 population. Then, this figure increased in 2011 to 252 cases per 100,000 population. [7] At Nakhon Phanom Hospital, many patients with lumbar herniated nucleus pulposus have been admitted for treatment. Some patients have been successfully cured by surgical treatment resulting in a continual increase in the number of lumbar spinal surgeries. [8]

The impact of leg pain post-surgery can render difficulties in terms of carrying out activities during the postoperative period. These patients present limited self-care, both in terms of movement and routine activities - more so than other postoperative patients. Such symptoms can affect the patient directly in regards to their body, mind and quality of life. [2] A study concerning postoperative spinal surgery patients revealed that leg pain from sciatica and the limitation in the ability to bear pain were correlated. The limitation in the ability to bear pain can be used to predict physical health status as well as sciatica. [9] The related symptoms affect not only the body and the psychosocial, but also the economy. Healing prior to and post-surgery are rather time consuming. Consequently, this affects the cost of ongoing

treatment: these costs have continually increased. [4]

Thus, the researchers have concerned with the importance of relieving leg pain post lumbar spinal surgery through a therapy program employing post-surgery self-care comprising of postoperative self-care teaching, promotion of daily practice and exercise. Thus, postoperative self-care program is a convenient and safe method for application. Indeed, patients and their relatives could perform these methods at home. The study's findings could be nurses play a significant role amid health prevention and promotion which is of importance to patients. Consequently, postoperative activities have led to the development of guidelines for the recovery of patients.

Aim of the study

The aim of this study was to compare the effects of postoperative care program on leg pain and functional performance between the patients in the experimental and control group.

Hypothesis

-Hypothesis was after receiving the intervention program that the experimental group will have reduced leg pain compared with those in the control group.

-Hypothesis was after receiving the intervention program that the experimental group will have better postoperative functional performance improvement than those in the control group.

Significance of the study

As mentioned above, it can be seen that leg pain - both preoperative and postoperative continuously render the effect of suffering on the health, physical, mental, economic, and social condition, and consequently, quality of life among patients. This was probably due to the program activities providing a myriad of knowledge regarding spinal surgery, postoperative symptoms, postoperative self-care, avoidance activities, and proper posture. What's more, the demonstration of exercises for the back and leg muscle enabled patients to follow appropriately, which presented the ability to further increase flexibility in the leg muscles. This also projects itself for the enhanced performing of other activities. [9]

Materials and methods

Participants

Patients exhibited both types of surgery, that is to say, who had undergone lumbar spine surgery with internal fixation using plates and screws and with general anesthesia at the orthopedic ward, Nakhon Phanom Hospital. The sample characteristics were as follows: aged 20 years and above, had experienced one occasion of spinal surgery, had not been diagnosed as a cancer patient, had a good sense of consciousness, and able to communicate and understand Thai. Those with spinal injuries were not considered for inclusion. Subjects consented to participate in the research and made themselves available for follow-up visits. The criteria for subjects to cease participation during the trial period would be in the case of severe complications such as repeat surgery, complications concerning diseases, for instance, heart disease, abnormal sensations, varicose veins in the legs or calves, burning sensation in the legs after surgery, numbness and weakness in the legs and unable to participate in the research at all.

Calculation of sample size in this study was calculated as follows: we did not know the figures relating to the population group, therefore, the calculation of the sample employed G * power 3.1.9.2, computer program to determine power of test at .80 le, and significance level was determined at .05 (α = .05). The literature review revealed no effect of population size in the studied variables. Consequently, the influence size of the effect size was determined using the middle effect of small effect dimension and medium effect dimension (d = 0.35). [10] The initial sample number was 52 persons selected via purposive sampling and random sampling by drawing lots. Accordingly, 52 patients qualified for the sample of which 12 were removed due to repeat surgery. Therefore, 40 subjects were included and divided equally into two groups: experimental and control group. The data were collected from November 2016 to January 2018.

The research instruments

The research instrument consisted of 2 parts.

Part 1: Instruments employed to collect data:

1.1 General records of personal data and illness information including age, sex, education level, occupation, family income, underlying disease(s), medical history, surgical experiences, postoperative diagnosis, types of surgery, duration of surgery, size of surgical wound, and receiving of pain relief.

1.2 An evaluation form for leg pain post-surgery was applied from the symptom evaluation form of Numerical rating scale (NRS). As a consequence, patients were evaluated for leg-pain symptom frequency. Accordingly, scores ranged from 0-10 points as follows: 0 points: not pain and 10 points: the most pain. The researchers allowed the samples to respond to the frequency of the symptoms by dividing scores from 0 to 10. A lower score indicated that leg pain was mild in nature.

1.3 An evaluation from in relation to Postoperative Functional Performance of Lumbar spinal surgery was developed from a guideline for surgical patients with spinal surgery, care of the Neurological institute,[11] and from the theory of Unpleasant Symptoms by Lenz et al. [12] Questions were 26 items including, daily activities: 10 items (ADL), 6 items relating to social activities and other interactions, and rehabilitation activity practice to promote recovery after spinal surgery patients (10 items). Responses were obtained via 5-level answering system as follows: 0 points was interpreted as the patient being unable to practice, 1 point was interpreted as the patient was able to practice yet he/she did not practice, 2 points was interpreted as that the patient was able to practice sometimes, 3 points was interpreted as that the patient practiced almost every prescribed time, and lastly, 4 points was interpreted as that the patient was able to practice every prescribed time. Rankings were criterion based. Interpreting class calculation was reached by the maximal mean score minus the minimal mean score; then it was divided by the number of ranges. [13] Thus, mean score range was 0-4A high score meant a high level of postoperative activity practice. A low score determined a low level of postoperative activity practice.

Part 2: Study instruments employed for experimentation:

2.1 Regarding postoperative care program for lumbar spinal surgery patients, the program was set for 4 practice occasions. The first occasion was started on the third day post-surgery. The program began with surveying the list of lumbar spinal surgery participants at the orthopedic ward, then, the researchers took 30 minutes to select the patients according to individualized qualities. Following that, the researchers greeted participants, introduced themselves, informed participants of the research objectives, and clarified the subjects' rights in regards to the study. The sample signed the consent forms and lastly, general data were collected from history records and patient response.

The second step was run on the fifth day post-surgery during the first week. The researchers made an appointment date and time to visit patients' homes individually in order to create closer relationships with patients and their relatives. Additionally, assessment of patient readiness was conducted by utilizing a postoperative self-care handout relating to the postoperative care program. Then, the researchers provided knowledge on postoperative self-care, including: self-care at home, avoidance activities and proper posture. Moreover, a demonstration on exercising the back and leg muscles was performed, with patients encouraged to follow the demonstration. Consequently, the patients were praised for their participation. After that, evaluation was conducted via the post-surgery leg pain evaluation form. Post -surgery activity practice was also evaluated.

The next occasion for experimentation fell on days 6-11 post- surgery with patients recommended to administer back and leg muscle exercises. The patients practiced on their own accordingly by administering back and leg muscle exercises together as prescribed on each day. The researchers called the patients as a follow-up in relation to the aforementioned practice methods, and recorded the data together. Additionally, the patients were asked about any problems faced during practice. Words of encouragement and praise were given to the patients once they were able to practice each method correctly. Also, finding solutions together would take place if there was a problem. This process took about 20 minutes. Then, on the fourth occasion after surgery on day 12, the researchers performed home visits again. Subsequently, for an hour, patients completed two forms: The Post-Surgery Leg

Pain evaluation form and the Postoperative Functional Performance of Lumbar Spinal Surgery evaluation form

2.1.1 Handouts with illustrations and lectures for the experimental group contained knowledge regarding spinal surgery, postoperative symptoms, postoperative self-care, and treatment of various symptoms. Review of relevant textbooks and research papers.

2.1.2 Postoperative care form recorded consecutively for seven days.

Quality inspection of instruments

1. The instrument reliability process was conducted as per the following. The instruments used to collect data included the Post-Surgery Leg Pain evaluation form and the Postoperative Functional Performance of Lumbar Spinal Surgery evaluation from. The instruments applied in this study also incorporated the postoperative care program for persons undergoing lumbar spinal surgery as mentioned. The program's reliability of content was inspected by five experts, namely, one orthopedic physician, two orthopedic nurse lecturers, one traditional Thai physician and one orthopedic nurse. The content validity index (CVI) of Numerical rating scale was 1, and the Postoperative Functional Performance of Lumbar spinal surgery evaluation form was .91, with the postoperative care program at .9.

2. The instrument reliability process was conducted as follows: postoperative care program for lumbar spinal surgery patients, Post-Operative Leg Pain evaluation form, and evaluation of post-operative activity practice for lumbar spinal surgery patients. Once content had been checked for reliability, the researcher considered suggestions to improve instrument reliability. The process was then trialed with 10 lumbar spinal surgery patients demonstrating similar characteristics to the sample. [14] The Post-Surgery Leg Pain evaluation form was tested for reliability utilizing Test-Retested Reliability. In addition, the form evaluated cognitive symptoms twice, comprising of an interval duration of 4 hours. Correlation coefficient was .99. The Postoperative Functional Performance of Lumbar Spinal Surgery evaluation form was evaluated for calculation via Cronbach's Coefficient Alpha. Coefficient of Internal consistency was .76.

Protection of the Rights of Human Subjects

Approval by an ethics committee from Nakhon Phanom Hospital (IEC-NKP_1-No. 55/2559).

Data collection

1. The researchers surveyed a list of patients who had undergone spinal surgery at the orthopedic ward of Nakon Phanom Hospital. The sample was selected based on determined characteristics via the simple random method. Those who had previously had surgery for lumbar spinal surgery were involved every day Monday – Friday and were randomized by drawing lots. Patients drawing the number 1 were grouped into the experimental group, and those drawing the number 2 made up the control group. Then, the researchers met the sample to first, introduce themselves, and second, inform subjects of the research objectives.

2. The researchers clarified the process of research conduction. Following that, the sample were invited to join the research. On accepting invitation to participate, subjects were requested to sign a participation consent form.

3. The researchers collected the necessary data from patients' medical histories as well as patient-response. Appointments were then made for home visiting on the fifth day after surgery. The experiment was conducted as per the following. For the experimental group, the sample was requested to perform the postoperative care program. As for the control group, the initial home visit took place on the fifth day post-surgery, taking around 30 minutes. Afterwards, the patients filled in the Post-Surgery Leg Pain evaluation form as well as the Postoperative Functional Performance of Lumbar spinal surgery evaluation form. Patients in the control group were routinely treated, i.e. normally without nursing and family therapy. Next, the researchers appointed subjects to return home for another 7 days and complete the Post-Surgery Leg Pain evaluation form in addition to the Postoperative Functional Performance of Lumbar Spinal Surgery evaluation form. The trial was then ended.

Results and discussion

1. Participant Characteristics

Characteristics of personal information, illness information, and sample treatment. Personal characteristic information concerning the sample was described as follows. The majority of the sample in the experimental group were male (60%) and the control group was split evenly between males and females: 50% and 50%, respectively. The age ranges of the experimental and control groups were (Mdn = 50.0) and (Mdn = 56.0), respectively. The majority education level of both groups was primary level: 95% in the experimental group and 75% in the control group. Duration of current episode in the experimental group and control groups were (Mdn = 13.0) and (Mdn = 12.0), respectively.

With regards to information on illness and treatment of the sample; the experimental and control groups were for the most part diagnosed with spinal stenosis L4-5: 70%, and 60%, respectively. Both groups had been operated on via decompressive laminectomy incorporating posterolateral lumbar fusion with pedicular screw: 75% and 60%, respectively. Duration of surgery was Mdn = 125.0 in the experimental group, and Mdn = 130.0 in the control group. Surgical wound size was Mdn = 14.5 in the experimental group and Mdn = 14.0 in the control group. In terms of the results concerning personal information and characteristic information on illness and treatment in both groups, it was concluded that both groups were not significantly different.

2. Comparison of postoperative care program for postoperative leg pain in both groups from the Numerical rating scale showed that both groups were significantly higher ($p < 0.001$) in regards to leg pain scores on the fifth- and eleventh-days post-surgery, as demonstrated in Table 1.

3. Comparison of postoperative care program postoperative functional performance between groups revealed that postoperative functional performance in both groups were significantly higher ($p < 0.005$) after taking a postoperative care program on days five and eleven post-surgery. as shown in Table 2.

Discussion

The study of the postoperative care program with leg pain for lumbar spinal surgery patients after postoperative care program on the fifth and eleventh days found that leg pain score was lower in the experimental group than control group ($p< .001$). It was indicated that exercise was a promotion and rehabilitation to relieve leg pain. It could increase the strength of the involved muscles turn to strength. Thus, it could support for doing activities better and adding more movements. Also, it could reduce the disability that may occur. [15] Moreover, a previous studied with a program of physical activity in daily living at the home of the elderly found that during in the experimental period of 8 weeks, the experimental group had behavioral habits of daily activities and physical fitness, including the strength of the hands and legs muscles, degrees of motion of joints were higher than the compared group. There was a statistically significant difference at $p <0.001$. [16]

The study results of the postoperative care program with postoperative lumbar spinal surgery effectively demonstrated postoperative functional performance after postoperative care program on the fifth and eleventh days - meaning that the experimental group performed better than the control group ($p < 0.005$). This was probably due to the program activities providing a myriad of knowledge regarding spinal surgery, postoperative symptoms, postoperative self-care, avoidance activities, and proper posture. What's more, the demonstration of exercises for the back and leg muscle enabled patients to follow appropriately, which presented the ability to further increase flexibility in the leg muscles. This also projects itself for the enhanced performing of other activities. [17] The duration of nerve injury in the spinal column was also decreased. [18] Suffering caused by various symptoms decreased and hence, comfort increased. As a result of this study, patients could perform postoperative functional performance in their entirety, and thus reduce their dependence on others. [9] Besides that, a study by Rungsawang et al. [19] focused on the health condition of patients with chronic lower-

back pain prior to and post-spinal surgery for 6 weeks in 69 persons. Accordingly, it was discovered that lower-back pain and postoperative limitations affected daily living practices, religious practices, and participation in various social activities.

This study is consistent with the Theory of Unpleasant Symptoms by Lenz et al. [12] The situation factor is that the postoperative care program can be used to promote daily activities and postoperative functional performance whereby incorporating excellent benefits among patients who have previously undergone lumbar spinal surgery.

Table 1. Postoperative leg pain by mann whitney U test

Variable	**Experimental group (n = 20)**	**Control group (n = 20)**	***P*- value**
Mdn (IQR)			
***leg pain**			
Day 5	4 (3.25 to 5)	5 (2.25 to 6)	
Day 11	1 (0 to 1.75)	3 (2 to 3)	
Scale difference Day 5 and Day 11	-3 (-3.25 to -3)	-2 (-0.25 to -3)	<0.001

***** Numerical rating scale, ranges from 0 to 10.

Table 2. Postoperative functional performance by mann whitney U test

Variable	**Experimental group (n = 20)**	**Control group (n = 20)**	***P*- value**
Mdn (IQR)			
***** Functional Performance			
Day 5	62 (53.5 to 75.24)	55 (45.50 to 70.50)	
Day11	90.5 (80.5 to 96.0)	77.5 (60.25 to 87.25)	
Scale difference Day 5 and Day 11	28.5 (27 to 20.76)	22.5 (14.75 to 16.75)	0.005

* Postoperative Functional Performance, ranges from 0 to 104.

Recommendations and use of research results

1. This research can be applied to develop other therapies
2. The results of this research can be used as examples of research amid teaching and innovative nursing.
3. This research may be further developed for other studies of disease, such as for back pain and leg pain, in elderly osteoarthritis patients or among those suffering with work-related pain.

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