

OUTCOME ANALYSIS OF POSTOPERATIVE DECOMPRESSION AND STABILIZATION PATIENTS WITH DEGENERATIVE THORACO-LUMBAR VERTEBRAL FRACTURE

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ARTICLE INFO

Keywords:

Thoraco-Lumbar
Degenerative Fracture, Pain,
VAS

ABSTRACT

Degenerative thoraco-lumbar fractures are structural and functional changes that occur in the thoracic and lumbar vertebrae regions. The degenerative process that occurs as a result of the aging process in each individual is different, as well as in the spinal region. The type of data used in this study is secondary data obtained through medical records conducted by researchers at the Semen Padang Hospital Medical Record Unit, the data includes variables of age, gender, occupation, smoking status, BMI, level of thoraco-lumbar fracture, mean VAS postoperative decompression and stabilization at Semen Padang Hospital. The research was conducted in December 2021 until completion which includes the preparation and reporting stages. This research is a form of analytical study with a cross sectional design. The affordable population was postoperative decompression and stabilization surgery patients in 2019 as many as 30 patients with a total sampling technique. Univariate data analysis is presented in the form of frequency distribution and percentage and data processing using computerized SPSS version 24.0 program. And the results of this study explain that based on the characteristics of the patient's risk factors, the most age is the early elderly 46-55 years, namely 10 people (33.3%), the most gender is female, namely 16 people (53.3%), occupation, which most people are not lifting weights, namely 22 people (73.3%), smoking status is not smoking, namely 24 people (80.0%) and the highest BMI is normal (≥ 18.5 - < 24.9) which is 19 people (63.3%). The highest number of damage levels were 1 and 2 damage levels, respectively, which were 14 people (46.7%). The most pain based on VAS was mild pain, namely 12 people (40.0%). There was a significant effect of the number of levels of damage on the pain scale in postoperative decompression and stabilization patients at Semen Padang Hospital ($p = 0.021$), and there was a significant effect of the number of levels of damage on the level of post operative decompression and stabilization pain in degenerative thoraco-lumbar fracture patients in Semen Padang Hospital.

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1. INTRODUCTION

Thoraco-lumbar degeneration is a structural and functional change that occurs in the thoracic and lumbar regions. The degenerative process that occurs as a result of the aging process in each individual is different, as is the case in the spinal region. The process of degeneration of the spine can occur in the bones and joints or intervertebral discs is called degeneration disease and degeneration that affects the facet joints is called facet joint degeneration (Osteoarthritis facet joint). Thoraco-lumbar degenerative

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disease can be caused by decreased mechanical function and chemical components that can be caused by the aging process, trauma, type of work, smoking or due to hormonal influences (Widodo, 2003).

Thoraco-lumbar degenerative fractures occur due to decreased mechanical and chemical components in bones and joints. This is caused by the aging process and is exacerbated by environmental factors such as trauma, high impact activities, type of work and smoking. The degenerative process in the spine begins with disc degeneration, followed by bone degeneration. This disc degeneration results in segmental instability which will increase the load on the facet joints and cause damage to the joint cartilage. Aging is the main cause of degenerative disease, risk factors for degenerative diseases include advanced age, socioeconomic status, torsional stress, smoking, obesity, lifting weights, weight, vibration, trauma, immobilization, psychosocial factors, gender, height, genetic factors, occupational factors such as machine drivers, carpenters and office workers (Buser et al., 2018).

The incidence of degeneration was highest in the age group 60 to 64 years, followed by the age group 55 to 59 years and the youngest age group 30 to 34 years. Asian Spine Journal (2013) reported as many as 163 patients diagnosed with degenerative disorders of which 95 patients (58.3%) were male and 68 patients (41.7%) were female. Patients were aged between 20 and 70 years and most were in the fourth decade of life, all patients with this degenerative disorder had a history of low back pain with 90 (55.2%) patients having continuous type of pain while 73 (44.8%) had intermittent pain type.

Pain according to the International Association for the Study of Pain (IASP) is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of that damage. Pain is a protective mechanism or can be interpreted as protection to raise awareness of the occurrence of tissue damage. Pain is the most common reason that individuals seek health care, because pain is very disturbing and complicates individual activities. The study was conducted on 5130 postoperative and trauma patients, as many as 22.5% of patients experienced postoperative pain, 10-40% of patients who underwent malignant surgical intervention in cartilage, back pain did not completely disappear or recur, and this was included in the category of failure. operation. Spinal surgery causes damage to the paraspinal muscles (Saleem et al., 2013).

Axial compression forces at adjacent levels increased after stimulated muscle damage, with the greatest changes being at the rostral level (78% increase in the presence of spinal fusion; 73% increase without spinal fusion) compared with the caudal level (41% in the presence of spinal fusion and 32% without fusion). Lumbar spinal stenosis is one of the most common problems, which is a degenerative disease of the spine in the elderly population. The prevalence is 5 in 1000 people over the age of 50 in America. Men have a higher incidence than women, mostly involving L4-L5 and L3-L4. For patients over 50 years of age, disc herniation usually occurs at levels above L4-L5.

Examination of pain assessment using Uni-dimensional and Multi-dimensional methods where the Uni-dimensional pain assessment examination is divided into Visual Analog Scale (VAS), Verbal Rating Scale (VRS), Numeric Rating Scale (NRS), and Wong Baker Pain Rating Scale, while Multi-dimensional is divided into McGill Pain Questionnaire (MPQ), The Brief Pain Inventory (BPI), and Memorial Pain Assessment Card. The Visual Analog Scale (VAS) is the most widely used way to assess pain. This linear scale visually describes the level of pain that a patient may experience. The range of pain is represented as a line 10 cm long, with or without markings per centimeter. The marks at either end of this line can be numbers or descriptive statements. One end represents no pain, while the other end represents the worst possible pain. The scale can be made vertically or horizontally. The VAS can also be adapted to a scale of pain relief or relief. Used in pediatric patients > 8 years and adults. The main benefit of VAS is that its use is very easy and simple (Goldberg, 2011).

The advantages of using VAS include VAS is the most sensitive, inexpensive and easy to make method of measuring pain intensity. The VAS has a good correlation with other measurement scales and can be applied to all patients and the VAS can be used to measure all types of pain. So based on the background description above, the researcher is interested in conducting research on the outcome analysis of degenerative thoraco-lumbar fracture patients through the Visual Analog Scale (VAS) of postoperative decompression and stabilization patients through the degree of pain using the Visual Analog Scale (VAS) with the factors that influence it on postoperative decompression and stabilization

patients at Semen Padang Hospital (Sari, 2017).

2. METHOD

The scope of this research is research that covers the field of Neurosurgery and Spine by analyzing the outcome of postoperative decompression and stabilization patients at Semen Padang Hospital in 2019. The type of research used in this study was correlative analytic with a cross sectional design, namely to determine pain analysis. perceived by the patient as measured using the VAS scale. Data collection was taken from medical records of patients who underwent decompression and stabilization surgery at Semen Padang Hospital in 2019. Meanwhile, the type of data used in this study was secondary data including variables of age, gender, occupation, smoking status, BMI, level of damage, average VAS. There are several activities carried out in data processing for analytical research including editing, coding, processing and after all the data has passed the coding, the next step is to enter the data into the SPSS application, to process the computerized data entry with the help of a data processing program using SPSS (Sulyanto, 2017).

3. RESULTS AND DISCUSSION

Characteristics of the patient's risk factors

The results showed that the frequency distribution of the patient's risk factor characteristics can be described as follows:

Table 1. Frequency distribution of postoperative decompression and stabilization patients based on the characteristics of the patient's risk factors at Semen Padang Hospital

Characteristics	<i>f</i>	%
Age		
- Late adults	10	33,3
- Early elderly	10	33,3
- Late seniors	5	16,7
- Seniors	5	16,7
Gender		
- Male	14	46,7
- Female	16	53,3
Occupation		
- Don't lift heavy weights	22	73,3
- Lifting heavy weights	8	26,7
Smoking Status		
- Do not smoke	24	80,0
- Mild smoker (\leq 200 cigarettes)	6	20,0
- Moderate smoker (200-600 cigarettes)	0	0
- Severe smoker (\geq 600 cigarettes)	0	0
BMI		
- Skinny ($<$ 18.5)	0	0
- Normal (\geq 18.5- $<$ 24.9)	19	63,3
- Overweight (\geq 25.0- $<$ 27)	3	10,0

- Obesity (≥ 27 ,) 8 26,7

Amount	30	100
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Based on the explanation of the table above, we can find that the patient characteristics, from 30 patients after decompression and stabilization surgery at Semen Padang Hospital, the most age were late adulthood and early elderly age 46-55 years, namely 10 people (33.3%). Based on gender, the majority were women, namely 16 people (53.3%). Based on occupation, the majority were not lifting heavy weights, namely 22 people (73.3%). Based on smoking status, the majority were non-smokers, namely 24 people (80.0%). Based on BMI, the majority were normal (≥ 18.5 - < 24.9), namely 19 people (63.3%).

Number of Fracture Levels

The results of the study obtained that the frequency distribution of the number of levels of damage can be described as follows:

Table 2. Frequency distribution of postoperative decompression and stabilization patients based on the number of fracture levels at Semen Padang Hospital

Number of Fracture Levels	<i>f</i>	%
1 Level	14	46,7
2 Level	14	46,7
3 Level	2	6.6
Amount	30	100

Based on the table above, data shows that from 30 postoperative decompression and stabilization patients at Semen Padang Hospital, the highest number of fracture damage levels is 1 level and 2 levels of fracture, namely 14 people (46.7%).

Pain by Visual Analog Scale (VAS)

The results showed that the frequency distribution of pain based on the patient's VAS can be described as follows:

Table 3. Frequency distribution of postoperative decompression and stabilization patients based on pain by Visual Analog Scale (VAS) at Semen Padang Hospital

Painful	<i>f</i>	%
Mild (1-3)	12	40,0
Moderate (4-6)	8	26,7
Severe (7-10)	10	33,3
Amount	30	100

Based on the table above, data shows that from 30 postoperative decompression and stabilization patients at Semen Padang Hospital, who experienced pain based on the VAS the most was mild pain, namely 12 people (40.0%)

VAS Outcome Analysis with The Number of Fracture Levels

The results showed that the frequency distribution of the VAS outcome analysis with the number of fracture levels can be described as follows:

Table 4. VAS analysis with the number of fracture levels of postoperative decompression and stabilization patients at Semen Padang Hospital

Number of Fracture Levels	Pain Based on VAS						Total		p Value
	Mild		Moderate		Severe		f	%	
	f	%	f	%	f	%			
1 Level	10	71,4	1	7,1	3	21,4	14	100	0,021
2 Level	2	14,3	6	42,9	6	42,9	14	100	
3 Level	0	0	2	100	0	0	2	100	
Amount	12	40,0	9	30,0	9	30,0	30	100	

Based on the table above, data shows that the proportion of patients who experience mild pain is more in patients who experience a number of fracture levels at 1 level, namely 10 people (71.4%) compared to the number of other levels of fracture. Patients who experience moderate pain are more common in patients with a number of fracture levels at 2 levels, namely 6 people (42.9%) compared to the number of other levels of fracture. Patients who experience severe pain are more common in patients with the number of levels of fracture at 2 levels, namely 6 people (42.9%) compared to the number of other levels of fracture. The results of statistical tests using *Chi-square* obtained p value = 0.021 ($p < 0.05$), so it can be concluded that there is an effect of the number of fracture levels on the outcome of pain scales in postoperative decompression and stabilization patients at Semen Padang Hospital.

Based on the results of the study, it was found that from 30 postoperative decompression and stabilization patients at Semen Padang Hospital, the highest number of fracture levels was 1 level and 2 fracture levels, namely 14 people (46.7%). Degenerative fractures are the most common late stage in the process of thoraco-lumbar degeneration, although arthritis of the facet joints can also precipitate a pathological state of the disc. Disc degeneration is most common at L4-L5, and L5-S1. However, men have a higher incidence than women, mostly involving L4-L5 and L3-L4. For patients over 50 years of age, disc herniation usually occurs at levels above L4-L5. Minimally Invasive Surgery for Lumbar Disc Herniation at Sanglah Hospital, showed that multilevel herniation occurred in 66.67% of cases, with L4/L5 level involvement found in all cases, about 50% at L5/S1 levels and L2/L3, L3/levels. L4 each as much as 16.67%.

The symptoms experienced by each patient differ depending on the pattern and distribution of stenosis. Symptoms may relate to one nerve root at one level. For example, the L5 nerve root at the L4-L5 level, or several nerve roots at several levels, is often of unclear type and the symptoms sometimes do not match the affected nerve root. The area between the lumbar vertebral bodies and the sacral vertebral bodies is a transition zone with a high risk of injury due to the biomechanical changes that occur between these areas. Separating each vertebral body from the spine is a cushion of fibrocartilage-based structures that provide support, flexibility, and sharing of small loads known as intervertebral discs. It mainly consists of two layers, the pulpy nucleus pulposus which is soft on the inside of the disc and the surrounding hard structure known as the annulus fibrosus (Herrera, 2018).

Injury to the normal architecture of the annulus fibrosus disc can cause degeneration or protrusion of the nucleus in the pulposus, possibly placing pressure on the spinal cord or nerve roots resulting in pain and weakness. More than 90% of herniated discs occur in the L4-L5 or L5-S1 disc spaces. If the disc injury progresses to the point of neurological impairment or limitations in activities of daily living, then surgical intervention may be required to decompress and stabilize the affected segment. In the

absence of motor deficits, nonoperative analgesia, activity modification and injections should be attempted over several months.

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. On the other hand, pain is also the most common reason that individuals seek health care, because pain is very disturbing and makes activities difficult. Pain is a protective mechanism to raise awareness of the fact that tissue damage is or will occur. Because of their value for survival, nociceptors (pain receptors) do not adapt to repeated or prolonged stimulation. Stored experiences that cause pain in memory help us avoid potentially harmful events in the future (Putu Indah et al., 2017).

In the study, it was seen that patients felt more mild pain. This shows that the patient's pain after surgery is still felt. In line with research conducted by Prabandari (2017) that post-elective surgery patients experienced more mild pain NRS 1-3 (57.8%), moderate pain NRS 4-6 (26.9%), and severe pain NRS 7-10 (2.7%). The occurrence of pain is caused by a person's perception and behavior of pain, namely (1) gender; (2) age; (3) race; (4) socio-cultural. The results of the ASA study said that postoperative pain is more felt in elderly patients because this age group is more sensitive to feeling pain and is more willing to report pain compared to younger ages. A study in Croatia stated that postoperative pain intensity was reported more by women because it was more sensitive to pain and had a low tolerance for pain.

Predictors of postoperative pain are influenced by several factors, namely (1) preoperative pain; (2) anxiety; (3) type of operation. Pain is subjective, so pain assessment is challenging, but essential for successful pain management. Although each individual experiences pain differently and responses to pain may vary, a pain assessment should still be performed for all patients. Pain has been designated as the fifth vital sign, therefore pain must be assessed periodically so that response to treatment and side effects can be detected (Suyasa et al., 2019).

This pain occurs because the pain received by nociceptors on the skin can be of high or low intensity such as stretching and temperature as well as by tissue lesions. Necrotic cells will release K⁺ and intracellular proteins. Increased levels of extracellular K⁺ will cause depolarization of nociceptors, while protein in some circumstances will infiltrate microorganisms, causing inflammation or inflammation. As a result, pain mediators are released such as leukotrienes, prostaglandin E₂, and histamine which will stimulate nociceptors so that noxious and harmless stimuli can cause pain (hyperalgesia or allodynia).

The Visual Analog Scale (VAS) is the most widely used way to assess pain. This linear scale visually describes the level of pain that a patient may experience. The range of pain is represented as a line 10 cm long, with or without markings per centimeter. The marks at either end of this line can be numbers or descriptive statements. In addition, the lesion also activates blood clotting factors so that bradykinin and serotonin will be stimulated and stimulate nociceptors. If blood vessel occlusion occurs, ischemia will occur which will cause the accumulation of extracellular K⁺ and H⁺ which in turn activates nociceptors. Histamine, bradykinin, and prostaglandin E₂ have a vasodilator effect and increase vascular permeability. This causes local edema, increased tissue pressure and stimulation of nociceptors (I Kadek et al., 2017).

When nociceptors are stimulated, they release substance peptide (SP) and calcitonin gene-associated peptide (CGRP), which stimulate the inflammatory process and also produce vasodilation and increase vascular permeability. Vasoconstriction (by serotonin), followed by vasodilation, may also be responsible for migraine attacks. Stimulation of these nociceptors causes pain. The results showed that the proportion of patients who experienced mild pain was more in patients who experienced the number of levels of damage at level 1, namely 10 people (71.4%) compared to the number of other levels of damage.

Patients who experience moderate pain are more common in patients with the number of levels of fracture at level 2, namely 6 people (42.9%) compared to the number of other levels of fracture. Patients who experience severe pain are more common in patients with the number of levels of fracture at level 2, namely 6 people (42.9%) compared to the number of other levels of fracture. The results of

statistical tests using *Chi square* obtained p value = 0.021 ($p < 0.05$), so it can be concluded that there is an effect of the number of levels of fracture on the pain scale in postoperative decompression and stabilization patients at Semen Padang Hospital.

4. CONCLUSION

Based on the results of research on outcome analysis based on the Visual Analog Scale (VAS) of patients postoperative decompression and stabilization at Semen Padang Hospital, it can be concluded that, based on the characteristics of the patient's risk factors, the highest age is the early elderly 46-55 years, namely 10 people (33,3%), the most gender are women, namely 16 people (53.3%), the most occupation is not lifting heavy weights, namely 22 people (73.3%), smoking status is mostly non-smoker, namely 24 people (80.0%) and the highest BMI was normal (≥ 18.5 - < 24.9), namely 19 people (63.3%). Then the highest number of fracture levels is 1 level and 2 levels of fracture are 14 people (46.7%). The most pain based on VAS was mild pain, namely 12 people (40.0%). Furthermore, there was a significant effect of the number of fracture levels on the pain scale in postoperative decompression and stabilization patients at Semen Padang Hospital (p value = 0.021).

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