

## **Clinical Outreach of Functional Metastase Spine Disease Before and After the Measurement of Posterior Bone Instrumentation in Haji Adam Malik Hospital, Medan**

**Fadli Yogi Arif<sup>1\*</sup>, Otman Siregar<sup>2</sup>, Husnul Fuad Albar<sup>2</sup>**

**Orthopedics and Traumatology Department University of North Sumatra -RSUP Haji Adam Malik, Medan, Indonesia**

**<sup>1</sup>Orthopedic and Traumatology Resident, University of North Sumatra, Medan, Indonesia**

**<sup>2</sup>Teaching Staff Dept. Orthopedics and Traumatology, University of North Sumatra, Medan, Indonesia**

**Abstract : Objective** -The aim of this study was to determine the comparison of functional clinical outcome of metastase spine disease before and after the action of posterior spinal instrumentation. **Material and Methods**-This Research using Sixty-one (61) subjects of spine disease metastases were divided into 2 groups, with thirty-six (36) subjects not operating and twenty-five (25) subjects operating spinal posterior instrumentation that met the criteria of Spinal Instability Neoplastic Score (SINS) in the period September 2014 to February 2018 included in the inclusion criteria included in this study where twenty-two (22) total subjects were obtained and data was collected by interviewing techniques assessing clinical outcomes based on VAS, ODI and SF-36. **Result**-The distribution of 22 Metastase Spine Disease samples with 12 females (54.5%) and 10 females (45.5%) men, with the youngest age of the 41 years research subjects and the oldest age from the 78-year study subjects with mean and standard deviations amounting to  $51.7 \pm 14.0$  years. There were significant differences in results from clinical outcomes before and after the action of posterior spinal instrumentation with a significance value of 0.001 ( $p < 0.05$ ). **Conclusion**-The functional clinical outcome of metastase spine disease after posterior spinal instrumentation is better than clinical outcome before the action of posterior spinal instrumentation with statistical values ( $P < 0.01$ ), this is in accordance with the initial hypothesis of the study, namely there are differences in functional clinical outcome of spinal metastase patients disease before and after the action of posterior spinal instrumentation.

**Key Words:** *Metastase Spine Disease*; Visual Analog Scale (VAS); Oswestry Disability Index (ODI); SF – 36

## Introduction

*Metastatic Spine Disease (MSD)* is the most common bone metastasis with an incidence of 30% to 70% in cancer patients. Postmortem examination showed that MSD can be found in nearly 70% of terminal cancer patients. MSD is the most common spinal tumor and occurs 20 times more frequently than primary neoplasms in the spine. It is estimated that around 18,000 new cases of spinal metastasis are diagnosed every year in America.<sup>1</sup>

MSD can be found in all age groups; the highest incidence was found at the age of 40-65 years, associated with a period of increased risk of cancer. The incidence of higher spinal metastases is found in men compared with women.<sup>2</sup>

Breast, prostate, lung, renal and hematopoietic cancers often metastasize to the spinal. The thoracic vertebra is the most common location for metastasis, because the thoracic vertebra has the largest volume of bone marrow, so it can accommodate metastatic deposits. About 16.5% of symptomatic metastases are secondary to breast cancer, 15.6% are secondary to lung cancer and 9.25% are secondary to prostate cancer. Other solid tumors that often metastasize to the spinal system are renal, gastrointestinal and thyroid carcinoma. In children, sarcomas (especially Ewing's tumors) and neuroblastoma are the most common types of histology.<sup>2</sup>

MSD can be found in 3 locations namely extradural, intradural extramedulla (IDEM) and intramedullary. More than 98% of spinal metastasis is extradural because the dura mater is a barrier to metastasis; IDEM and IM only occur about 1% of MSD. Both IDEM and IM often originate from brain tumors.<sup>2</sup>

## Method

This study was an observational analytical study paired using a retrospective design with a cross sectional approach evaluating patients with Metastatic Spine Disease before and after posterior spinal instrumentation in this study were patients with Metastatic Spine Disease who had undergone posterior spinal instrumentation at the hospital in the education period time November 2018 - December 2018. Based on the calculation of the number of samples used in this study were 21 people.

The variables assessed in this study were patient demographics, SF-36, ODI, VAS before and after instrumentation. Posterior, Analysis of data using statistical processing software. Data is narrated and clarified in the form of tables and graphs. The numerical value of the clinical outcome examination will be made an average /  $\pm$  and SD. The level of significance used is 5% (0.05) and the level of significance of the trend is 10% (0.1).

The statistical analysis used when data is normally distributed is paired T-Test, but if the distribution data obtained is not normal, the analysis used is the Wilcoxon test. A difference is considered significant if the P value is  $<0.05$ . This research was carried out after obtaining approval from the Health Ethics Committee of the Faculty of Medicine, University of North Sumatra.

## Result

Improvement of conditions in all patients with Metastatic Spine Disease.

Two patients had several levels of involvement. There were no patients suffering from major medical illnesses and we did not find intraoperative or postoperative complications in our study. Demographics and patient characteristics are shown in table 1.

The distribution of the number of samples undergoing posterior instrumentation was 22 subjects with 12 as many women (54.5%) and 10 as men (45.5%). The youngest age of the study subjects was 41 years and the oldest age of the study subjects was 78 years with a mean and standard deviation of  $51.7 \pm 14.0$  years. The examination of the primary tumor is dominated by lung tumor metastasis

**Table 1. Distribution of characteristics and demographic samples**

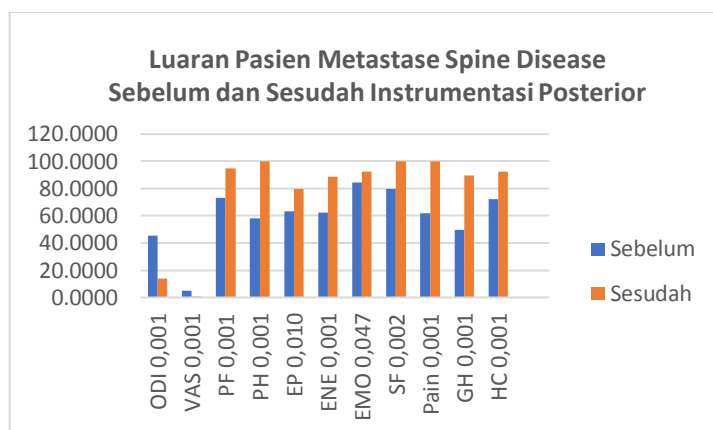
Variabel	Total
Woman, n(%)	12 (54,5%)
Man, n(%)	10 (45,5%)
Youngest Age	41 tahun
Oldest Age	78 tahun
Average Age	51,7 ± 14,0
<b>Primary Tumors</b>	<b>Total</b>
Lung Cancer	16
Bladder Cancer	1
Nasofaring Cancer	2
Breast Cancer	1
Cervix Cancer	2

The average VAS score increased from  $4.9 \pm 1.9$  before surgery to  $1.0 \pm 0.0$  at the final follow-up. ODI also increases from very severe disability before surgery becomes minimal disability at the final follow-up. Table 3 summarizes changes in clinical and radiological results before surgery and at the final follow-up, so that the clinical outcome for the patient in quality of life and for pain management satisfying, this result make the conclusion that pain reduce and the posterior instrumentation in the metastase bone disease could increase the quality of life of the patient.

**Table 3. Preoperative clinical and radiological output and final follow-up**

Variabel	Before	Follow up	p value
VAS	$8,89 \pm 1,89$	$1,32 \pm 0,99$	0,001
ODI	$78,9 \pm 19,6$	$10,7 \pm 16,5$	0,001

ODI, Oswestry Disability Index; VAS, Visual Analog Scale; KYP, Kyphotic

**Table 3. Average pre-operative SF-36 and follow-up scores**

ODI, Oswestry Disability Index; VAS, Visual Analog Scale; PF, Physical Functioning; PH, Physical Health; EP, Emotional Problem; ENE, Energy/Fatigue; EMO, Emotional Well Being; SF, Social Functioning; GH, General Health; HC, Health Change

From the graph above is the output diagram of patients with metastase spine disease before and after posterior instrumentation in 22 samples, obtained ODI before surgery of  $45.5 \pm 19.6$  to  $13.9 \pm 5.6$  after surgery; Preoperative VAS was  $4.9 \pm 1.9$  to  $1.0 \pm 0.0$  after surgery. And for the assessment of SF-36, physical functional preoperative results were  $72.9 \pm 16.5$  to  $94.5 \pm 6.7$  after surgery; preoperative physical health was  $58 \pm 23.1$  to  $100.0 \pm 0.0$  after surgery; emotional problems before surgery  $63.1 \pm 21.8$  to  $79.9 \pm 32.9$  after surgery; energy / fatigue before surgery was  $62.5 \pm 12.0$  to  $88.6 \pm 13.7$  after surgery; emotional state before surgery was  $84.1 \pm 14.8$  to  $92.3 \pm 1.7$  after surgery; social function before surgery was  $79.6 \pm 23.5$  to  $100.0 \pm 0.0$  after surgery; preoperative pain level of  $62.0 \pm 25.3$  to  $99.9 \pm 0.4$  after surgery; general health before surgery amounting to  $49.5 \pm 3.4$  to  $89.3 \pm 14.9$  after surgery; preoperative health changes were  $72.0 \pm 7.8$  to  $92.4 \pm 9.7$  after surgery.

## Discussion

The incidence of bone metastasis is as much as 70% at autopsy of cancer patients, and the spine is the most frequent location of bone metastasis<sup>49</sup> Most patients with metastase spine disease come with spinal instability and low back pain due to pathological fractures. Approximately 5% to 10% of these patients present with compression of the spinal cord resulting in neurological deficits. Both pain related to instability and neurological deficits can significantly affect the quality of life<sup>3</sup>. Patients tend to lie because of unbearable pain and neurological deficits. Immobilization in bed can cause complications, including orthostatic pneumonia, pressure wounds, urinary tract infections, thromboembolism, and joint contractures. Treatment of metastase spine disease is usually palliative, which aims to relieve pain, maintain or restore neurological function, control local durable tumors, stability of the spine, and better quality of life, although it is rare, patients who present with spinal metastases isolated at an early stage can be treated with radical resection. Treatment for patients with spinal instability due to metastatic disease often involves nonoperative palliative care because of the serious prognosis associated with their condition. Decisions regarding surgical treatment in such cases are generally based on 3 main factors: surgical indication, surgical risk, and life expectancy. The goal of surgery in these cases is unique: improving the quality of life of patients immediately<sup>4</sup>.

In this study, patients with metastase spine disease who underwent posterior instrumentation surgery experienced significant improvements in quality of life. This is indicated by the significant difference in ODI, VAS, and SF-36 scores between before and after surgery. Many assessments of quality of life have been reported for tumor patients and bone cancer<sup>48</sup>. reported a series of 85 patients who experienced pain relief and the results of the EORTC QLQ-C30 questionnaire 1 year after surgery<sup>2</sup>. reported 118 patients with an increase in the QLQ-C30 score at 1 year follow-up, and Wu et al. described 46 surgical patients with improvements in the Cancer Therapy Functional Assessment questionnaire at 9 months after surgery.<sup>3</sup> This study was the first published assessment of postoperative early QoL after fixation of the long segment spine in patients with spinal metastases<sup>5</sup>

There are several limitations in this study. Primary tumors in patients in this study had heterogeneous spinal metastasis. Different primary tumors have different biological behaviors and prognoses. Moreover, the number of patients included is small. However, the results of this study indicate that posterior instrumentation procedures can be considered for all patients with spinal metastasis, with the aim of improving patients' quality of life<sup>6</sup>

The functional clinical outcome of patients with metastase spine disease after posterior spinal instrumentation is better than clinical outcomes before the action of posterior spinal instrumentation with statistical values ( $P < 0.01$ ), this is consistent with the initial hypothesis of the study, namely there are differences in functional clinical outcome of metastatic patients spine disease before and after surgery for posterior spinal instrumentation

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