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Research article

Clinical and functional outcome of cervical degenerative disc disease after operative treatment at Dr. Soetomo General Hospital Surabaya in 2013-2018

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ABSTRACT

Backgrounds: Cervical degenerative disc disease is a pathological change in the cervical associated with the degenerative process. Surgery is one of the therapeutic modalities in cases of cervical degenerative disc disease. Post-surgical clinical outcomes are needed to evaluate the results of the actions that have been taken. Methods: This study is an observational retrospective study to evaluate clinical and functional outcomes using Neck Disability Index & SF36 on cervical degenerative disc disease before and after surgery at Dr. Soetomo Hospital Surabaya in 2013-2018. Data is processed using SPSS and compared using the T-test. Results: A total of 12 patients with details of 8 male patients and four female patients who met the inclusion and exclusion criteria in this study. There was a significant decrease in the average NDI score ($p = 0.05$) before surgery (47.33) compared with after surgery (15.58). There was a significant increase in the average SF36 score ($p< 0.05$) before surgery (50.75) compared to after surgery (88.16). Conclusions: There is an increase in clinical and functional outcomes in patients with cervical degenerative disc disease who undergo operative treatment.

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INTRODUCTION

Cervical degenerative disc disease is cervical pathology associated with the degenerative process. Some experts mentioned it as cervical spondylosis. Although most cervical degenerative changes are often asymptomatic, they can manifest with several significant complex symptoms, including axial neck pain, radiculopathy, myelopathy, or a combination of it. Axial neck pain refers to pain along the cervical bone and associated paraspinal muscles. Cervical radiculopathy is associated with cervical pain that radiates to the arm and can be accompanied by radicular sensory or motor change (Adams & Roughley, 2006; Friedenberg & Miller, 1963).

There are several treatment options for cervical degenerative disc disease. Nonoperative and operative with its indications. Stabilization is one of the operative management in cervical injuries. Initially, this technique was mostly used for non-traumatic cases, and there was controversy regarding the use of this technique in trauma cases. Post-operative clinical assessment is needed to evaluate the patient and the treatment that has been done. (Nouri, Tetreault, Singh, Karadimas, & Fehlings, 2015; Tetreault, Ibrahim, Côté, Singh, & Fehlings, 2016) This study will explain the post-operative outcome using the Neck Disability Index and Short Form 36 (SF-36) questionnaire in patients with cervical generative disc disease at Dr. Soetomo General Hospital Surabaya in 2013-2018. The patient included a diagnosis of degenerative disc disease with radiculopathy or myeloradiculopathy that underwent Anterior Cervical Discectomy and Fusion (ACDF)

METHODS

This study is an observational retrospective study to evaluate the Neck Disability Index & SF36 in Post-operative Cervical Degenerative Disc Disease patients in Dr. Soetomo Surabaya in 2013-2018. The patient criteria included a diagnosis of degenerative disc disease with radiculopathy or myeloradiculopathy. The operative procedure was Anterior Cervical Discectomy and Fusion (ACDF). All the subjects have similar diagnoses and treatment during this study. The NDI score was used to assess the specific outcomes of pathology around the neck. Meanwhile, the SF36 score was used to assess overall functional outcome and quality of life for non-specific causes.

The inclusion criteria:

1. Patients with cervical degenerative disc disease are adults (at least 40 years old) with post-operative evaluation timeless than equal to 6 months;
2. Deficit confirmed by CT, MRI, or X-ray;
3. No prior surgical procedures at the operative level;
4. The patient physically and mentally able and willing to comply with the protocol;
5. Signed informed consent;

The exclusion criteria:

1. Any prior surgery at the operative level or any previous fusion at any cervical level;
2. Active infection of the surgical site or history of or anticipated treatment for systemic infection including HIV and/or Hepatitis C;
3. Known allergy to devise materials including cobalt, chromium, molybdenum, or polyethylene;
4. Reported to have a mental illness or belonging to a vulnerable population.

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The pre-operative and post-operative NDI and SF-36 scores were obtained. Disease-specific health measures are used to evaluate patients with disorders at specific sites, and these two instruments, namely NDI and SF-36, are sensitive to particular diseases. An analytical study using a T-dependent test to assess the comparison between pre and post-operative NDI and SF-36 scores was done using the 25th version of the Statistical Program for Social Sciences (SPSS).

RESULTS

In this study, there were twelve patients with Cervical Degenerative Disc Disease who underwent surgery at Dr. Soetomo Regional Hospital in 2013 - 2018 and evaluated using NDI and SF-36 scores. The mean age of the subject was 52.83, with a standard deviation of 11.37 years. There were eight male patients (67%) and four female patients (33%). Most pathologies were found on the C4-C5 level (75%). The mean Length of Stay during the operative procedure was 8.12 days. Pre-operative and Post-operative VAS score was 6.51 ± 2.65 and 2.31 ± 1.38. The subject's demographics showed in Table 1.

The results of pre- and post-operative NDI scores in patients with Cervical Degenerative Disc Disease are shown in Figure 1. The highest pre-operative NDI scores were 52. and the lowest was 42. with an average score of 47.33. In contrast. The postoperative NDI scores were decreased significantly compared to the pre-operative score. The highest post-operative NDI score was 22. the lowest score was 12. and the average NDI score of 15.58. The comparison of NDI scores shows a significant difference between pre- and post-operative scores. (p = 0.000)(Table 2)

Table 1. Subjects Demographics

Variable	Number (n)	Percentage (%)	Mean ± SD
Age	12	100	58.23 ± 11.37 years
Sex			
Male	8	67 %	
Female	4	33 %	
Level of pathology			
C3-C4	2	16.67 %	
C4-C5	9	75 %	
C5-C6	1	8.33 %	
Length of Stay	12	100%	8.12 ± 3.45 days
Pre-operative VAS score	12	100%	6.51 ± 2.65
Post-operative VAS score	12	100%	2.31 ± 1.38

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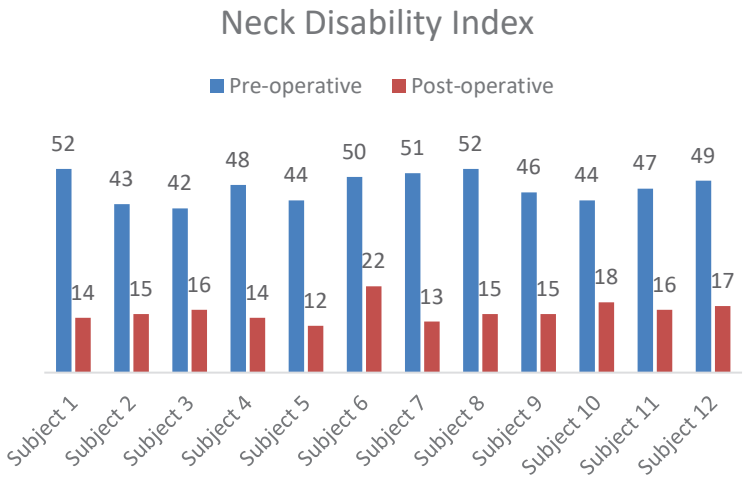

Figure 1. Pre- and Post-operative NDI score

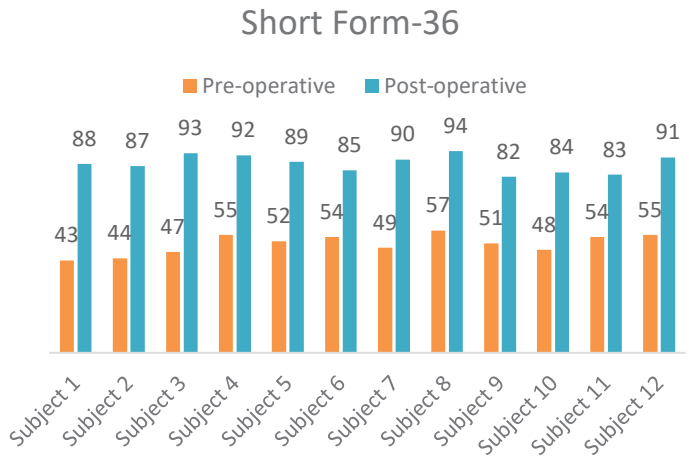

Figure 2. Pre- and Post-operative SF-36 Score

Table 2. Comparison between pre- and post-operative NDI score

		Mean	SD	p-Value
Neck Disability Index	Pre-operative	47.33	3.55	0.000
	Post-operative	15.58.	2.60	

Table 3. Comparison between pre- and post-operative SF-36 score

		Mean	SD	p-Value
SF-36 Score	Pre-operative	50.75	4.55	0.000
	Post-operative	88.16.	4.01	

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In Figure 2. showing the distribution of pre- and post-operative SF-36 scores in patients with Cervical Degenerative Disc Disease. The pre-operative lowest SF-36 score was 43. and the highest score was 57. with an average of 50.75. After the surgery. The SF-36 score was increased, namely. The lowest SF-36 score was 82, and the highest score was 94, with an average of 88.16. Comparison of pre- and post-operative SF-36 scores shows a significant difference between these groups. (p = 0.000) (Table 3).

DISCUSSION

The cervical intervertebral disc has long been considered a common source of neck pain. The degenerative cervical disc has an abundant supply of nerve fibers, which is prone to inflammatory reactions and is susceptible to pain that can be provoked by disc stimulation or distention and can be eliminated by block. The presenting manifestation depended on the nerve root and disc space that affected, and the symptoms may include pain, sensory or motor deficits, diminished reflexes, or a combination of the above. Several epidemiological studies showed that monoradiculopathy involving the C7 nerve root to be the most frequent. followed by C6 monoradiculopathy. (Hisey et al., 2014; Holly et al.,2009; Tetreault et al., 2016).

There are several indications for surgery in this disease, including the failure of conservative therapy using physiotherapy for 6-12 months progressive increase in axial pain that disrupts daily activities and increased neurological deficits. Neck pain can be successfully treated conservatively in those cases. When the surgical intervention was pursued, patients with shorter DOS have better improvement in radiculopathy symptoms that is statistically significant. The surgical treatment was to decompress the nerves, restore the alignment of the vertebrae. and stabilize the spine. (Farshad-Amacker. Farshad. Winklehner. & Andreisek. 2015; Hisey et al.,2014; Kuijper et al., 2009).

Neck Disability Index (NDI) is an outcome measurement tool that is self-assessed and filled in by patients to assess disability and is often used to evaluate the effects of treatment of neck-related problems. There are 10 question items measure disability in patients with neck pain in NDI. (Carreon. Glassman. Campbell. & Anderson. 2010; Khan et al.. 2019) The higher the score obtained, the greater the disability of the patient (Carreon et al.. 2010). In this study, a significant difference between pre-a post-operative NDI scores (p=0.000) in patients with Cervical Degenerative Disc Disease who had surgery was 15.38 compared to before surgery which was 47.33. The NDI score adequately reflects the patient's physical and mental quality of life. Implying that the use of NDI to assess functional outcomes can also be used to evaluate the patient's quality of life. These results are in line with research conducted by Carreon et al (2010). where there was a significant decrease in NDI scores in 505 patients who had surgery in the United States. (Carreon et al., 2010) Similar results were also obtained from a study by Khan et al (2019). where there was a significant decrease in NDI scores in 2206 patients who had surgery (Khan et al., 2019).

The treatment of the cervical degenerative disease can be classified into the fixation of the cervical spine alone—decompression of the nerves alone or a combination of both. Historically, the posterior approaches were thought to be safe and direct methods for cervical multisegment stenosis and lordotic cervical alignment. Meanwhile, anterior approaches are indicated for patients with cervical compression with anterior factors: relatively short-segment stenosis and kyphotic cervical alignment. Recently, a posterior approach is widely applied to several cervical degenerative diseases due to the development of various instruments. These study results indicate that cervical spine surgery for appropriately selected patients with myelopathy or radiculopathy is tremendously

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effective at improving patient pain and quality of life (Carreon et al.., 2010; Laucis. Hays. & Bhattacharyya. 2015; Moran & Bolger. 2012).

In a study conducted by Andresen et al. (2018). there was a significant increase in SF-36 scores in 272 Cervical Radiculopathy patients who performed surgery in Denmark in 2011-2016. (Andresen et al.. 2018) The results obtained are in line with this study, where there is a significant increase in SF-36 score ($p < 0.05$) in postoperative patients with Cervical Degenerative Disc Disease. Similar results were obtained in the study of Carreon et al. (2010). where there was a significant increase in SF-36 scores in 505 cervical degenerative patients, including spondylosis, disc herniation, and stenosis, which had surgery in the United States. (Carreon et al., 2010).

Several studies were conducted to find which operative procedure is superior to the others for the treatment of cervical myelopathy. The current peer-reviewed literature did not conclude whether an anterior or a posterior surgery would have better short- and long-term results. Meanwhile. the surgical outcomes for patients with myelopathy significantly higher concerning motor recovery if the surgical intervention is performed less than one year after the onset of symptoms. (Avery. 2012; Daimon et al., 2018). This study has a limitation related to a number of subjects that participated during this study. Even though this limitation does not affect the results that can be concluded that ACDF improved the quality of life, patients with cervical degenerative disc disease.

CONCLUSION

Our findings showed significant improvement in NDI dan SF-36 score after the operative procedure in patients with cervical degenerative disc disease. There is an illustration of improvement in functional ability and quality of life of patients in patients with cervical degenerative disc disease that has been performed operative procedures.

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