Quest Journals Journal of Medical and Dental Science Research Volume 12~ Issue 6 (June 2025) pp: 82-87 ISSN(Online): 2394-076X ISSN (Print):2394-0751 www.questjournals.org

**Research Paper** 



# Functional outcome following surgical decompression in degenerative spine disease at a tertiary health facility, North Central Nigeria.

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# ABSTRACT

**Background**. Spinal decompression and fusion surgeries in degenerative disease of the spine are commonly indicated in lateral recess syndrome, central spinal canal or foraminal stenosis from osteophytes, prolapsed discs and spondylolisthesis to relieve radiclar back or neck pain. A Careful patients selection is required to achieve significant improvement in clinical symptoms. In this study we reviewed the clinical outcomes associated with spinal decompression and fusion surgery in patients with degenerative spine disease associated with spinal canal and or foraminal stenosis

**Methods**. This was a 10 year (January 2014 - December 2023) retrospective cohort review of all patients who had spinal decompression surgery for spinal canal or foraminal stenosis. Patients' hospital records were retrieved, and relevant biodata and clinical information were obtained and entered into the Statistical Product and Service Solutions version 27. a univariate analysis of the clinical outcome was performed.

**Results**. There were 80 patients who had spinal decompression surgery over this period. Thirteen patients were excluded from analysis due lack of relevant clinical data .The majority (43, 64.2%) of spinal decompression surgeries were performed in males, and the median age was 56years. Most (49. 73.1%) of the surgeries were done for lumbar spine disease. More than half of the Patients who had cervical decompression surgeries remained clinically same without significant improvement, whereas the large majority of those who had lumbar surgery improved significantly

**Conclusion**. Spinal decompression surgery for patients with degenerative spine disease assocaited with spinal canal stenosis results in clinical improvement of symptoms in patients with lumbar disease. However, most of the patients who had cervical decompression surgery had no change in their clinical symptoms.

Keywords: Spine, degenerative disease, decompression, outcome,

*Received 03 June., 2025; Revised 11 June., 2025; Accepted 13 June., 2025* © *The author(s) 2025. Published with open access at www.questjournas.org* 

# I. INTRODUCTION

Degenerative spine disease is a common condition that is considered a natural process that occurs with ageing. The global incidence of lumbar degenerative spine disease alone was estimated in 2016 to be 266 million persons per annum, with the highest rates in Europe and the lowest rates in Africa, although, the absolute numbers were about four times more in low- and middle-income countries compared to developed countries. In the United States, the trend is towards an increase in the number of spinal surgeries by 13.3%-19.3 % performed for degenerative cervical spine disease in the 2020-2040 period [1]. A study done in South Western Nigeria in patients with low back pain, revealed that 96.3% of their MRIs showed degenerative changeswith most presenting with back pain as a major indicator of degenerative spine disease [2]. Some other studies in Nigeria show a hospital incidence of 2.3% and 11.5% respectively [3,4].

In degenerative spine disease, there is a gradual reduction in the structure and function of the spine. The process of degeneration principally involves the intervertebral disc anteriorly and the facet joints posteriorly as described in the Kirkaldy- Willis three joint theory[5]. A degenerative process in any one of these joints triggers a degeneration in the other joints. A review of literature by Kem Singh et al concluded that the degenerative process of the spine is a complex interaction of biochemical and biomechanical processes initiated by genetic predisposition and modulated by environmental factors[6]. There have been further attempts by Darwono and Radchenko to elucidate the factors leading to degenerative spine disease (DSD) includes components like spondylosis, disc degeneration, disc narrowing, disc herniation, degenerative scoliosis, spondylolisthesis and spinal stenosis occurring singly or in combination. These changes in the spine lead to neck and back pain , radiculopathy, myelopathy, progressive neurologic deficit and sphincteric involvement. These often lead to disability and a reduction in the quality of life, culminating in suffering.

Several tools have been used to assess the functional status of the patients prior to and after a surgical intervention. The patient related outcome measurements (PROM) emanate from the patients themselves and give an assessment about how the patients feel about their symptoms. Common PROMS include the visual analogue scale, numeric rating scale (NRS) and the Oswestry disability index. Some of the objective functional assessment include the Nurick grading scale (NGS)[8] and the modified Japanese Orthopaedic association(mJOA)[9]. A study on cervical myelopathy showed a good correlation between the NGS and mJOA[10]. The NGS is chosen for this study because of its simplicity and objectivity.

The goals of management of degenerative spine disease include the relief of pain and other distressing symptoms and improving the general functioning of the individual. These can be achieved by initial non-operative techniques and then surgery subsequently. The non-operative method involves the use of physical therapy, lifestyle modifications, medications and injections[11].

Common indications for surgical intervention include persistent or recurrent back and leg pain or neurogenic claudication associated with a significant reduction in the quality of life despite reasonable nonoperative measures; progressive neurologic deficit and sphincteric involvement.

This study reviewed the clinical outcomes associated with spinal decompression and fusion surgery in patients with degenerative spine disease associated with spinal canal and or foraminal stenosis by comparing the nuricks score of the the patients before and after surgery.

# II. METHODS

This is a retrospective comparative cross-sectional study. An ethical clearance was obtained from the hospital's ethical review board for the retrieval and use of patients' information. All patients with degenerative spine disease who had surgical decompression from January 2014 to December 2023 were recruited into the study. Their case notes were obtained from the hospital records registry and information relevant to this study were retrieved and entered directly into the SPSS spreadsheet in their relevant domains. Those with incomplete data were excluded from the study. Statistical analysis was subsequently done using the IBM SPSS (Statistical Product and Service Solutions) Statistics version 27.

## III. RESULTS

Of the 80 patients with degenerative spine disease who had surgical decompression, only 67 had complete records and these were the ones used for the analysis. Most of the patients were males(43, 64.2%). The median age of the patients was 56 years(table 1).

The lumbar spine was the most operated spinal segment(49, 73.1%).

There was a significant improvement in the functional outcome of the patients put together with the improvement occuring from lumbar decompressive and fusion surgeries(table 3).

A further analysis showed that most of the patients who had surgery for cervical degenerative disease showed no improvement in their neurological state(Fig 1).

Most of the patients with lumbar degenerative disease showed improvement in their neurology following decompression and or fusion(Fig 2).

Biodata				
Parameter				
Sex	Frequency	%		
Male	43	64.2		
Female	24	35.8		
Age(years)				
Range	23-80			
Median	56, (IQR-42,65)			

Table 1- Sex and age distribution of the patients

# Table 2- Spine segment operated

Spine segment operated				
	Ν	%		
Sub-axial cervical spine	16	23.9%		
Thoracic spine	1	1.5%		
Thoraco-lumbar junction	1	1.5%		
Lumbar	49	73.1%		

# Table 3- Test of significance: the Wilcoxon Signed Ranked Test

Test statistic: the Wilcoxon Signed Ranked Test

		Neurology at 6mnth-1yr- neurology before surgery Nurick
	Z	Asymp.Sig(2-tailed)
All segments	-3.862 <sup>b</sup>	.000
Cervical	3446 <sup>b</sup>	.731
Lumbar	-3.889 <sup>b</sup>	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks



Fig 1. Change in neurology following decompression and or fusion of the cervical spine



Fig 2. Change in neurology after decompression and or fusion of the lumbar spine

# IV. DISCUSSION

This study had the following key findings: the sample population has a median age of 56 and a predominantly male population (64%). The most common operated spine segment was the lumbar region. The test statistic (Wilcoxon Signed Ranks Test) showed a statistically significant improvement in the functional status of the patients using the Nurick grading following a surgical decompression. This improvement was actually accounted for by the lumbar decompression because a sub analysis of this improvement across the different spine segments revealed that there was no significant change in the functional status for surgeries in the cervical spine but the significant improvement was noticed only for surgeries of the lumbar region (table 3). The median age occurring in the sixth decade in our study correlates well with many studies done in Nigeria[12,13,14,15]. This differs from the peak age seen in the Western and some Asian countries where degenerative disease of the spine occurs mostly in the seventh decade of life[16,17,18]. This difference in peak age of occurrence between Nigeria and other developed parts of the world raises some issues and questions. Could this be as a result of the difference in the life expectancies of these two regions? In the U.S, the life expectancy was 78.4 years in 2024 whilst that of the U.K was 81.3 years for the same year compared to that of Nigeria which was 54.6 years. This would mean that since there are comparatively fewer aged persons in Nigeria, persons with degenerative spine disease in Nigeria would expectedly be younger. Again, does our genetics predispose us to early degeneration? The answer would be clear only after genetic studies and how this translates to degeneration. In addition, are there some environmental factors that modulate the early development of this degeneration in our environment? These are all areas of further research to possibly answer such questions. In the sixth decade, many Nigerians are at the twilight of their careers and should be meaningfully contributing to the economy. Thus, degeneration of the spine which is commonly associated with pain would interfere with the quality of life and work output of these group of patients and thus have a significant negative impact on productivity.

The prevalence of degenerative spine disease is highly variable among males and females across different regions. Most series however show a female preponderance[16,19]. In our study, however, there is a male preponderance. It is difficult to say if this finding is reflective of the actual state of affairs in Nigeria or an isolated finding, because most of the studies reviewed for the Nigerian territory indicate a female preponderance. A collation from the various facilities will provide a clearer picture on this issue.

Our study showed the lumbar spine is the most common spine segment operated in degeneration of the spine. This finding is in agreement with most publication in the literature[13,14,17] However, a study in Nigeria showed that the cervical spine as the most common segment involved in spinal decompressive and fusion surgeries[15]The lumbar spine bears most of the weight of the body and is the site of maximal stress and strain on the back. It is thus not surprising that denegerative spine disease would most often involve this segment of the spine.

This study found a significant improvement in the functional status of the patients using the Nurick grading scale after our surgical interventions. The Nurick score improved from a mean pre-operative value of 2.87 to a post-operative value of 2.19. sub analysis revealed that most patients functional status remained unchanged for patients who had cervical decompressive surgery and fusion (see table 4), whereas patients who had lumbar sugeries had a statistically significant improvement (see table 5). It therefore, implies that a patient

with cervical degenerative disease requiring decompressive surgery and or fusion is less likely to improve in their nurick score compared to those who had lumbar surgeries. Our finding is in contrast with most available studies that show a significant improvement of the functional status of patients with cervical degenerative disease following a surgical decompression[20,21]. This improvement is in fact replicated even in those with severe myelopathy(Nurick 5)[22,23]. Some of the determinants of improvement following a surgical decompression include the age of the patient, the duration of the symptoms prior to intervention and preoperative neurological status[24]. A study done by Pumberger et al found that patients with Nurick grade 2 had the highest chance of complete symptom resolution and that those who did not improve had a longer period of myelopathic symptoms[25]. Perhaps, the poor recovery following surgery seen in our patients with cervical degenerative disease relates to the long duration of symptoms before presentation. Many of our patients do not present early and only come to the hospital when the disease is crippling or pain becomes unbearable.

## LIMITATIONS

This study has similar limitation to those associated with retrospective design, this include incomplete data. The inclusion of non-randomly selected participants may have resulted in difficulty in eliminating unpredictable biases. This single-institution based study had a limited dataset and the lack of significance of some of the parameters of potential interest may reflect insufficient statistical power for generalization.

## V. CONCLUSION

Spinal decompression surgery for patients with degenerative spine disease associated with spinal canal stenosis results in clinical improvement of symptoms in patients with lumbar disease. However, most of the patients who had cervical decompression surgery had no change in their clinical symptoms.

Acknowledgement. We want to thank Miss Rebecca Makyim, secretary, Division of Neurosurgery, Jos University Teaching Hospital for helping out with type-setting of the manuscript.

## Declaration

#### Funding-None

Conflict of interest- None declared.

Ethical Approval- Ethical approval for this study was obtained from the Health Research and Ethical Committee of the Jos University Teaching Hospital.

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