



## Effect of psychomotor physiotherapy with individualized physiotherapy program on pain, kinesiophobia and functional outcome following Transforaminal Interbody Lumbar Fusion (TLIF): A case report

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## General Note

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## ABSTRACT

**Introduction:** Transforaminal Interbody Lumbar Fusion is a common surgical procedure for lumbar disc herniation. Pain, functional limitation and kinesiophobia are commonly reported after TLIF. Psychomotor physiotherapy has been shown to be effective in modifying the behavioural and cognitive aspects of pain and movement and thus improve functional outcomes. NPMP approach, focusing on strategies to improve body awareness, self confidence, dealing with fear of failure and feeling safe in an environment, when added to the individualized physiotherapy program following TLIF showed significant reduction in low back pain and improved functional independence along with decreased kinesiophobia. **Clinical findings:** A 53 year old female presented with chief complain of pain in low back with tingling and numbness in both feet since last 3 months after a fall leading to difficulty in walking and performing daily activities. Pain was aggravated by forward bending and relieved by rest, stretching and medication. MRI report of dorsal spine revealed disc desiccation at D10-D11, D11-D12 and D12 –L1 levels, ligamentum flavum hypertrophy at D8-D9 and D10-D11 levels with lumbar canal stenosis at L3-L4 at L4-L5 disc levels (canal diameter D12-L1 was 8mm) and degenerative changes at L3, L4 and L5 levels. Muscle strength was 3/3 as per MRC grading. TLIF was done on the patient as advised. Postoperatively the patient presented with pain (8/10 on NPRS), functional disability (Modified Oswestry Disability Index score of 64%) and fear of movement (Tampa Scale of Kinesiophobia raw score of 51%). An individualized physiotherapy program for a duration of 8 weeks was designed incorporating Psychomotor Physiotherapy (Norwegian Psychomotor Physiotherapy protocol was used) once a week for 8 weeks. **Conclusion:** NPMP along with individualized physiotherapy program was effective in reducing low back pain, improving function and reducing kinesiophobia after TLIF.

**Keywords:** Case report, Lumbar disc herniation, Transforaminal interbody lumbar fusion (TLIF), Psychomotor Physiotherapy, Kinesiophobia

## 1. INTRODUCTION

The prevalence of low back pain is significantly high throughout the world (Mathew *et al.*, 2013). Nearly 80% of the population experiences an episode of low back pain (LBP) once during their lifetime (Amin, Andrade and Neuman, 2017). Disc herniation is one of the common cause of lumbar radiculopathy and it is treated by conservative and surgical methods (Goel *et al.*, 2019). Failure of conservative treatment is an indication for surgical intervention. Patients with surgical intervention for herniated disc have better long term treatment outcomes regarding relief of leg pain, improvement in function and satisfaction compared to patients treated conservatively (Atlas *et al.*, 2005). Transforaminal Interbody Lumbar Fusion (TLIF) is a widely used surgical intervention for lumbar disc herniation (Zhao *et al.*, 2018). Post-operative management after lumbar fusion commonly focuses on analgesic pain control and ADL or activities of daily living (Abbott, Tyni-Lenné and Hedlund, 2010). Patients who undergo lumbar fusion have significant fear of movement and reinjury which often leads to poor treatment outcomes (Madera *et al.*, 2017). Pain related kinesiophobia leads to hypervigilance, muscular reactivity and avoidance of movement (Guck *et al.*, 2015). Psychomotor Therapy when included in the early stages of rehabilitation shows better improvement in functional disability, self efficacy, and kinesiophobia (Abbott, Tyni-Lenné and Hedlund, 2010).

Norwegian Psychomotor Physiotherapy (NPMP) protocol is advised to patients having long-lasting musculoskeletal pain with associated psychosomatic disorders. In NPMP it is believed that physical aspects such as posture, respiration and movement are closely related to emotional states. Physical, psychological and social strains can affect posture, balance, movements and flexibility (Dragesund and Kvåle, 2016). The aim is to correct dysfunctions of the body to facilitate change by movements and exercises associated with body awareness and respiration. Instead of focusing on a local approach, NPMP focuses on treating the whole body. This treatment protocol emphasizes on patient's body and self-awareness (Probst, 2017). Patients are taught movements that emphasise on body awareness training in standing, walking, balancing, stretching as well as relaxation (Dragesund and Kvåle, 2016). The purpose of this case study is to examine the effect of adding Psychomotor Physiotherapy to an individualized physiotherapy program to improve pain, kinesiophobia and functional outcome in a patient who had undergone TLIF.

## 2. PATIENT INFORMATION

A 53 year old female, homemaker presented with chief complaint of pain in low back region and tingling and numbness in both feet since last 3 months. The pain was accompanied by heaviness in low back and numbness in both lower limbs leading to difficulty in walking moderate distances and also interfering with her daily activities. Pain aggravated on performing household chores and other activities that involved forward bending of spine continuously for 10-15 minutes or more. Rest, stretching and pain relieving medications relieved the pain. No bladder and bowel symptoms were present. She recalled that the pain started after she had a fall in the bathroom 3 months ago and was unable to stand up on her own due to pain in lower back with numbness in both the lower limbs. She was confined to bed for about a week due to pain. Thereafter she was taken to a hospital where investigations had been carried out. The patient was asked to take rest and avoid movements. She was kept on pain relief medication and spinal fusion surgery was suggested. After two weeks she visited our hospital to seek further opinion.



**Figure 1** MRI of spine

MRI report of dorsal spine revealed disc desiccation at D10-D11, D11-D12 and D12 –L1 disc level. Schmorl's nodes were noted at the lower end plate of D10, D11, D12 and upper end plate of L1 vertebra. Ligamentum Flavum hypertrophy was noted at D8-D9 and D10-D11 disc levels. At D10-D11 disc levels there was moderate thickening of posterior longitudinal ligament and ligamentum flavum causing bilateral lateral recess narrowing and compression of the central spinal canal (canal diameter D10-D11 was 6.6 mm). At D12- L1 Disc level there was diffuse disc bulge with postero-central disc extrusion, extending caudally indenting over the anterior

theal sac causing compression of the central spinal canal. Lumbar canal stenosis at L3-L4 at L4-L5 disc level (canal diameter D12-L1 was 8mm) was noted with spondylo-degenerative changes in L3, L4 and L5 levels of the spine (Fig. 1). Patient reported no previous trauma, illness, surgery or any medical condition and was a non-smoker. Muscle strength was 3/3 a per MRC grading. Patient underwent surgery for posterior decompression and transforaminal lumbar interbody fusion at L4- L5 level with bullet cage. Patient was shifted to the ward after the surgery and was advised physiotherapy treatment.

The patient was assessed on the first post-operative day and physical examination of the patient revealed presence of incision with pain upon palpation of lumbar spine and also muscle guarding of spinal muscles. The patient rated the pain as 8/10 on the Numeric Pain Rating Scale (0 being not having any pain and 10 being the state of having the worst pain ever experienced). SLR, Lasegue and Bragard sign could not be tested. No bladder and bowel dysfunction was reported. On neurological evaluation, superficial sensation was found to be absent on the right side at L4, L5 and S1 levels and reduced on the left side at the same levels. Patellar reflexes and ankle jerk reflexes were absent on the right side while hyperreflexia was found to be present on the left side. Paraesthesia was present in the lateral compartment of right leg. Disability for low back pain was measured using Modified Oswestry Disability Index and disability was found to be severe at 64%. The patient presented with a remarkable pain related fear of movement, which presented a challenge for movement restoration. Tampa Scale of Kinesiophobia (TSK) was used to see the extent of Kinesiophobia. The TSK questionnaire comprises of 17 items, each with 4 point scale. Response ranges from 'strongly disagree' to 'strongly agree'. Scores are between 17 which indicate low fear and 68 which will mean high degree of fear. The patient's raw score was 51, indicating a high degree of kinesiophobia.

### 3. TREATMENT INTERVENTION

Treatment started on the first post-operative day included an individualized physiotherapy program along with a single session of NPMP once a week for 8 weeks to overcome kinesiophobia. Treatment protocol of NPMP was taken from a study published by Tove Dragesund and Kvale. Each session of Psychomotor Physiotherapy lasted for 45 minutes. This included activities to improve body awareness and control of body movements, proprioceptive and kinesthetic sensations and strategies to improve confidence during movement and overcoming fear of fall (Dragesund and Kvåle, 2016).

Physiotherapy treatment was designed taking into consideration the problems and need of the patient based broadly upon Advanced Orthopedics and Sports Medicine Post operative Spine Rehab-Lumbar Fusion Treatment Guidelines.

Goals: 1. Reduction in pain and inflammation.

2. Increase bed mobility and physical activity.

3. Patient education on body mechanics, flexibility and posture.

4. To re-establish the neuromuscular recruitment of multifidus (Functional dynamic lumbar stability).

5. Normalization of gait deviations.

6. Improve cardiovascular endurance and functional independence in ADL.

#### PHASE I: Immediate Post-surgical Phase

##### Week 1

Day 1: Patient was immobilized using lumbar supporting braces. Treatment involved breathing exercises and patient education regarding bed mobility and transfers with proper positioning of the spine.

Day 2: Bed positioning, diaphragmatic breathing, thoracic expansion, passive ankle and toe movements, heel slides for bilateral lower limb, isometric abdominal and quadriceps exercises were given.

Day 3-4: Thoracic expansion and ankle toe movements and heel slides, upper and lower limb mobility exercises in all planes, isometric exercises of multifidus with normal breathing within the limit of toleration and isometric contraction of the glutei was given.

Day 5-7: Strengthening exercises for the upper limb, active assisted lower limb mobility exercises and pelvic control exercises given.

#### PHASE II

##### Week 2

Strengthening exercises for upper limb, active assisted lower limb exercises and bed mobility exercises were continued. Trunk control by pelvic bridging and pelvic rotation, supported sitting, balance exercises in sitting, strengthening exercises for quadriceps in sitting and scar tissue mobilisation were given.

### PHASE III

#### Week 3-4

Balance training by weight shifting in standing and co-ordination exercises, functional reach outs, weight transfer, and sit to stand was initiated with assistance in the 3<sup>rd</sup> week. Progression to walking with assistance of walking aids started on 4<sup>th</sup> week. As balance improved, stand marching was taught.

#### Week 5-8

Focus was on regaining functional independence with ADL activities. 15-20 min. of walking to improve cardiovascular endurance was initiated and gradually progressed to 45-60 min. of cardiovascular exercise by 8<sup>th</sup> week.

#### Follow up

Patient was asked to come for follow up after 4 weeks.

*Outcome Measures:* measurements for NPRS, ODI and TSK were taken at the 1<sup>st</sup> and 8<sup>th</sup> week to detect improvement in pain, kinesiophobia and functional disability (Table 1). NPRS score at 8<sup>th</sup> week was 3/10 showing substantial reduction in low back pain. Modified ODI score showed moderate disability at 32% and the raw score of TSK was 35 implying low kinesiophobia (Table 2 & figure 2).

Outcome measures	Week 1	Week 8	Change in score
NPRS	8/10	3/10	5
Modified ODI	64%	32%	32%
TSK	51	35	16



**Figure 2** Patient in supine at Week 1, in sitting without assistance at Week 3 and in standing without assistance at week

Date	Summary of events	Assessment and Investigations	Interventions
24/03/2020	Had a fall in bathroom	None	None
30/03/2020	First hospital visit	Details not available with patient	Prescribed medications for pain, advised spinal fusion surgery
14/04/2020	Reported to present hospital	MRI done	Prescribed medications and rest Advised Posterior decompression with TLIF
25/06/2020	Surgery done	Routine preoperative	Posterior decompression with TLIF
26/06/2020	Postoperative assessment done	NPRS, Modified ODI and TSK noted at baseline	Physiotherapy with NPMP started
14/08/2020	Last day of treatment and discharge from program	NPRS, Modified ODI and TSK noted	Physiotherapy with NPMP
16/09/2020	Follow up	NPRS, Modified ODI and TSK noted	Outcome measures noted

### Follow up Report

The patient was asked to visit our hospital for follow up on 10/09/2020. The patient reported on 16/09/2020. Patient was assessed for pain, function and kinesiophobia. Score of NPRS, Modified Oswestry Disability Index and TSK were noted at follow up. Improvement was noted in all the outcome measures. The scores of NPRS, Modified Oswestry Disability Index and TSK at follow up are as follows (Table 3).

Outcome Measures	Score at Follow Up	Score at Discharge	Change in Score
NPRS	2/10	3/10	1
Modified ODI	28%	32%	4%
TSK	26	35	9

## 4. DISCUSSION

Disc herniations have a high prevalence among patients with low back pain. In low back pain patients with and without radiculopathy, prognosis after one year shows disability, pain, health anxiety and fear avoidance of movement. Surgical treatment methods have been found to have better long term treatment outcomes compared to the conservative methods. However pain and fear of movement do affect the functional outcomes. Physiotherapy is an integral part of the rehabilitation program following spinal fusion. Michael R Noonan, 2005, in a case series approach included physical therapy interventions in the rehabilitation program of patients following lumbar fusion for improved treatment outcomes. James Greenwood et al., 2015, included individualized physiotherapy to improve cardiovascular function, limb strength and flexibility in a study protocol for evaluating rehabilitation following lumbar fusion surgery.

This patient had undergone TLIF following disc herniation of the lumbar vertebra and was advised physiotherapy following surgery. Postoperative physiotherapy evaluation of the patient revealed a high degree of pain related kinesiophobia. Taking into consideration this fact, NPMP approach, focusing on strategies to improve body awareness, self confidence, dealing with fear of reinjury and feeling safe in an environment, was added to the individualized physiotherapy program. After 8 weeks of NPMP and physiotherapy program, the patient demonstrated significant improvement in all the three outcome measures. The assessment at the time of follow-up done after more than a month indicated some reduction in pain and kinesiophobia and also improvement in function.

Psychomotor factors have strong influence on level of disability and are important predictors of postoperative outcomes. Early postoperative rehabilitation with emphasis on cognition, behavior and motor control is recommended for better treatment outcome. Allan Abbott 2010, in a study on physiotherapeutic rehabilitation following lumbar fusion, found that patients improved more significantly after receiving psychomotor therapy along with individualized physiotherapy compared to individualized physiotherapy alone. Marcella Madera et al., 2017, stated that patients undergoing lumbar fusion surgery have significant fear of movement and recommended using psychological coping strategies in postoperative rehabilitation.

Limitations of this report are that this is a single case report and therefore the results cannot be generalized. Also, as NPMP is individually tailored, results may vary between patients.

## 5. CONCLUSION

The clinical implication of this study is postoperative rehabilitation that includes psychomotor measures along with physiotherapy interventions may be effective in reducing low backs pain, improving function and reducing kinesiophobia after lumbar fusion surgery. In summary, the findings of the present study may give a significant insight on the benefits of adding NPMP to an individualized physiotherapy program for low back pain following TLIF.

### Authors Contribution

Authors 1 & 2 conceived and presented the idea and performed the interventions, all authors contributed equally towards analyzing the data and preparing the manuscript.

### Informed Consent

Informed consent was obtained from the patient.

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**Conflict of Interest**

Authors declare no conflict of interest

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**Abbreviations**

TLIF: Transforaminal Interbody Lumbar Fusion

NPMP: Norwegian Psychomotor Physiotherapy

NPRS: Numeric Pain Rating Scale

ODI: Oswestry Disability Index

TSK: Tampa Scale of Kinesiophobia

**Data and materials availability**

All data associated with this study are available upon request to the corresponding author.

**Peer-review**

External peer-review was done through double-blind method.

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