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CASE REPORT - 3

Title : Is McKenzie method with core exercise effective for Patients with disc derangement?

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Abstract :

Background: McKenzie method is a common intervention for patients with Prolapse inter-vertebral disc (PIVD). Although this intervention sequence is effective but recurrence of symptoms is common, addition of core stabilization exercises will definitely give a permanent stability to disc thus reducing chances of recurrence. **Purpose:** Current study was done to see the combined effect of McKenzie with core muscle exercise in improving condition of disc herniation patient. **Study Design :** A case series of consecutive patients with Lumbar disc prolapse. Case Description: Four consecutive patients (mean age 38 years) who presented with prolapse intervertebral disc (PIVD) were treated with four weeks protocol which included McKenzie exercises along with lumbar core muscle stabilization exercises. All patients completed Visual analogue Scale (VAS), Manual Muscle Testing, spinal ranges and Quebec disability scale on initial assessment and at the end of intervention of 4 weeks. **Outcome :** Post treatment outcome score showed reduction in VAS score 56% at rest and 55.30% during movement with improvement in muscle strength, 33% improvement in back extension, 49.60% in lower abdominals, 50% in hip flexor strength and spinal ranges 44% improvement in lumbar flexion, 43% in extension 43% in side flexion right and 46% left respectively. Quebec disability score showed 65% reduction after treatment. **Discussion :** This case series describes the management and outcomes of patients diagnosed with lumbar disc prolapse treated with McKenzie with core muscle stabilization exercises. Patients demonstrated clinically meaningful decrease in pain, improved back muscle strength, improvement in spinal range of motion and decreased disability. However because a cause and effect relationship cannot be inferred from a case series, further studies in the form of well-designed, randomized clinical trials should be performed to evaluate the effectiveness of this protocol in patients with lumbar PIVD. **Conclusions :** McKenzie with core strengthening exercises reduces pain, improves strength, range of motion and reduces disability in PIVD subjects.

Key Words : Prolapse intervertebral disc, McKenzie method, core muscle stabilization exercise.

Introduction :

Recurrent back pain with radiating leg pain, is a sign of lumbar disc herniation[1]. Discogenic low back pain is a serious medical and social problem, and accounts for 26%-42% of the patients with chronic low back pain.[2] It is seen at L4-L5 and L5-S1 level with a rate as high as 98%. It is a major cause of morbidity throughout the world[3].

Physical therapy is one such conservative approach with successful treatment and prevention of disc herniation. Passive therapies like traction, Transcutaneus electrical nerve stimulation (TENS), Short wave dithermy (SWD), Manipulations like Sustained natural apophysial glides (SNAGs), and active exercises reduces PIVD pain. McKenzie method is a type of active exercise, also minimize PIVD pain[4].A systematic review showed that patients with low back pain treated with MDT reported a greater, more rapid reduction in pain and disability compared with NSAIDs, educational booklets, back massage and back care advice, strength training, spinal mobilization and general exercises.[5]

Core muscle system is the total component of a protective mechanism which reduces the stress that harmful forces are applying to spine during the functional movement[6].Reduced core strength leads to recurrent disc displacement . Strengthening the core increases stability thus reducing displacement. Number of studies on effect of core stabilization exercise for LBP are their but effect on a precise such as of lumbar disc prolapse is not that common.

If Mckenzie exercise that reduces disc derangement is

prescribed with core exercise that strengthens the muscle prolong improvement can be obtained. Hence this case series was undertaken to assess the combined effect of McKenzie with core muscle exercise in subjects with lumbar disc herniation.

METHODS

Material and Methodology : Study design was case series study A-B-A design done at Tertiary care Hospital. The ethical clearance for this study was obtained from IEC, COPT. For this study both Male & Female patients[7] between age of 30 to 50 years[8] with acute(>3 weeks to <6 weeks), sub-acute (>6-12 weeks)[9] were included. Patients with symptoms of - pain, paraesthesia or both in lumbar spine, with symptoms extending from gluteal fold to distal of knee/till ankle. Patients with any 3 of following symptoms as Painful heel and toe walk[10], showing 5, 6 or 7th derangement symptoms,[11] Flexion limited to reaching 2/3 of thigh[10,12], Straight leg raising angle less than equal to 60 degree with leg pain[10,13] were included in study.

Participants were excluded if they underwent any lumbar surgery within 6 month of baseline examination [11], had any serious spinal pathology such as spondylolisthesis, spinal canal stenosis or inflammatory condition[13], Severe active medical, neurological disorder /psychiatric comorbidities .Osteoporotic due to specific infection as T.B or prior h/o of T.B, h/o steroids intake for > 3-4 month or analgesics/ nerve blocking injectable or drugs for LDH condition and if were pregnant[14]

Outcome measures - Quebec Back Pain Disability Scale [16] Manual muscle testing[15] Lumbar range of motion by schober's method[15,17] Vas scale for pain level were measured at baseline and after 4 weeks.

PROCEDURE The written informed consent was taken from participant. Total 4 participants(1 male & 3 female) were included in the case series.

Participants received 3 individual sessions per week for 4 weeks, lasting an average of 45 minutes to an hour each. Treatment was provided in accordance with the direction of the preference of movement, or rather, flexion, extension) of McKenzie exercise with core exercise program[18,19]. The subjects were supervised in order to ensure that the exercises were performed correctly. The intensity of the exercises was at the subject's tolerance level, and the subjects were encouraged to report any problems immediately.

Mckenzie Flexion exercises

Level 1 - flexion in lying
Level 2 - flexion in sitting
Level 3 - flexion in standing

Mckenzie Extension Exercises

Level 1 - lying prone
Level 2 - lying prone in extension
Level 3- sustained extension
Level 4 - extension in standing

Core exercises (for transverse abdominus and multifidus) were given to all four patients.The subjects were asked to comfortably perform 10 contraction repetitions, 10-second duration twice daily for 4weeks. Once in OPD and once at their house.

Table 1 showing patients demographic variables

	Patient 1	Patient 2	Patient 3	Patient 4
Age	42	44	35	34
Sex	F	F	M	F
BMI	27	23	23	24
Occupation	Housewife	housewife	Driver	Housewife
Onset of pain	Sudden due to lifting weight	Sudden due to fall	Gradual	Gradual due to lifting weight
Painful bias	Extension	Flexion	flexion	Flexion
Duration of symptoms	2months	2weeks	2 months	4months

Result : Table 2 outcome measure at baseline, after 4 weeks & % change post treatment

	Patient 1				Patient 2				Patient 3				Patient 4			
	Bef	Af	Change		Bef	af	Change		bef	Af	Change		bef	af	change	
MMT				%				%				%				%
back ext strength	3	4	1	25	2	4	2	50	3	4	1	25	2	4	1	25
lower abdo strength	2	3+	1	33	1	3	2	66	2	4	2	50	1	3	2	50
Upper abdo strength	2	4	2	50	1	4	3	75	3	4	1	25	1	4	1	25
hip flexor	3	4	1	25	4	4	0	0	4-	5	1	20	4	5	1	20
Hip extensor	2	4	2	50	4	4	0	0	4	5	1	20	4	5	1	20
Hip abductor	4,	4	0	0	4	4	0	0	5	5	0	0	4	5	0	0
knee extensor	3+	4	1	25	4	4	0	0	5	5	0	0	4	5	0	0
knee flexor	4+.	4+	0	0	4.	4	0	0	5.	5	0	0	5.	5	0	0
Ankle dorsiflexor	4	4	0	0	4	4	0	0	5	5	0	0	5	5	0	0
Ankle planterflexor	4+	4	0	0	4	4	0	0	5	5	0	0	5	5	0	0
Finger to floor -- Spinal ranges																
Flexion in cm	3	5	2	44	1	5	4	48	3	5	2	40	1	5	4	48
Extension in cm	3	3.5	0.5	14	0.5	3	2.5	83	2	3	1	33	0.5	3	2.5	83
Side flexion left	9	15	6	40	5	8	3	38	6	13	7	53	5	8	3	38
Side flexion right	7	14	7	50	5	7	2	28	5	13	8	61	5	7	2	28
Rotation left	4	5	1	20	3	5	2	40	3	5	2	40	3	5	2	40
Rotation right	4	5	1	20	3	5	2	40	3	4	1	32	3	5	2	40
On vas pain level at rest	3	4	1	33	7	1	-6	85	6	3	-3	50	7	1	-6	85
On vas pain level at movement	4	5	2	50	9	3	-6	66	8	4	-4	50	9	3	-6	66

The result showed there was improvement in muscle grade in MMT with 33% improvement in back extension, 49.60% in lower abdominals, 50% in hip flexor strength and 23% in hip extensor strength. Finger to floor showed 44% improvement in lumbar flexion, 43% in extension 43% in side flexion right and 46% left respectively. Rotation to left showed 33% and to right showed 30% improvement. Mean reduction in pain was on vas score of 56% at rest and 55.30% during movement.

Quebec score also showed a significant improvement 65% after treatment. This signifies all outcome measures showed significant improvement compared to baseline values.

Because of small sample size, no statistical analysis was completed on this series. Exercise and time effects, respectively, describes the significance of treatment and differences between baseline and after 4 week treatment. Interaction (% change) describes there is significant difference in the outcome measures from baseline values.

DISCUSSION :

The patients were assigned either McKenzie flexion or extension exercises according to their individual directional preferences combined with core muscle exercises to all of them. Outcome measure after treatment showed improvement than baseline measure. Therefore, it is implied that the results obtained in the course of this study could have been largely due to the effects of the treatment regimens.

Of interest in this case series, was one patient who reported that numbness and loss of sensation, her symptoms were reduced in intensity, while after 4 weeks of treatment she started experiencing pain sensation. This might be due to reduction in compression on nerve that led to reduction in numbness and increase in sensation level so she started experiencing pain. This might be due to McKenzie exercises directional preferences that lead to centralization of protruded disc leading to release of impinged nerve. R. A. Mckenzie in his book “The lumbar spine Mechanical diagnosis and Therapy” says the reversal of symptoms occur during centralisation. When the protrusion reduces in size, it releases first the nerve root and then the dura matter, which results in acessation of pain and paraesthesia below the knee followed by a reduction in thigh pain.

Results indicated significant reduction in the patient's pain level this might be also due to centralization phenomena when compared with baseline outcome measures. These correlates with Patrick et al' s., 2002 study that shown one third of the patients with sciatica recovered within two weeks and approximately 75% within three months[20]. Another study shows McKenzie increases patients activity level and improves strength[21].

Our study result of MMT shows improvement which matches with previous Clinical studies that indicated that the McKenzie method is slightly more effective than manipulation or is equal to strengthening training for patients with chronic low back pain[22,23].

In our study Mean reduction in pain was on vas score of 56% at rest and 55.30% during movement, that correlate with Patrick et al' s study.

Panjabi in 1992 described spinal stabilizing system as consisting of three subsystems. The vertebrae, discs, and ligaments constitute the passive subsystem. All muscles and tendons surrounding the spinal column that can apply forces to the spinal column constitute the active subsystem and third neural subsystem. A dysfunction to component of any one of the subsystems may lead to other subsystems compensation, adaptation and injury to one or more components of any subsystem. Degradation of the spinal system may be due to injury, degeneration, and/or disease of any one of the subsystems abnormally large intervertebral motions causes disc displacement leading to pain sensation. This large load-carrying capacity is achieved by the participation of well-coordinated muscles surrounding the spinal column mainly the core stabilizer.[22]

Thus, the importance of the active subsystem (the muscles) in providing the required stability is explained by Panjabi. Strengthening of core muscle groups may improve specific passive stability that was lost due to injury. That would led to reduce instability, reduce load on disc so less disc displacement. It leads to less nerve impingement and less radiating pain. Hence we

can say core strengthening leads to reduced pain. Pain reduction gives chances to improve mobility i.e spinal ranges thus reduction in overall disability. In this study there is improvement in muscle grade33% improvement in back extension, 49.60% in lower abdominals, 50% in hip flexor strength. Back & abdominal strength improvement was due to regular core exercise that leads to hypertrophy of core muscles. Spinal range showed 44% improvement in lumbar flexion, 43% in extension 43% in side flexion right and 46% left respectively. This was mainly due to reduced pain and increase stability. Xue-Qiang Wang in their study concluded compared to general exercise, core stability exercise is more effective in decreasing pain and may improve physical function in patients with chronic LBP in the short term.[24]Rotation to left showed 33% and to right showed 30% improvement. This improvement seems unsignificant as spinal ranges were least hampered.

Quebec score showed a 65% improvement after treatment. The result correlate with study by Paul S. Sung, who revealed CSE intervention reduced disability level following the 4-week intervention period[25]

Post treatment outcome measure might be due to the combined effects of movements by Mckenzie & core stabilization exercise. Mckenzie exercises helped shifting the disc in opposite side of derangement thus reducing the disc prolapse & core stabilization exercise that strengthened the surrounding muscles thus improving stability, reducing load on disc and thus reducing disc shift and prolapse

The patients with lumbar disc herniation reported satisfactory relief with exercise which prescription of McKenzie and core strengthening. So this study Concludes McKenzie with core exercises helps reduce pain, improves muscle strength and reduces disability in lumbar disc herniation patients. This case series suggests that it may be possible to alter a patient's course of pain and functional ability with this treatment program.

Because a case series cannot establish a cause-and-effect relationship, further research, including randomized clinical trials, is necessary to uncover the exact combined effects of McKenzie and Core exercise for the treatment PIVD.

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