Preoperative Predictors of Outcome Post Lumbar Discectomy

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ABSTRACT:

BACKGROUND:

Deciding the prognostic factors that influence the surgical result would be useful for judgment planning. Other than that, recognizing the prognostic factors that foresee the clinical course of remaining dissensions may be essential for assist advancement of viable strategies for treatment, particularly when these prognostic components can be changed.

OBJECTIVE:

The aim of the study was to determine the positive, negative and unrelated predictors of surgical outcome for patients undergo lumbar discectomy.

PATIENTS AND METHODS:

A prospective cohort study including consecutive series of 102 patients, who had undergone surgical management for herniated lumbar discs at the private nursing home hospital in Baghdad, Iraq, between March 2017 and March 2018, were included in this study. The patient population consisted of 45 females and 57 males, ranging in age from 22 years to 65 years at the time of initial diagnosis with a mean age of 44.7 ± 7.9 years. A full available investigation had done including X-rays and M.R.I.

RESULTS:

Male: female ratio equals 1.3:1, 69.6% are employed, 58% with no or basic educational level and 70% of patients were smokers. Average duration of low back pain and radicular pain were 8 and 4 months respectively. In 89% there was disc space height loss, the level lumbar disc herniation was at L4-L5 in 45% while at L5-S1 in 41%. Mean Oswestry disability index (ODI) was 63 and 27.7 respectively both pre and postoperatively. Mean Visual Analogue Score (VAS) for low back pain for pre (4.8) and postoperative period (1.8) while mean VAS for radicular pain preoperatively was 4.3 and postoperatively 1.4. The mean MCID – TUG test was 4.3 seconds.

DISCUSSION:

Comparisons have been made with other studies regarding preoperative predictor factors and the lumbar discectomy surgical outcome.

CONCLUSION:

- The good surgical outcome can be predicted with MCID ~ TUG test ≥ 3.4 seconds, TUG < 14 seconds, L5 - S1 disc level, annular defects, employed status, higher education, preserve disc height, BMI < 25, short duration of < 3 months of preoperative radicular pain. Lower VAS low back pain preoperatively of < 4 will have better postoperative results regarding back pain.
- Worse outcome predictors include male gender, tall patients >180 cm, low level of education, unemployment, higher preoperative ODI ≥ 40%, positive tension root signs, > 50 % disc height loss, preoperative motor deficits, prolonged duration of preoperative low back pain (> 3 months) and higher preoperative VAS score radicular pain (≥ 4). Also to mention that higher preoperative VAS low back pain (≥ 4) will be translated to more postoperative radicular pain.
- Factors that have no effect on outcome include age and smoking.

KEYWORDS: Outcome, predictor factors, lumbar discectomy.

INTRODUCTION:

Lumbar disc herniation is one of the commonest purposes behind spine facility visit. Its administration ranges from preservationist administration to surgical alternatives.

Open Lumbar discectomy is as often as possible utilized as a strategy for treating lumbar disk herniation that requires spinal surgery.

Since it was presented, it has been broadly utilized as the fundamental surgical regimen for the treatment of disc herniation. [1]

Mixter and Barr carried out the principal lumbar discectomy by a laminectomy and transdural approach in 1934.

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Semmes depicted the hemilaminectomy approach with the withdrawal of the dura to expel the disc. Lumbar discectomy gives a powerful clinical advantage in patients with sciatica. There is solid proof for microdiscectomy surgery over conservative treatment at here and now development. [1]

Outcome:

A wide range of parameters has been concentrated to distinguish prescient elements for the outcome after lumbar discectomy. Some of these components are magnitude and span of leg pain, Physical examination, gender, age, work and academic level, social and psychic factors and sort of herniation. [2]Variables that have been recognized to foresee a positive result (leg agony remedy and additionally fulfillment with surgical outcome as well as come back to work) are brief time of preoperative leg pain, no preoperative co-morbidity, male sex, age and concise time to surgery. [3]

Longstanding preoperative leg agony has been shown to be an indicator of a less ideal result. Overwhelming manual work and low level of education, female gender, contained herniation, protruded disc and central lumbar disc herniation are different elements that may influence the result adversely. [4]

I.I. Outcome appraisals

There is a wide range of approaches to assess the result after lumbar disc herniation surgery. Generally, the impact of treatment has been founded on pain scales (VAS), come back to work, working status, imaging estimations, and surgery-related complexities. The result was before regularly surveyed by the specialist however, an autonomous spectator (objective) or the patient itself (subjective) has been acquainted with assessing the outcome. [5]

I.I.I. Subjective outcome

A few approved patient controlled inquiries utilized for patients surgically treated for the spinal cases. The greater part of them depends on the back and leg pain remedy, day to day living, physical action, inability and social confinement. [6]

The "Visual Analogue Scale" (VAS) is a pain scale utilized for formulating the patients' agony in the clinical care of patients yet additionally a notable outcome instrument for pain evaluation regularly utilized as a part of orthopedic conditions (e.g. in spinal surgery). Clarke and Lance presented this instrument in therapeutic science 1964, for appraisal of prosperity. [6]

The "Oswestry Disability Index" (ODI) portrays back-related incapacity with a blend of physical and social limitations. It has developed as the most generally prescribed condition-particular outcome for spinal problems. ODI was created by John O'Brien in 1976 and depends on interviews with an orthopedic specialist and an occupational advisor of back pain patients. In view of these meetings, they developed a survey made of 10 questions covering distinctive measurements of everyday living. [7]

I.I.II. Objective outcome

The hazard of prejudice diminishes when utilizing an autonomous eyewitness not engaged with the treatment of the patient, for appraisal of surgical result. The target result is frequently characterized by scales identified with postoperative pain alleviation, work limit/sick leave, daily activity or analgesics utilization. These scales regularly utilize the scale; magnificent, great, reasonable or poor. They are exhibited to relate well with other approved result scores in light of subjective result and patients' fulfillment with treatment. [8]

I.I.II.I. The timed up and go (TUG) test

It measures the period that a patient needs to rise from a chair, march for three meters, rotates, return to the chair, and sit down. TUG test is a reliable tool to evaluate objective functional impairment in patients with degenerative disc disease. The validity of the TUG Test was demonstrated with good correlation with the Visual Analog Scale (VAS) back and leg pain and functional impairment indexes, as well as with Health Related Quality of Life **(**HRQoL). The upper limit of “normal” was determined as 11.5 s. [9]

Although all established patient related outcomes (PROs) deliver specific numeric values of pain intensity, functional impairment, and HRQoL, the scores do not directly translate into clinically meaningful improvement. [10] Thus, the concept of the minimum clinically important difference (MCID) was established and later introduced as a critical threshold to define treatment effectiveness. [11]

Currently, MCID considers being "the smallest change that is important to patients." [12] So far, several studies have reported a range of different MCIDs for established PROs in different patient populations with various spinal pathologies. The average TUG Test MCID was 3.4 s. [12]

Patients and methods:

This randomized cohort study was conducted prospectively between March 2017 and March 2018 on 102 patients who were diagnosed with lumbar disc prolapse and surgically treated with underwent open conventional lumbar discectomy at the private nursing home hospital in Baghdad, Iraq. Patients with secondary gains, other spinal disorders, history of previous spinal surgery or recurrent herniation, more than 70 years old, well-known psychological disturbance were excluded from study.

All patients subjected to preoperative assessment including sociodemographic data, full detailed clinical history, neurological examination including, BMI, radiological investigation including plain x-ray and MRI study of lumbosacral spine done for all patients. Both preoperative and postoperative evaluation (after 1 month) for back pain and radicular pain using the visual analogue scale (VAS), degree of disability according to Oswestry Disability Index (ODI), timed up and go (TUG) test and the minimum clinically important difference (MCID).

RESULTS:

I. Analysis of sociodemographic data:

a. Gender: This study included 57 male (55.9%) and 45 females (44.1%) with male to female ratio being 1.3:1.

b. Age: The age incidence ranged between 22-65 years with mean of 44.7 ± 7.9 years, the male's mean age was (43.8 ± 8.9) and the female's mean age was (45.9 ± 6.3). (mean ± standard deviation)

c. Occupation: There were 71 patients (69.6%) employed and 31 patients (30.4%) were unemployed.

d. Education level: 59 patients (57.8%) have noneducated or primary level of education, 43 patients (42%) have secondary level or university degree.

e. Smoking habit: There were 70 patients (68.6%) were smokers and 32 (31.4%) patients were non smokers.

f. Body mass index (BMI): The mean of BMI for the patients included in the study was 31.7 ± 5.85 with the mean for males was 32.5 ± 5.79 and for females was 30.68 ± 5.83. (mean ± standard deviation)

II. Analysis of the preoperative presentation and clinical examination findings:

a. Patients clinically presented with the following:

- Low back pain (LBP) with duration of preoperative back pain ranged from (2-18) months with mean of 8.2 ± 3.96 months **(**mean **±** standard deviation).
- Radicular pain (RP) with duration of preoperative radicular pain ranged from 0.5-12 with mean of 4.18 ± 2.9 months **(**mean **±** standard deviation).

b. Clinical examination of the patients revealed the following:

- Of the 102 patients included in the study, only 12 patients (11.77%) presented with motor deficit and all the other 90 patients (88.23%) were intact.
- Tension root signs (either SLR or reverse SLR) were positive in 91 patients (89.2%).

III. Analysis of radiological results:

- On plain X-ray, of the 102 cases, disc space narrowing > 50% was present in 91 cases (89.2%).
- In regard to the level of disc herniation, there were 46 cases of L4-5 (45.1%), 42 cases of L5-S1 (41.2%), 10 cases of L3-4 (9.8%) and 4 cases of L2-3 (3.9%).

IV. Analysis of prognostic factors affecting ODI, low back pain VAS, Radicular pain VAS and MCID – TUG time at postoperative follow-up.

Table 1. Analysis of prognostic factors affecting ODI, low back pain VAS, Radicular pain VAS and MCID – TUG time at 1 month postoperative follow-up.

	ODI		low back pain VAS		Radicular pain VAS		MCID – TUG time	
	F	**Sig.**	**F**	**Sig.**	**F**	**Sig.**	**F**	**Sig.**
Age of patients	.816	.683	2.114	.059	.565	.688	.902	.607
Height in meters	1.893	.026*	2.424	.032*	3.104	.019*	1.106	.357
Weight in kilograms	.935	.543	1.790	.109	1.228	.304	.886	.628
Calculated BMI	.689	.819	1.114	.360	4.468	.002*	.590	.937
Employment status	.695	.814	3.853	.002*	1.510	.205	.776	.767
Smoking status	.866	.624	.752	.609	1.158	.334	.778	.048*
Preoperative Reflex Changes	1.286	.017*	.750	.611	3.095	.02*	1.101	.362
Annular defect on MRI	.663	.844	3.881	.002*	7.603	.001*	3.669	.001*
Herniation disc level	1.745	.045*	1.726	.123	6.917	.001*	1.322	.173
Education level	.863	.627	2.068	.015*	5.740	.001*	1.739	.032*
Preoperative low back pain duration (months)	1.251	.02*	4.153	.001*	9.253	.001*	.958	.533
Preoperative Motor Deficit	.471	.967	2.092	.061	2.541	.045*	.978	.508
Duration of preoperative radicular pain	.523	.945	3.513	.004*	3.213	.016*	.454	.988
Disc Space height	1.286	.017*	.750	.611	3.095	.02*	.425	.993
Preoperative low back pain VAS	1.292	.211	38.607	.001*	1.622	.029*	.804	.732
Preoperative radicular pain VAS	1.103	.364	.930	.477	48.237	.001*	1.574	.065
Radicular pain VAS (1 month postoperative)	.853	.639	1.548	.171	-	-	1.405	.127
Preoperative ODI	1.980	.018*	.833	.547	1.238	.300	1.021	.455
Time up and go in seconds preoperative	.756	.750	1.870	.094	3.902	.006*	2.066	.008*
Time up and go in seconds (1 month postoperative)	.525	.944	2.134	.056	3.998	.005*	2.145	.005*
MCID – TUG	4.640	.001*	.669	.675	1.916	.114	-	-
Low back pain VAS (1 month postoperative)	1.173	.300	-	-	3.123	.018*	.405	.995
Postoperative ODI (1 month postoperative)	-	-	.628	.707	.202	.937	1.256	.009*

****ANOVA * Statistically significant Sig. = Significance F= Factor**

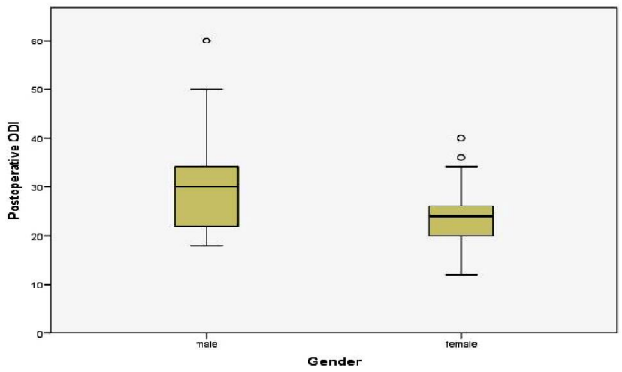

Figure 1. Gender and postoperative ODI relationship

IV.I. Analysis of the factors affecting ODI: (see Table 1.)

- The male gender showed a tendency (p = .001) for a *higher* ODI score (≥ 40%) (worse outcome) (69.1 ± 10.25) as compared with that of the female (56.2 ± 12.8) **(**mean ± standard deviation) as shown in figure 1.
- Similarly, taller (>180 cm.) patients (p = .026), positive preoperative reflex changes (p = .017), lost disc space height (≥ 50%) (p = .017) and higher (≥ 40%) preoperative ODI score (p = .018) have *high* ODI scores (worse outcome) at final ODI (1 month).
- On the contrary a correlation between The minimum clinically important difference (MCID) of The Timed Up and Go Test (TUG Test) with ODI exist as more MCID score (≥ 3.4 seconds) will *decrease* (< 40%) (Better outcome) the final ODI (p = .001).
- Likewise a follow up ODI at 1 month postoperatively was significantly *lower* (p = .02) in patients with preoperative duration of LBP < 3 months.
- Analogously, A follow up ODI was significantly *lower* (p = .04) at L5-S1 disc level herniation.
- However, the ODI scores at a final follow-up *did not show a significant difference* depending on some factors as a smoking history, age groups.

IV.II. Analysis of the factors affecting LBP VAS: (see Table 1.)

- At the final follow up (1 month postoperative), VAS of low back pain was markedly *lower* (< 4) (better outcome) in the cases with annular defects as compared with that cases with intact annulus with (p = .002). We realize similar relation with higher (≥ 4) preoperative VAS of low back pain (p = .001).
- Similarly it was found that VAS score of low back pain (1 month postoperative) significantly is *lower* (p= .004) in patients with shorter duration (< 3 months) of preoperative radicular pain.
- In contradiction, we found that lower level of education (p = .015) and longer period (≥ 3 months) of preoperative back pain (p = .001) correlate positively with *higher* scores (≥ 4) of VAS post operative low back pain (worse outcome).
- Comparably, taller patients tend to have *higher* scores of low back pain VAS postoperatively (p = .032). Likewise, *higher* VAS scores for post operative low back pain found in patients who are unemployed (p = .002).
- However, according to the factors of age, gender, BMI, smoking, have no significant relation to the LBP VAS scores at final follow-up.

IV.III. Analysis of factors affecting radicular pain VAS: (see Table 1.)

- At follow-up of radicular pain VAS (after month) and based on statistical analysis, there were significant tendency for *high* (≥ 4) radicular pain VAS (worse outcome) in patients with positive preoperative reflex changes (p = .02). In like manner to the relation with the duration of preoperative low back pain (p = .001), as the longer the duration (≥ 3 months) will score *higher* regarding VAS radicular pain postoperatively. Also High radicular pain VAS preoperatively (p = .001) and preoperative motor deficits (p = .045) produce *high* post operative VAS.
- On the other hand, *lower* (< 4) VAS scores (better outcome) for radicular pain was found to be related to higher level of education (p = .001) also lower scores in patients with preserved disc space height (p = .02). Lower scores regarding both pre (p = .029) and post (p = .018) operative VAS back pain associated with a lower VAS radicular pain postoperative score.
- Analogously, we found that both pre (p = .006) and post (p = .005) operative TUG scores are related, the lower the TUG score (< 14 seconds) associated with *lower* VAS score for radicular pain in the post operative period.
- Uniformly, L5-S1 disc level herniation (p = .001), annular defect (p = .001), calculated BMI (< 25) (p = .002), height of patients (< 180 cm.) (p = .019) were all associated with better outcome in form of less VAS score (< 4) postoperatively for the radicular pain.

- Other factors were not affecting the radicular pain VAS scores with no any significant correlation.

IV.IV. Analysis of The factors affecting the MCID ~ TUG: (see Table 1.)

- MCID ~ TUG of ≥ 3.4 seconds (better outcome) related significantly to the reduction in both pre (p = .008) and post (p = .005) operative TUG times of < 14 seconds.
- Equivocally, MCID ~ TUG was related to the employment status, with employee will produce a bigger improvement in TUG ~ MCID of ≥ 3.4 seconds (p = .048) (better outcome).
- Identically, post operative ODI related to the TUG – MCID (p = .009) with the more the MCID ~ TUG of ≥ 3.4 seconds connected to more decrease in ODI scores (better outcome).
- Correspondingly, Disc Space height (p = .001) shown to cause more MCID ~ TUG when the disc space was preserved or minimally reduced in height.
- Finally, regarding better outcome factors, it was found that herniation disc level (p = .032) has an effect on the TUG ~ MCID, especially for L5-S1 disc level herniations as it shown to be associated with more MCID ~ TUG.
- On the other side it has been found that positive preoperative reflex Changes shown to correlate with reduced TUG ~ MCID (worse outcome) (p = .001).
- Other factors not shown to be statistically significant with MCID ~ TUG.

DISCUSSION

- In our study, there was no statistically significant relationship amongst age and the postoperative outcome. This can be explained by the uncommon of symptomatic disc pathology at older age groups with more of spinal stenosis.

To date, numerous investigations have been directed to inspect the connection between the treatment results of ordinary open discectomy and how old the patients are. As per Hurme and Alaranta [13], the treatment results were observed to be poor in patients matured 40 years or more. Weber [14] likewise noticed that the treatment results were poor at follow-up as the patient age get older.

However as indicated by Junge et al. [15], Woertgen et al. [16] and Kaptain et al. [17], there was no huge relationship amongst age and the postoperative results. Likewise, Carragee et al. [18] has demonstrated no impact of age on the postoperative consequences.

- Additionally in our investigation, the postoperative ODI was somewhat higher (worse outcome) for the male (69.1 ± 10.25) patients as contrasted and their female counterparts (56.2 ± 12.8) and was statistically significant. This in part may be related to the gender differences regarding workload, preoperative duration of symptoms that are heavy and prolonged respectively.

Numerous examinations have inspected the impact of gender on the consequences of discectomy. As indicated by Manniche et al. [19] the surgical treatment results of 261 patients were poorer for the female patients as contrasted and their male partners.

Weber [14] and Kosteljanetz et al. [20] similarly noticed that the surgical treatment results were poorer in female patients as contrasted and their male partners; however, there was no measurably noteworthy distinction in the treatment results between the two gatherings.

Then again, Junge et al. [15], Woertgen et al. [16] and Kaptain et al. [17] have demonstrated no relationship with outcome result. Carragee et al. [18], Kohlboeck et al. [21], Lee et al. and Gautschi et al. [22] who have neglected to discover a relationship between the gender and the postoperative result.

- Regarding our research, there was no factually noteworthy contrast with respect the postoperative low back pain VAS, radicular VAS and ODI between the smoker and the non-smokers. The possible reason can be attributed to that our smokers group was not heavy smokers and our institute policy to abstain from smoking at least 1 month before surgery and to continue this abstinence in the post operative period indefinitely.

In spite of the fact that, Hanley and Shapiro [23] revealed that postoperative low back agony is essentially related to patients who have more noteworthy than a 14 pack-year smoking history. The same likewise has been accounted for by Ahn H et al. [24] who consider smoking as a hazard factor for repetitive herniation.

Notwithstanding, Carragee and Kim [25] and Woertgen et al. [16] have demonstrated that there was no critical relationship between's the postoperative low back pain score and a smoking history and expected that smoking has no extraordinary effect in light of the fact that numerous variables are engaged with postoperative low back agony. This runs likewise with Stienen et al. [26] This was upheld by the investigation led by Ng and Offer [27] on which additionally denied any huge connection of surgical outcome with smoking.

- For the current study at our institute, patients with BMI over or equal to 25 demonstrate a noteworthy propensity for higher radicular agony VAS at the final follow up contrasted with those with BMI of lower than 25 while there was no huge distinction as respect postoperative low back pain, ODI or TUG ~ MCID between the two gatherings. This is identified with the weight impact applied to the included nerve root that is as of now traded off by the herniated plate material with its impact on vascularity and resultant root ischemia.

  Numerous examinations demonstrate no impact of higher BMI on result limiting the estimation of body weight as an indicator of outcome as those investigations directed via Carragee and Kim [25], Schade [28] and Lee [29]. However, in a research by Block [30] indicated corpulence to negatively affect the outcome.

- As sees the level of education as an indicator of the postoperative result, the present investigation has demonstrated that more elevated level of education related with bringing down VAS scores for radicular pain (p = .001) (better outcome). Lower level of education connects emphatically with higher scores of VAS postoperative low back agony (*p* = .015).

Higher level of educated patients will bring better comprehension of the pathology of the disease and put better expectations and realistic outcomes. On other hand, lower education level usually brings possible financial challenges and psychosocial issues that adversely affect the surgical outcome.

This runs with different investigations, where a low education level was a negative indicator as in the study of Young [31] and as revealed by Junge [15], Woertgen [16] and Kohlboeck [21]. Kaptain [17] have proposed in his study this is on the grounds that people with a higher education and with a higher rank in their occupations may conquer any incapacity keeping in mind the end goal to accomplish their objective in the vocation.

- Work status before surgery has been inspected in our study as an indicator of result with altogether worse outcome translated into higher VAS scores for postoperative low back pain among non-working patients (p = .002) contrasted with the individuals who are working.

  Unemployment has its adverse drawbacks on surgical outcome, so factors like financial issues, psychosocial and depression will be accused for.

This has been analyzed in some studies, and the outcomes seem, by all accounts, to be to some degree clashing. In one review examine on herniated disc patients directed by Loupasis [32], it has been accounted for that employers had a poorer result in regards to their execution in work after discectomy. Block, likewise uncovered in their study a poorer result concerning substantial manual laborers, while a further two investigations on discectomy patients by Dionne [33] and Elfering [34] demonstrated no impact of employment on the surgical outcome.

- Duration of symptoms before the surgery has been analyzed as an indicator of outcome in numerous studies. Regarding our study, preoperative span of low back pain of under 3 months was related to better outcome as far as altogether (p = .02) bring down ODI and lower VAS score of low back pain (p= .004) at final follow-up. While preoperative radicular pain of over 3 months has worse outcome in form of higher scores of VAS postoperative low back pain (p = .001) and higher radicular pain VAS (p = .016).

The longer duration of symptoms means longer pressure over nerve roots with interruption of neural transmission and nerve ischemia and hypoxia that will cause varying degrees of nerve

injury that persist for variable periods after removal of the disc.

As a matter of fact, Longer length of preoperative radicular pain has been depicted as an indicator for the poor result after lumbar discectomy as per Jonsson [35], Vucetic [36], Ng and Offer [37], Nygaard [38]. In later study led by Silverplats [39], preoperative length of leg pain less than 6 months were identified with excellent-good result at both 2-year and long-term follow-up.

Whereas Blazhevski [40] announced that the best result was found in patients with < 3 months span of sciatica accepting that after this term perpetual pathologic changes will begin inside a nerve root.

In disparity to the above, as indicated by Manniche [19], Schade [28] McGregor and Hughes [41], Carragee et al. [42] and Lee et al. [29] there were no huge contrasts in the preoperative span of manifestation and the postoperative outcomes. These examinations suggested that neurologic outcome can be normal after discectomy even in the patients who have long-standing radiculopathy because of disc herniation.

- Concerning our study, examination of preoperative clinical findings as predictors of surgical outcome uncovered more regrettable result as respect to high radicular pain VAS (p = .02), high ODI (p = .017) and diminishment in TUG ~ MCID (p = .001) at final follow-up in relationship with positive tension root signs (SLRT).

Also motor deficit has a noteworthy connection with a worse outcome as indicated it is specifically connected to the higher radicular pain VAS score postoperatively (p = .045).

Positive reflex changes and motor deficit preoperatively indicates the severity of neural injury. Ischemia, hypoxia, irritation and inflammation with edema of nerve roots, especially with prolong duration, all attributed to less favorable surgical outcome.

As per Kohlboeck et al. [21], positive preoperative Lasègue's sign showed a better result. Junge et al. [15] expected that lost reflexes pre-operatively are related with the better result after surgery. Conversely, Hagg et al. [43] found that the main indicator for the result after surgery was the status of motor function and its loss has been identified with a poor result.

- As respect the surgery disc level, in our study, a correlation was differentially made with surgical outcome. There was noteworthy contrast in the final clinical outcome as respect the post operative ODI relying upon the influenced fragment with L5-S1 level had better final ODI (p=0.04) in comparison with other disc levels, the same relation found with better outcome in form of increase TUG ~ MCID (p = .032) and less radicular pain VAS score (p = .001) postoperatively.

  The preference of L5-S1 regarding better surgical outcome in part related to the fact of thecal sac is more spacious and that give some sort of protection to nerve roots at this level.

  Truth be told, there are numerous examinations revealing that there was no noteworthy contrast contingent upon the influenced level. In relationship with this, Manniche et al [19], Kim et al [44] and Lee et al. [29] revealed that there was no huge distinction relying upon the level. Weir [45] detailed that L5-S1 lesion would do well to clinical outcome postoperatively.
- In our study, there were critical relationships between disc space narrowing and the postoperative clinical outcomes. Poor outcomes in the form of higher ODI scores (p = .017) associated with a marked loss in disc space height (> 50 %). On other hand preserved or minimally reduced disc space height (< 25%) shows better outcome as the increase in TUG ~ MCID (p = .001) and Lower VAS scores for radicular pain (p = .02).
- An explanation to our results attributed to that disc space narrowing will add more pressure on nerve roots that are already impinged by the herniated disc material. Biomechanics disruption with eventual ischemia, edema and acceleration of the degenerative cascade will result. Therefore, the issue of restoration of disc space height comes with importance for better surgical outcome.

As per Dabbs and Dabbs [46] and Nah et al. [47] there was no critical relationship between the preoperative disc space narrowing and post-discectomy low back pain. Lee et al. [2] likewise detailed that there was no huge relationship between's the disc space narrowing and the postoperative clinical result.

Interestingly, Hagg et al. [43] found that the affection of the height of the disc (less than 50%) was associated with poorer outcome regarding low back agony.

- At the final follow up, VAS of low back pain was markedly lower in the cases with annular defects as compared with that cases with intact annulus (p = .002). This can be attributed to the tension caused by the herniated disc which can be reduced with defects in disc annulus and less pressure over adjacent neural structures and better outcome.

  This goes in harmony with some studies like the one conducted by Carragee et al. [42] recognized that the type of disc herniation is related strongly to the surgical outcome. Ng and Sell [27] found that patients with extruded disc perform better regarding outcome after surgery in comparison to protruded disc.

  Schade et al. [28] declared that the type of disc herniation and the affection of the nerve root in MRI were found to be a solid based anticipator for the outcome after surgery. In a practical sense, surgery would seem best indicated in symptomatic cases, where disc herniation is substantial enough so that its removal would relieve a sufficient level of nerve root compression and gain the ultimate outcome postoperatively.
- The mean minimum clinically important difference (MCID) of The Timed Up and Go Test (TUG Test) in our study was 4.3 seconds. It is related to the better outcome postoperatively for lumbar disc surgery as those measures are the only practical objective measures for outcome.

Better outcome regarding more increase in MCID ~ TUG test (> 4.3 seconds) associated with longer preoperative TUG time (p = .008), employed status (p = .048). Interestingly MCID ~ TUG test also related to reduction in final post operative ODI scores (p = .009).

Better results for TUG ~ MCID when the disc space was preserved or minimally reduced in height (p = .001) on same direction better results (p = .032) happen with herniation level at L5-S1. Worse outcome happen with positive reflex changes preoperatively that is translated to less than 3.4 seconds MCID ~ TUG test.

What creates the TUG a dependable tool for use in patients especially after back surgery was the assessment of the MCID found to be, on average, 3.4 seconds (Gautschi 2016). This is important particularly for goal setting. Gautschi, et al found that the TUG has been found to be more sensitive to change with functional outcomes even more exact after surgery. [22, 48]

CONCLUSIONS:

- Predictors of better surgical outcome include MCID ~ TUG test ≥ 3.4 seconds, TUG < 14 seconds, L5 - S1 disc level, annular defects, preserve disc height, employed status, BMI (< 25), higher education, short duration of < 3 months of preoperative radicular pain and lower VAS of low back pain preoperatively of < 4 will have better postoperative results regarding back pain.
- Predictors of worse outcome include male gender, tall patients of >180 cm, low level of education, unemployment, higher preoperative ODI ≥ 40%, positive preoperative reflexes (SLRT, RSLRT) , > 50 % disc height loss, preoperative motor deficits, prolong duration of preoperative low back pain (> 3 months) and higher preoperative VAS score radicular pain (≥ 4). Also to mention that higher preoperative VAS low back pain (≥ 4) will be translated to more post operative radicular pain.
- Factors that have no effect on outcome include age and smoking.

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