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Low-Back Outcome Scale and the Oswestry Disability Index they Reflective of Patient Satisfaction

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Abstract

Background: Low back pain is the most common type of pain. The causes of many painful conditions of the low back remain obscure. Low back pain bothers not only patients but also the experts about its multidisciplinary approaches. The typical background of a low back incidence is a faulty postural pattern. A mechanical or functional strain causing muscular misbalance in one part of the body may soon result in compensatory changes in other parts. The Low-Back Outcome Scale (LBOS) of Greenough and Fraser and the Oswestry disability index (ODI) were compared to the patient satisfaction index (PSI) in lumbar disc herniation (LDH) surgery.

Methods: This prospective interventional study was conducted in department of Orthopaedic Surgery, BSMMU, Dhaka from October 2017 to September 2019. A total of 22 patients who underwent discectomy were followed through assessment of pre and post-surgical satisfaction by the PSI, the LBOS, and the ODI. The LBOS were rated as satisfied if the outcomes were excellent or good and as dissatisfied if fair and poor. Considering the ODI, clinically satisfied was defined as a 13-point improvement from the baseline ODI scores. Phi (Φ) correlation analysis was used to study the correlation among the PSI, the LBOS and the ODI scores as proxy for patients' satisfaction.

Results: In this study, out of 22 patients 8 (36.4%) were 35-45 years of age, 8 (36.4%) were 46- 55years, 4 (18.2%) were 56-65 years and 2 (9.1%) were 66-70 years old. The mean (± SD) age of the patients was 51.1±9.7 years and the youngest and the oldest patients were 35 and 70 years respectively. Among 22 subjects, majority of the study subjects 15 (68.2%) were male and only 7 (31.8%) were female. Significant improvement from the pre- to post-operative ODI scores was observed. Post-surgical satisfaction based on the PSI, the ODI, and the LBOS were 72.7%, 68.1%, and 81.1%, respectively. Regarding patient satisfaction, there were weak associations between LBOS vs. PSI and ODI vs. PSI (Φ=−0.054, P=0.533) and (Φ=−0.129, P=0.136), respectively.

Conclusions: Our study showed that the ODI and the LBOS were not reflective of patients' satisfaction after discectomy.

Keywords: Botulism Toxin-A; Neuromuscular Disorders; Spinal Disorders; Spasticity

Abbreviations: LBOS: Low-Back Outcome Scale; ODI: Oswestry Disability Index; PSI: Patient Satisfaction Index; LDH: Lumbar Disc Herniation; COMI: Core Outcome Measures Index; JOABPEQ: Japanese Orthopedic Association Back Pain Evaluation Questionnaire; JOA: Japanese Orthopaedic Association; HNP: Herniation of the Nucleus Pulposus; VAS: Visual Analogue Score; MRI: Magnetic Resonance Imaging; CT: Computed Tomography; PSI: Patient Satisfaction Index.

Introduction

Low back pain is the most common type of pain. The causes of many painful conditions of the low back remain obscure. Low back pain bothers not only patients but also the experts about its multidisciplinary approaches. The typical background of a low back incidence is a faulty postural pattern. A mechanical or functional strain causing muscular misbalance in one part of the body may soon result in compensatory changes in other parts. Conversely, the symptoms appearing in the low back region may be caused by faulty mechanics of the feet, legs or hip [1]. At the junction of L5/S1 apophyseal joint: the long mass of five fused vertebrae forming the sacrum articulate with the fifth lumbar vertebra and bear most of the weight and shearing forces and stress. In the standing position the lordotic curve of the lumbar spine places particular stress on the L5/S1 junction. With the wedge-shaped disc and body of L5, the tendency would be for L5 to slide forward on the sacrum [2]. There are several tools such as the Japanese Orthopedic Association Back Pain Evaluation Questionnaire (JOABPEQ) [3], the Oswestry disability index (ODI) [4], the Japanese Orthopaedic Association (JOA) [5], and the Core Outcome Measures Index (COMI) [6], for measuring performance status or functionality in these patients. Diagnosis of the cause of recurrent back pain is still difficult. Many causes of recurrence of back pain after surgery have been recorded; recurrent disc herniation and postoperative fibrosis are the two major ones. It is important to distinguish these two entities as disc herniation may require re-operation, whereas postoperative fibrosis does not. MRI imaging appeared to be the examination of choice in the investigations of spine and disc diseases especially in recurrent disc prolapse. MRI with contrast (Gadolinium enhanced MRI) may differentiate post-operative fibrosis from recurrent herniation [7]. On the other hand, patient satisfaction is believed to be an attitudinal response to value judgments that patients make about their clinical experience and is associated with many variables, such as patient demographics, symptom-related expectations, functional status, mental disorders, unmet expectations, doctor–patient communication, and to a large extent, patient expectations [8]. Prior studies have shown that discectomy is a safe and effective surgical technique for the treatment of LDH based on various measures [9]. However, little is known about the correlation of patient satisfaction to functioning status after surgical treatment for LDH [10]. In addition, in some cases, spine surgeons and patients occasionally do not agree on the success of the treatment. In the case of the most minor restrictions, we know from our own experience how these can happen: sitting or working for a long time in an unfavorable position, we sense a need to stretch and move, which is to ease such minor inhibitions of movement. Minor restrictions can be present even in physiological situations and in healthy individuals and these resolve spontaneously. There is a fluid transition between such minor restrictions following physiological stress, and persistent restrictions following physiological stress and persistent restrictions following pathogenic, harmful stress [11]. Moreover, in the literature, there has been a trend toward the assessment of patient satisfaction as an outcome measure [12-17]. Recent efforts in orthopedic research have generated insights into the efficacy, safety, and preferred methodology in dealing with recurrent post-discectomy lumbar disc herniation (LDH). Recurrent herniation of the nucleus pulposus (HNP) and subsequent disc degeneration after a discectomy is a common problem, with reported rates ranging from 2% to 25%. When it occurs, recurrent herniation is a major contributor to debilitating pain, disability, and reoperation following primary surgery, and it is therefore an important factor in determining postoperative success [18].

Materials and Methods

This prospective interventional study was conducted in department of Orthopaedic Surgery, BSMMU, Dhaka from October 2017 to September 2019. A total of 22 cases of RLDH having the inclusion criteria were taken as sample after diagnosing clinically, radiologically and with MRI. Outcome of low back pain (LBP) and radicular pain was measured by visual analogue score (VAS) and overall clinical outcome by Japanese Orthopaedic Association (JOA) score. All patients who underwent discectomy with a single-level disc herniation were eligible to be included in the study. The diagnosis of LDH was made on the basis of clinical and radiographic evidence. All participants underwent a complete clinical examination for LDH including an assessment of clinical symptoms and clinical examination, and imaging studies including plain radiography, computed tomography (CT) and magnetic resonance imaging (MRI) of the lumbar spine. In all cases more than one spine surgeon confirmed the diagnosis and experienced surgeons performed surgery. There were no restrictions on patient selection with regard to level(s) of LDH, age or other characteristics. We excluded all patients with previous back surgeries, malignancy, fracture, spinal cord compression, and spinal anomalies from the study.

Operative Procedure

Standard open lumbar discectomy was used to manage LDH in patients who have persistent symptoms of the condition that do not improve with a conservative treatment.

Outcome

The study outcome was patient satisfaction post discectomy. Patient satisfaction was assessed by the patient satisfaction index (PSI). The PSI was completed for each patient by face-to-face interview. A PSI response of 1 or 2 was considered to be associated with a satisfied outcome and a PSI response of 3 or 4 to be associated with a dissatisfied outcome [19].

Additional Measures

The Finneson-Cooper score was also used. This is a lumbar disc surgery predictive score card or questionnaire that was developed by Finneson-Cooper to evaluate potential candidates for excision of a herniated lumbar disc [20]. The Finneson-Cooper score ranges from 0 to 100. It categorizes candidates into a 4-grade classification: good >75; fair 65–75; marginal 55–64, and poor <55. The Finneson-Cooper score was measured at preoperative.

The LBOS of Greenough and Fraser was used for measuring functional outcome in patients with low back pain. The LBOS scale ranges from 0 to 75 and the higher score indicates better condition. It categorizes patients into a 4-grade classification scheme: excellent ≥65; good 50–64; fair 30-49, and poor 0–29 [21]. In this study excellent and good classification were considered satisfied and fair and poor classification were considered dissatisfied. The LBOS was measured at last follow-up.

The Iranian version of ODI (Version 2) is a measure of functionality and contains 10 items. The scores on the ODI range from 0 to 50, with higher scores indicating a worse condition. The psychometric properties of the Iranian version of questionnaire are well documented [4]. The ODI score was measured at admission and at last follow-up to assess functionality outcome after treatment. A minimum clinically important difference (MCID) is a threshold used to calculate the effect of clinical treatments. Satisfied was defined as a 13-point improvement from the baseline ODI scores [22].

Demographic information including age, gender and body mass index (BMI), a leg pain visual analog scale (VAS) and a VAS associated with back pain also were collected. The duration of symptoms (in months), type of herniation and smoking histories were assessed.

Statistical Analysis

All the data were compiled and sorted properly and the quantitative data were analyzed statistically by using Statistical Package for Social Science (SPSS-25). The results were expressed as frequency, percentage and mean ± SD and level of significance was calculated at confidence interval of 95% and $p<0.05$.Paired Student's t-test was performed to compare continuous variables between the groups and Z proportion test was performed to compare the proportion between the groups.

Results

In this study, out of 22 patients 8 (36.4%) were 35-45 years of age, 8 (36.4%) were 46- 55years, 4 (18.2%) were 56-65 years and 2 (9.1%) were 66-70 years old. The mean (± SD) age of the patients was 51.1±9.7 years and the youngest and the oldest patients were 35 and 70 years respectively. Among 22 subjects, majority of the study subjects 15 (68.2%) were male and only 7 (31.8%) were female. In this study, Tobacco, diabetes and hypertension were found highly associated with recurrent disc herniation. 14 (63.6%), 11 (50%) and 13 (59.1%) patients were found as tobacco users, diabetic and hypertensive. In all 13 patients underwent discectomy via laminotomy and the remaining 12 patients received fenestration, no case was observed with missed level surgery. Cauda-equina syndrome occurred in one case (4.5%). In one case (4.5%) dural laceration occurred during surgery which were repaired and no one showed CSF leakage or meningitis. No mortality rate was observed due to surgery. Patient's scores on the PSI, the Finneson-Cooper score, the ODI and the LBOS are shown in Table 1. Based on the PSI, the ODI and the LBOS, post-surgical satisfactions were 16 (72.7), 15 (68.1) and 18 (81.8%), respectively. Mean improvement in the ODI was 21.5±12.1 and statistically was significant ($P<0.001$) at 2-year followup. No significant differences were observed for postsurgical satisfaction between levels of LDH (Tables 2 & 3). To determine patients' satisfaction correlation analysis was carried out. There were weak associations between PSI and LBOS ($\Phi=-0.054$, $P=0.533$; $\chi2=0.388$, $P=0.533$); PSI and ODI ($\Phi=-0.129$, $P=0.136$; $\chi2=2.22$, $P=0.136$).

Characteristics	Mean (SD)
Age (year) [range]	51.1±9.7[35–70]
Gender (male; n, %)	15 (68.2)
Smoking (n, %)	14 (63.6)
Body weight (kg)	81.4±9.6
BMI	31.2±1.5
Symptoms	
Duration of symptoms (months) [range]	15.4±12.2 [1–25]
VAS of leg pain (mm) [range]	57.6±18.9 [15–100]
VAS of back pain (mm) [range]	53.6±24.2 [18–100]
ODI	
Baseline	37.7±14.8
At last follow-up	16.2±11.7
Satisfied (n, %)	15 (68.1)
Dissatisfied (n, %)	7 (31.9)
The Low-Back Outcome Scale of Greenough and Fraser (n, %)	
Excellent	11 (50.0)
Good	6 (27.2)
Fair	3 (13.6)
Poor	2 (69.1)
Patient satisfaction index (n, %)	
Satisfied	14 (63.6)
Dissatisfied	8 (36.4)
Finneson-Cooper score (n, %)	
Good	12 (54.5)
Fair	10 (45.5)
Level of herniation (n, %)	
L1–L2	1 (4.5)
L2–L3	2 (9.1)
L3–L4	4 (18.1)
L4–L5	9 (40.9)
L5–S1	6 (27.2)
Type of herniation (n, %)	
Sequestration	6 (27.2)
Transligamentous extrusion	8 (36.3)
Subligamentous extrusion	5(22.7)
Protrusion	3 (13.6)

Values are mean (SD), number or percentage. BMI, body mass index.

Table 1: Demographic data and preoperative status of patients with lumbar disc herniation (n=22).

LBOS (patients' satisfaction)	PSI (patients' satisfaction)		Total
	No	Yes	
No	2	4	6
Yes	4	12	16
Total	6	16	22

LBOS, Low-Back Outcome Scale of Greenough and Fraser; PSI, patient satisfaction index.
Table-2: Two-by-two matrices of the relationship between the LBOS and the PSI for patients' satisfaction after surgery.

ODI* (patients' satisfaction)	PSI (patients' satisfaction)		
	No	Yes	Total
No	2	5	7
Yes	4	11	15
Total	6	16	22

*Considering the ODI, clinically satisfied was defined as a 13-point improvement from the baseline ODI scores. ODI, Oswestry disability index; PSI, patient satisfaction index.
Table 3: Two-by-two matrices of the relationship between the ODI and the PSI for patients' satisfaction after surgery.

Discussion

One pathogenic factor is overload and another one, more frequent is disturbed movement pattern (motor stereotype) on the part of the patient, consisting of an imbalance of muscle function, which impairs the joint. Modern civilization brings with it very one-sided posture and movement causing muscular imbalance. Lack of movement together with static or postural overload are a characteristic feature of modern life. Disturbed movement patterns and static overload are probably the most frequent causes of reversible restrictions and of their occurrence and recurrence [11]. The results of current study demonstrate that mean (±SD) age of the patients was 51.1 (9.7) years with the youngest and the oldest patients were 35 and 70 years of age respectively. The recurrent lumbar disc herniation occurs in adult aged population. Almost similar to the findings observed by the various investigators from different countries [23,24]. Majority of the study subjects 15 (68.2%) were male and only 7(31.8%) were female which was similar to the findings of Khayat, et al. [24]; Mashhadinezhad, et al. [25]. To the best of our knowledge, no published study has investigated whether the ODI and the LBOS reflects true patient satisfaction after discectomy. We demonstrated a limitation for the ODI and the LBOS as an outcome measure in reflecting patient satisfaction. In general, such measures have their own limitations and depending on their development history might give different profile from one to another scale for one identical patient. These measures usually are developed based on a classical test theory (CTT) where psychometric properties for an instrument does not include difficulties that one might experience in responding to each question. However, more recent patient-reported outcomes are those that do not assume that each item is equally difficult [item response theory (IRT)]. The IRT treats the difficulty of each item as information to be incorporated in scaling items [26]. The LDH surgery is a successful operation in majority of patients. In most patients the pain in the affected leg disappears almost immediately. However, in 10–40% of patients the symptoms either do not disappear or recur. In spite of this high symptom recurrence rate, it is reported that almost 90% of patients are satisfied with the operation according to the variety measures and the various followup assessments [18]. In this study, based on the PSI, the ODI and the LBOS, post-surgical satisfactions were 16 (72.7), 15 (68.1) and 18 (81.8%), respectively. Mean improvement in the ODI was 21.5±12.1 and statistically was significant ($P<0.001$) at 2-year followup. No significant differences were observed for postsurgical satisfaction between levels of LDH. To determine patients' satisfaction correlation analysis was carried out. There were weak associations between PSI and LBOS ($\Phi=-0.054$, $P=0.533$; $\chi2=0.388$, $P=0.533$); PSI and ODI ($\Phi=-0.129$, $P=0.136$; $\chi2=2.22$, $P=0.136$). These observations indicate that we must seek means to improve prognostication prior to member spine surgery; i.e., we need to develop a better decisions-making and strategic planning process [18,27]. We found that the ODI and the LBOS lacked significant association with the PSI to determine patient's satisfaction. Hence, these measures are not reflective of true patient satisfaction after discectomy. There is a risk of underestimating patient satisfaction after discectomy based on lower levels of scores on the LBOS and the ODI measures, and there also is a risk of overestimating patient satisfaction based on higher levels of scores on the LBOS and the ODI measures. This finding could be attributed to the influence of patients' expectations, other factors that improve

satisfaction without improving outcome measures as home support visitors, functionality status, level of herniation, surgical procedure type, and preoperative counseling, in patients with LDH [28]. The literature has shown that, among other factors, patient expectations regarding surgery influence satisfaction with treatment. It has also been shown that such expectations can be altered by the information that is transmitted by the surgeon [29]. Gepstein, et al. [30] reported that preoperative expectations correlated with postoperative satisfaction rate in patients with lumbar spinal stenosis [31].

To determine patient expectations in lumbar spine surgery, Toyone et al. reported that, even if the clinical expectations were met, some patients remained dissatisfied [29]. Godil, et al. [17] showed that patient satisfaction is not a valid measure of overall quality or effectiveness of surgical spine care [31]. In addition, patient satisfaction was evaluated with a dichotomous yes/no question and may not fully represent this aspect of outcome in patients with LDH. Based on the aforementioned, it is clear that a standardized metric or objective assessment tool for comparing techniques or treatments is needed. One might inquire about the need to investigate relationships between satisfaction and quality of care.

Certainly, satisfaction and quality of care are very different terms, with very different meanings [30]. In addition, there is no doubt that the use of patient satisfaction scores represents an important target for the treatment of patients with low back pain. Moreover, patient satisfaction tools alone should not be used to represent the overall quality, safety, or effectiveness of surgical spine care [31]. However, researchers have suggested that we should examine our own patients' satisfaction scores and seek to improve them. This may lead to an improved decision-making process for the patient [32,33].

Conclusions

The present study suggests that the ODI and the LBOS as outcome measures do not reflect patient satisfaction after discectomy. Further work is needed in this arena to assess other factors that improve satisfaction without improving outcome measures that may influence patient satisfaction after discectomy

Limitations

Although optimal care had been tried by the researcher in every steps of the study, but there were some limitations:

- Study was conducted in a selected hospital. So, the study population might not represent the whole community.
- The sample was taken purposively. So, there may be chance of bias which can influence the results.
- The study and follow-up period was short in comparison to other studies.

Thus, further studies are needed to evaluate these parameters. Finally, due to the above-mentioned limitations, we believe the results should be interpreted with caution and one should not generalize the findings. Above all, we believe the best way to avoid these is to develop a standardized method for evaluation of patient satisfaction.

References

1. Kendall F (2005) Muscles testing and function with posture and pain. In: 5th (Edn.), Lippincott Williams & Wilkins Baltimore, Philadelphia, USA, pp: 122-126.

2. Oliver J, Middlediteh A (1991) Functional Anatomy of the spine. In: 1st (Edn.), Butterworth Heinemann, Elsevier LTD, UK, pp: 145-149.

3. Azimi P, Shahzadi S, Montazeri A (2012) The Japanese Orthopedic Association Back Pain Evaluation Questionnaire (JOABPEQ) for low back disorders: a validation study from Iran. J Orthop Sci 17(5): 521-525.

4. Mousavi SJ, Parnianpour M, Mehdian H, Montazeri A, Bahram M (2006) The Oswestry Disability Index, the Roland-Morris Disability Questionnaire, and the Quebec Back Pain Disability Scale: translation and validation studies of the Iranian versions. Spine 31(14): E454-E459.

5. Azimi P, Mohammadi HR, Montazeri A (2012) An outcome measure of functionality and pain in patients with lumbar disc herniation: a validation study of the Japanese Orthopedic Association (JOA) score. J Orthop Sci 17(4): 341-345.

6. Mohammadi HR, Azimi P, Zali A (2015) An outcome measure of functionality and pain in patients with low back disorder: A validation study of the Iranian version of Core Outcome Measures Index. Asian J Neurosurg 10(1): 46.

7. Papadopoulos EC, Girardi FP, Sandhu HS (2006) Outcome of revision discectomies following recurrent lumbar disc herniation. Spine 31(13): 1473-1476.

8. Wang H, Zhang D, Ma L (2015) Factors Predicting Patient Dissatisfaction 2 Years After Discectomy for Lumbar Disc Herniation in a Chinese Older Cohort: A Prospective Study of 843 Cases at a Single Institution. Medicine (Baltimore) 94(40): e1584.

9. Weinstein JN, Tosteson TD, Lurie JD, Skinner JS, Hanscom B, et al. (2006) Surgical vs non-operative treatment for lumbar disk herniation: the Spine Patient Outcomes

Research Trial (SPORT): a randomized trial. JAMA 296(20): 2441-2450.

10. Verbeek JH (2005) Patient satisfaction following operation for lumbosacral radicular syndrome: an apparent paradox. Ned Tijdschr Geneeskd 149(27): 1493-1494.

11. Lewit K (2010) Manipulative therapy in musculoskeletal medicine. In: 1st (Edn.), Churchill Livingstone Elsevier, UK, pp: 234-237.

12. Bair MJ, Kroenke K, Sutherland JM (2007) Effects of depression and pain severity on satisfaction in medical outpatients: analysis of the Medical Outcomes Study. J Rehabil Res Dev 44(2): 143-152.

13. Kane RL, Maciejewski M, Finch M (1997) The relationship of patient satisfaction with care and clinical outcomes. Med Care 35(7): 714-730.

14. Fenton JJ, Jerant AF, Bertakis KD, Franks P (2012) The cost of satisfaction: a national study of patient satisfaction, health care utilization, expenditures, and mortality. Arch Intern Med 172: 405-411.

15. Hoff RA, Rosenheck RA, Meterko M, Wilson NJ (1999) Mental illness as a predictor of satisfaction with inpatient care at Veterans Affairs hospitals. Psychiatr Serv 50(5): 680-685.

16. Rosenthal MB, Fernandopulle R, Song HR, London B (2004) Paying for quality: providers' incentives for quality improvement. Health Aff (Millwood) 23(2): 127-141.

17. Godil SS, Parker SL, Zuckerman SL, Mendenhall SK, Devin CJ, et al. (2013) Determining the quality and effectiveness of surgical spine care: patient satisfaction is not a valid proxy. Spine J 13(9): 1006-1012.

18. Shepard N, Cho W (2017) Recurrent Lumbar Disc Herniation: A Review. Global Spine Journal 9(2): 202-209.

19. Garg B, Nagraja UB, Jayaswal A (2011) Microendoscopic versus open discectomy for lumbar disc herniation: a prospective randomised study. J Orthop Surg (Hong Kong) 19(1): 30-34.

20. Slosar PJ, Reynolds JB, Schofferman J, Goldthwaite N, White Z, et al. (2000) Patient satisfaction after circumferential lumbar fusion. Spine 25(6): 722-726.

21. Finneson BE, Cooper VR (1979) A lumbar disc surgery predictive score card. A retrospective evaluation. Spine 4(2): 141-144.

22. Azimi P, Nayeb Aghaei H, Azhari S, Shazadi S, Kashany HK, et al. (2016) An outcome measure of functionality and pain in patients with low back disorder: a validation study of the Iranian version of Low Back Outcome Score. Asian Spine J 10(4): 719-727.

23. Copay AG, Glassman SD, Subach BR, Berven S, Schuler TS, et al. (2008) Minimum clinically important difference in lumbar spine surgery patients: a choice of methods using the Oswestry Disability Index, Medical Outcomes Study questionnaire Short Form 36, and pain scales. Spine J 8(6): 968-974.

24. Khattak AU, Haider A, Rehman L, Mushtaq, Ilyas (2009) Surgical outcome of recurrent lumbar disc herniation: experience with 30 patients. JPMI 23(1): 86-89.

25. Khayat R, Khallaf M, Hassan HM, Gamal M (2017) Evaluation of treatment of recurrent lumbar disc prolapse: fusion versus non Fusion. International Annals of Medicine 1(9): 1-7.

26. Mashhadinezhad H, Sarabi E, Mashhadinezhad S, Ganjeifar B (2018) Clinical outcomes after microdiscectomy for recurrent lumbar disk herniation: a single-center study. Arch Bone Jt Surg 6(5): 397-401.

27. Cappelleri JC, Lundy JJ, Hays RD (2014) Overview of classical test theory and item response theory for the quantitative assessment of items in developing patient-reported outcomes measures. Clin Ther 36(5): 648-662.

28. Sitzia J, Wood N (1997) Patient satisfaction: a review of issues and concepts. Soc Sci Med 45(12): 1829-1843.

29. Walraven VC, Oake N, Jennings A, Forster AJ (2010) The association between continuity of care and outcomes: a systematic and critical review. J Eval Clin Pract 16(5): 947-956.

30. Gepstein R, Arinzon Z, Adunsky, Folman YA (2005) Decompression surgery for lumbar spinal stenosis in the elderly: preoperative expectations and postoperative satisfaction. Spinal Cord 44: 427-431.

31. Toyone T, Tanaka T, Kato D, Kaneyama R, Otsuka M (2005) Patients expectations and satisfaction in lumbar spine surgery. Spine 30(23): 2689-2694.

32. Truumees E (2013) Appropriate use of satisfaction scores in spine care. Spine J 13(9): 1013-1016.

33. Daubs MD, Norvell DC, McGuire R, Molinari R, Hermsmeyer JT, et al. (2011) Fusion versus nonoperative care for chronic low back pain: do psychological factors affect outcomes. Spine 36(21): 96-109.