

Full Length Research Paper

Study on the health-related quality of life after surgical treatment for lumbar stenosis

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Lumbar stenosis (LS) affected middle-aged people and may cause severe symptoms and functional impairment at lower limbs. We conducted a study in China to assess the HRQoL in patients operated on for LS, and investigate the possible determinants of HRQoL. From June 2008 to June 2010, 60 patients have been surgically treated for lumbar stenosis in our Hospital. The medical outcomes study short Form 36 (SF-36) was used to measure the quality of life before and after surgery. With regard to the results of the general quality of life tool (SF-36), we observed a significant improvement of HRQoL, JOY score and improvement rate of LS patients after surgery for 3 months ($p < 0.05$). Logistic regression showed that female patients had lower mental component summary (MCS) scores (OR=0.6, 95% CI=0.4-0.9). Patients older than 45 years had lower scores in the physical component summary (PCS) (OR=0.5, 95% CI=0.3-0.8). Patients with higher JOY score (>11) was related to both lower MCS and PCS scores (For MCS, OR=1.8, 95% CI=1.1-2.3; for PCS, OR=1.7, 95% CI=1.1-2.2). A significant dose-response relationship was found between the JOY score and HRQoL. In conclusion, our study showed the surgery for lumbar stenosis could greatly improve the HRQoL of patients. Age, sex and JOY score were associated with physical or mental HRQoL after surgery for LS.

Key words: Health-related quality of life (HRQoL), surgical treatment, lumbar stenosis, outcome assessment, JOY score.

INTRODUCTION

Lumbar stenosis affected middle-aged people and may cause severe symptoms and functional impairment at lower limbs. The neurological deficits may greatly impair patients' quality of life (QoL). History and clinical examination findings, in particular the evaluation of osteotendoneous reflexes and muscle strength, are considered essential for diagnosis and a good measure to assess the severity of the disease. Neuroimaging provide information concerning the anatomy of the lumbar canal, and it is considered fundamental for the diagnosis. Neurophysiologic evaluation assesses the root axonal function and therefore provides information on the

neurologic damage resulting from stenosis. The clinical, neuroradiologic, and neurophysiologic findings in LS have been evaluated as diagnostic parameter and outcome measure in many studies (Tonali et al., 1999; Padua et al., 2002). However, in LS patients, these measurements were not related with validated measurement of the outcomes that are more relevant to patients such as functional status and symptoms. Studies on these outcome of LS patients are still limited.

In recent decades, there has been increasing concern about the importance of measuring health-related quality of life (HRQoL) for evaluation of outcomes after surgery

for LS (Padua et al., 2004). After surgical treatment for LS, the patients were reported to have significant mental improvement before surgery (Luca et al., 2004). A number of factors, such as sex, age, clinic symptom, and severity of illness, may be associated with the HRQoL of LS patients after surgery. However, such associations were only published in one study conducted in Italy (Padua et al., 2004). Due to lack of these outcome and its influencing factors of LS patients after surgery, we conducted a study in China to assess the HRQoL in LS patients after surgery, and investigated the possible determinants of the HRQoL of these patients. We performed a prospective follow-up study, and used a validated SF-36 questionnaire to investigate the QoL of LS patients after surgery.

PATIENTS AND METHODS

This study was performed in the Second Affiliated Hospital of Inner Mongolia Medical College in the Department of Spinal Surgery of Inner Mongolia Medical College in Huhhot of China. 128 patients have been surgically treated for lumbar stenosis during the period of June 2008 to June 2010; and same number of patients was invited to participate on the day of hospitalized. This study was approved by the Ethics Committee of the hospital and all participants signed informed consents before participants.

On the day of participating, all the patients were asked to provide their and their next of kins' telephone numbers and mailing addresses to enable our follow-up. The assessment of HRQoL was performed via telephone interview before surgery, and every 3 months after surgery. The follow-up period lasted for one year. The Medical Outcomes Study Short Form 36 (SF-36) (Ware et al., 1993) was employed to measure the HRQOL. The SF-36 is a well validated HRQOL-measuring instrument and has been widely used among trauma survivors. This 36-item questionnaire consists of eight HRQOL domains that comprise two summary measures: the physical component summary (PCS) and the mental component summary (MCS).

The surgical approach were taken in terms of clinical finds by MRI or CT scan. All the operations were conducted with the patients in prone position. Decompression of the dural sac was accomplished by removal of laminae and lateral recesses were opened by tangential undercutting facetectomy. Each compressed nerve-root was always examined along its course to the foramen and then a partial foraminotomy was performed. No arthrodesis was performed and no patient was reoperated. Demographic and clinical characteristics abstracted from medical records included: age, education, economic status, length of stay in hospital and clinic symptoms. The clinic symptom improvement was evaluated according to JOA (Japanese Orthopaedic Association) score (Costanzo et al., 2005). The improvement situation was evaluated by

$$\text{Improvement rate}\% = \frac{\text{Scores after surgery} - \text{Score before surgery}}{17 - \text{score before surgery}} \times 100\%$$

We used the Statistical Package for the Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago, IL, USA) for the data analysis. A P-value <0.05 was considered statistically significant. Mann-Whitney U-tests and Wilcoxon's rank sum tests were employed to compare unpaired and paired quantitative variables, respectively. Chi-square tests and non-conditional logistic

regression to estimate odds ratios (ORs) and 95% confidence intervals (CIs) of potential affecting factors for low HRQOL after 6 months were also performed. Median values of dependent variables were chosen as cut points. Potential confounders were included in the multivariate model based on biological and statistical considerations. Potential confounders were entered into the multivariate models if they changed the effect estimates by 10% or more. Variables selected to appear in the final model include: sex, age (<45; >45 years), economic status (annual income≤5000 RMB; annual income>5000 RMB), and JOY score (<5, 5-11, >11).

RESULTS

No patient was lost to follow-up. The baseline demographic and clinical characteristics of the LS patients and clinical characteristics of them are shown in Table 1. Most of the LS patients were males, and 44% of the LS patients had the economic status below 5000 RMB. Moreover, the length of stay in hospital was about 17±4.6 days.

The results of HRQoL assessment and Joy score for clinic symptoms before surgery, after surgery for 3 and 6 months are listed in Table 2 by the eight domains. With regard to the results of the general quality of life tool (SF-36), we observed a significant improvement of Physical Function (PF), Role-Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Function (SF), Role-Emotional (RE) and Mental Health (MH) after 3 months ($p<0.05$), and the JOY score and improvement rate also significant increased after surgery for 3 and 6 months compared with score before surgery ($p<0.05$). After surgery for 6 months, all the indexes of SF-36 was significantly improved ($p<0.05$). PF, RP, BP and JOY score and improvement showed significant increase between surgery after 3 and 6 months ($p<0.05$). Although there was no reference group representing the general population included in this study, we were able to compare the HRQoL of LS patients with previous published results from a Chinese general population (Li et al., 2003). The means of the HRQoL of LS patients in our study were still much lower than those of general population in every domain, even 6 months after surgery.

Odds ratios with confidence intervals for HRQoL 6 months after surgery from logistic regression are shown by summary measurement in Table 3. Female patients were found to have lower scores in MCS than males (OR=0.6, 95% CI=0.4-0.9). Patients older than 45 years had lower scores in PCS (OR=0.5, 95% CI=0.3-0.8). Patients with economic status ≤5000 RMB was associated with high score, but no significant difference was found ($p>0.05$). Patients with higher JOY score (>11) was related to both lower MCS and PCS scores (For MCS, OR=1.8, 95% CI=1.1-2.3; for PCS, OR=1.7, 95% CI=1.1-2.2). We also observed a dose-response relationship between the JOY score and HRQoL in both MCS and PCS, but only the PCS showed significant association with the JOY score ($p<0.05$).

Table 1. Baseline demographic characteristics of 128 LS patients.

Variable	Patients {n=128(%)}
Male (%)	79(61.7)
Age (mean±SD, years)	44.3±3.9
Education (illiteracy, %)	32(25)
Economic status (%)	
≤5000 RMB	57(44.5)
>5000 RMB	71(55.6)
Length of stay in hospital (mean±SD, days)	17±4.6

Table 2. Changes in health related quality of life (HRQoL) over time among 128 patients (mean±standard deviation).

Variable	Before surgery		3 months after surgery		6 months after surgery	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
SPF-36						
PF	31.7 ^a	22.5-39.7	75.2 ^b	69.7-80.3	81.6	67.4-90.1
RP	20.4 ^a	16.7-28.3	70.1 ^b	58.3-83.4	83.4	72.6-91.9
BP	23.5 ^a	18.1-31.4	66.4 ^b	55.1-77.4	86.4	70.4-95.4
GH	46.3 ^a	37.5-57.5	70.9	61.1-80.5	71.2	61.3-71.7
VT	45.4 ^a	35.7-53.9	73.5	61.2-84.3	72.3	60.2-73.2
SF	52.5 ^a	40.5-61.3	78.6	67.8-86.7	79.5	68.9-85.7
RE	54.3 ^a	45.7-67.3	83.5	70.4-92.3	84.1	72.3-93.8
MH	60.4 ^a	53.2-69.6	79.8	70.2-89.2	81.6	70.1-90.2
JOY score	4.7 ^a	4.2-5.7	12.3 ^b	10.3-14.9	14.7	13.2-16.3
Improvement rate(%)	-	-	62.2 ^b	54.3-74.3	82.0	74.5-93.8

^a Comparing the scores between before surgery and after surgery for 3 months, $p < 0.05$; ^b Comparing the scores between surgery for 3 months and 6 months, $p < 0.05$.

Table 3. Logistic regression for HRQoL 6 months after surgery among 128 patients.

Variable	Physical component summary ^a	Mental component summary ^b
Sex		
Male	1.0 (reference)	1.0 (reference)
Female	0.8 (0.4-1.3)	0.6 (0.4-0.9)
Age, years		
≤45	1.0 (reference)	1.0 (reference)
>45	0.5 (0.3-0.8)	0.9 (0.6-1.3)
Economic status (%)		
≤5000 RMB	1.0 (reference)	1.0 (reference)
>5000 RMB	1.3 (0.7-1.8)	1.5 (0.9-2.2)
JOY score		
<5	1.0 (reference)	1.0 (reference)
5-11	1.4 (0.8-2.0)	1.3 (0.7-1.9)
>11	1.8 (1.1-2.3)	1.7 (1.1-2.2)

DISCUSSION

Lumbar stenosis (LS) may cause neurological deficits

such as severe symptoms and functional impairment at lower limbs, which may greatly affect patients' quality of life. Previous assessment of LS has been based on

clinical, neuroradiological and neurophysiological findings. However, previous studies have outlined the need for a thorough evaluation of concepts such as QoL, especially in those pathologies that may affect the general status of the patients (such as LS) (Tonali et al., 1999; Padua et al., 2002; Apolone and Mosconi, 1998; Padua et al., 2001; Zanolli et al., 2002a). It has been suggested that a more widespread use of standardized health measures may improve clinical practice (Zanolli et al., 2002b). Our study used QoL to evaluate the physical, general health, vitality and emotion as well as mental health.

Our study showed the QoL score of patients before operation generally revealed low, and the score of PF showed to be the lowest, which indicated the pain of LS brought large limitation and inconvenient for physical function of patients. However, after surgery, the SF-36 and JOY scores were significantly improved as the time increased after surgery, which showed the quality of life was greatly improved in terms of physical function, general health, emotion and mental health. Our study showed the General Health, Vitality, Social Function, Role–Emotional and Mental Health significantly improved after surgery for 6 months when compared with those before surgery, which showed the life, emotion and mental health were significantly improved with the improvement of physical function. The physical function in life and work could improve the quality of life of patients. However, no significant improvement was found between the time of 3 and 6 months after surgery, which indicated that emotion and mental health need long time to change.

Older patients were found to have lower HRQoL 6 months after surgery on the physical health aspect. This may be partly explained by the slower recovery of older patients. However, lowered HRQoL of older patients may not necessarily be the effect of surgery for LS, even in the general population, the older patients also have lower HRQoL than the younger patients. Thus as mentioned before, comparison with the general population is of great importance (Li et al., 2003). We found a difference of the HRQoL in MSC between the two genders, indicating that female LS patients after surgery may be in a poorer mental health status. We found the JOY score has a dose-response relationship with HRQoL. It could suggest that the HRQoL score could represent the clinic symptom of LS patients; also, it could reflect the physical and mental status of patients. Therefore, SF-36 questionnaire is more effective and powerful to measure the HRQoL of LS patients after surgery.

Conclusion

Our study showed the surgery for lumbar stenosis could greatly improve the QoL of patients, especially for the physical function, Role–Physical and Bodily Pain. The emotion and mental health need long time to improve. Age, sex and JOY score were associated with physical or mental HRQoL after surgery for LS. Further large sample study is needed to provide information to decide which therapy is the best choice according to clinical and QoL scores.

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