

Evaluation of the association between locomotive syndrome and depressive states: a cross-sectional study

Tomohiro Saito¹, Hideaki Watanabe², Ichiro Kikkawa² and Katsushi Takeshita³

¹Fukuoka Mirai Hospital, Fukuoka, Japan

²Jichi Children's Medical Center, Shimotsuke, Japan

³Department of Orthopaedic Surgery, Jichi Medical University, Shimotsuke, Japan

ABSTRACT

The Japanese Orthopaedic Association has proposed the term “locomotive syndrome” to designate a condition that places a person at high risk for long-term care. However, in daily clinical practice, even when a diagnosis of locomotive syndrome is made, exercise therapy often cannot be successfully performed in some patients owing to their lack of motivation. We speculated that locomotive syndrome and depressive states co-exist in elderly people. The purpose of this study was to determine the presence or absence of depressive states in older patients aged ≥ 65 years who were diagnosed with locomotive syndrome. A questionnaire survey, the 25-Question Geriatric Locomotive Function Scale and Self-Rating Questionnaire for Depression was conducted. The items of the interview survey were sex, age, and history of treatment for hypertension or diabetes mellitus. For somatometry, height and body weight were measured. Patients diagnosed with locomotive syndrome (LS group) were compared with those without locomotive syndrome (non-LS group). The LS group included 99 patients, mean age was 79.4 years old, while the non-LS group included 101 patients, mean age was 76.3 years old. The number of patients with depressive states and number of females were significantly higher in the LS group. In addition, the LS group was significantly older and shorter. Multivariate analysis revealed depressive states and age to be independent factors. Therapy for patients with LS should include evaluation and, if necessary, treatment for concomitant depression.

Key Words: locomotive syndrome, depressive states

This is an Open Access article distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view the details of this license, please visit (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

INTRODUCTION

In recent years, Japan has become a super-aging society and the number of persons certified as requiring long-term care has increased. With further increases in the number of persons with this certification, the financial situations of local governments are expected to become strained. To minimize such increases, it is important to maximize the number of elderly people who can walk and perform activities of daily living without assistance. To accomplish this, before the elderly require long-term care, disorders that impair their movement and independence should be diagnosed and treated early. The Japanese Orthopaedic Association has proposed the term “locomotive syndrome” to designate a condition that places a person at high risk for long-term

Received: October 31, 2016; accepted: February 2, 2017

Corresponding author: Tomohiro Saito, M.D.

Fukuoka Mirai Hospital, 3-5-1 Kashii Teriha, Fukuoka city, Fukuoka 813-0017, Japan

TEL: +81-92-662-3001, E-mail:tr-saitou@kkf.biglobe.ne.jp

care.¹⁻³⁾ However, in daily clinical practice, even when a diagnosis of locomotive syndrome is made, exercise therapy often cannot be successfully performed in some patients due to their lack of motivation. Ikemoto *et al.* reported the association between locomotive syndrome and degree of depression.⁴⁾ We also speculated that patients diagnosed with locomotive syndrome have a psychological reason for their lack of motivation to undergo exercise therapy, namely, a depressive state. We performed a prospective study to determine the presence or absence of depressive states in older patients aged ≥ 65 years who were diagnosed with locomotive syndrome in a local clinic.

SUBJECTS AND METHODS

The study design was cross-sectional study. Patients were informed about study and their written consent was obtained. This study was carried out with the approval of Human Studies Ethics Committee of Jichi medical university. The subjects consisted of 220 outpatients (50 males and 170 females) aged 65–91 years (mean, 78.1 years) who visited the Houjyo municipal clinic between October and December 2012, and who could walk unassisted and perform activities of daily life without assistance. Patients who could not walk without assistance, or had visual/hearing impairment, decreased cognitive function, or motor paralysis were excluded. In this study, cognitive function was investigated only by the examination of an internist without any formal testing. In addition, patients who had a history of spinal/lower limb fracture within 6 months before our questionnaire survey or who were in the acute stage of being treated for trauma were excluded.

A questionnaire survey, interview survey by nurses, and somatometry were performed when the subjects visited the outpatient clinic. The 25-Question Geriatric Locomotive Function Scale (GLSF-25) and Self-Rating Questionnaire for Depression (SRQ-D) were used.^{5, 6)} The items of the interview survey were sex, age, and history of treatment for hypertension or diabetes mellitus. For somatometry, height and body weight were measured. The GLSF-25 is a questionnaire for the diagnosis of locomotive syndrome, and a score ≥ 16 on this scale defines the subjects as having locomotive syndrome.⁵⁾ This questionnaire is a useful tool for the early diagnosis of locomotive syndrome, and its usefulness has been confirmed by at least two studies.^{7, 8)} The SRQ-D is a questionnaire for the diagnosis of masked depression, and a scores of ≤ 10 are defined as normal, of 11–15 as borderline, and of ≥ 16 as suspected depression.⁶⁾ In this study, a score ≥ 11 was regarded as indicating a depressive state. There were no patients being treated with anti-depressants. Patients diagnosed with locomotive syndrome (LS group) were compared with those without locomotive syndrome (non-LS group).

Statistical analysis was performed using SPSS for Windows Version 20.0 (SPSS, Chicago, IL, USA). Pearson's chi-square test was used for the comparison of SRQ-D, sex, hypertension, and diabetes mellitus, and the unpaired t-test for the comparison of age, height, and body weight. For multivariate analysis, multiple logistic regression analysis was performed. The all data were entered into the multivariate analysis. $P < 0.05$ was regarded as significant.

RESULTS

Although responses were obtained from 220 patients, 20 patients did not fulfill the questionnaire, we excluded them. 200 patients, consisting of 45 males and 155 females aged 65–91 years (77.7 years), were analyzed. The LS group included 99 patients (14 males and 85 females) aged 65–91 years (mean, 79.4 years), while the non-LS group included 101 patients (31 males and 70

Table 1 Background

	Loc (n=99)	Non-Loc (n=101)	P
Age	79.3±5.5	76.3±6.0	0.01
Sex(men:women)	14:85	27:74	0.03
Hight(m)	1.48±0.07	1.52±0.08	0.01
Weight(kg)	52.1±11.2	54.1±10.6	0.2
Hypertension	77	71	0.23
Diabetes	20	22	0.78
Depression state	22	8	0.01

Loc:locomotive syndrome

Table 2 Multiple logistic regression analysis

	Odds ratio	95% CI	P
Depressive state	4.0	1.63–10.0	0.01
Age	1.1	1.05–1.16	0.01

females) aged 65–89 years (mean, 76.3 years). The number of patients with depressive states and number of females were significantly higher in the LS group ($p = 0.01$ and 0.03 , respectively). In addition, the LS group was significantly older and shorter ($p = 0.01$ for both). There were no significant differences in body weight, hypertension, and diabetes mellitus between the two groups ($p = 0.2$, 0.23 , and 0.78 , respectively) (Table 1). Multivariate analysis for depressive states, sex, hypertension, diabetes mellitus, age, height, and body weight revealed depressive states and age to be independent factors ($p = 0.01$, odds ratio = 4; and $p = 0.01$, odds ratio = 1.1, respectively) (Table 2).

DISCUSSION

This study showed associations between locomotive syndrome and depressive states, advanced age, females gender, and short stature. Multivariate analysis revealed depressive states and age as independent factors, and their odds ratios were 4 and 1.1, respectively. Pennix *et al.*⁹⁾ performed a prospective cohort study involving 1,286 older subjects aged ≥ 71 , and reported that the presence of depressive symptoms was a high risk factor for a decline in physical performance, and remitting these symptoms may play a role in improving physical performance in the elderly. Szczepanska-Gieracha *et al.* compared the effects of rehabilitation given soon after coronary bypass operation between patients with and without depressive symptoms, and observed significantly lower physical performance in the former group, suggesting the importance of the early detection and treatment of depressive states for successful early rehabilitation.¹⁰⁾ In addition, Bienvenu *et al.* performed a 2-year prospective cohort study involving 186 survivors of acute lung injury, and reported long ICU stays and depressive symptoms as risk factors for the persistence of physical impairment.¹¹⁾ They stated that interventions targeting depressive symptoms should be evaluated for improving long-term outcomes in survivors of acute lung injury. Based on the results of the present and previous studies, not only exercise therapy but also psychological

treatment for depressive states may be necessary in patients diagnosed with locomotive syndrome. We intend to perform further studies to determine whether locomotive syndrome patients with depressive symptoms show additional improvement after exercise therapy given in conjunction with interventions to reduce their depressive states.

The limitations of this study are that only a questionnaire survey was performed and no interventions to test these associations were administered; also, the subjects were patients from only 1 institution. In the GLSF-25 question items and the S-RQD, there may be some overlap in the question items.

CONCLUSION

Locomotive syndrome is associated with depressive states and with age, which are independent factors. In particular, the association with depressive states was marked. Therefore, therapy for patients with LS should also include evaluation and, if necessary, treatment for concomitant depression.

CONFLICTS OF INTEREST

No outside funding or grants were received by the authors in relation to this study.

REFERENCES

- 1) Nakamura K. The concept and treatment of locomotive syndrome: its acceptance and spread in Japan. *J Orthop Sci*, 2011; 16: 489–491.
- 2) Nakamura K. A “super-aged” society and the “locomotive syndrome”. *J Orthop Sci*, 2008; 13: 1–2.
- 3) Nakamura K. Locomotive syndrome: disability-free life expectancy and locomotive organ health in a “super-aged” society. *J Orthop Sci*, 2009; 14: 1–2.
- 4) Ikemoto T, Inoue M, Nakata M, Miyagawa H, Shimo K, Wakabayashi T, *et al.* Locomotive syndrome is associated not only with physical capacity but also degree of depression. *J Orthop Sci*, 2016; 21: 361–365.
- 5) Seichi A, Hoshino Y, Doi T, Akai M, Tobimatsu Y, Iwaya T. Development of a screening tool for risk of locomotive syndrome in the elderly: the 25-question Geriatric Locomotive Function scale. *J Ortho Sci*, 2012; 17: 163–172.
- 6) Abe T, Tsutsui S, Nanba T, Nishida K, Nozawa A, Katoh Y, *et al.* A Self-rating Questionnaire for Depression (SRQ-D) as a screening test for masked depression. *Japanese Journal of Psychosomatic Medicine*, 1972; 12: 243–247. (in Japanese)
- 7) Muramoto A, Imagama S, Ito Z, Hirano K, Ishiguro N, Hasegawa Y. Physical performance tests are useful for evaluating and monitoring the severity of locomotive syndrome. *J Orthop Sci*, 2012; 17: 782–788.
- 8) Muramoto A, Imagama S, Ito Z, Hirano K, Tauchi R, Ishiguro N, *et al.* Threshold values of physical performances tests for locomotive syndrome. *J Orthop Sci*, 2013; 18: 618–626.
- 9) Penninx BW, Guralnik JM, Ferrucci L, Simonsick EM, Deeg DJ, Wallace RB. Depressive symptoms and physical decline in community older persons. *JAMA*, 1998; 279: 1720–1726.
- 10) Szczepanska-Gieracha J, Morka J, Kowalaska J, Kustrzycki W, Rymaszewska J. The role of depressive and anxiety symptoms in the evaluation of cardiac rehabilitation efficacy after coronary artery bypass grafting surgery. *Eur Cardiothorac Surg*, 2012; 42: 108–114.
- 11) Bienvenu OJ, Colantuoni E, Mendez-Tellez PA, Dinglas VD, Shanholtz C, Husain N, *et al.* Depressive symptoms and impaired physical function after acute lung injury: a 2-year longitudinal study. *Am J Respir Crit Care Med*, 2012; 185: 517–524.