hyperlipidemia, diabetes etc.[15–17] This association has also been verified by many intervention trials.[18,19] However, no significant difference could be found in the frequency of major risk factors except for diabetes. Diabetes is frequently associated with dysfunction of platelets.[20] In terms of relative frequency of clinical stages, there was also no significant difference among the groups at the baseline, but the hazard ratios for death due to vascular events were unexpectedly low in the advanced clinical stages. For this reason, antiplatelet therapy in the follow-up period could presumably affect the outcomes in these patients.

ADL status, cognitive functions and swallowing functions have been known to influence prognosis, especially in patients after a stroke.[21,22] In this study, one fourth of the subjects suffered from stroke. For this reason, it is considered that dependent ADL status, dementia or disturbance of swallowing could be accompanied by pneumonia, which was seen in 33 of 66 patients who died in our study.[21] The Cox proportional hazards regression analysis showed that totally dependent ADL status was an independent prognostic factor for overall death (hazard ratio; 1.619, $P = 0.0122$).

Study limitations

Some limitations were considered to be present in our study, especially in the evaluation of platelet aggregatability and selection bias in the subjects. Our study used the GC type obtained from *ex vivo* platelet aggregatability tests according to Born's turbidimetric method,[3,4] and applied ADP as an inducer chosen from several materials available for activating platelet. It is unclear to what extent the GC type using ADP corresponds to *in vivo* platelet aggregatability in the presence of various pathophysiological inducers. However, the GC type using ADP was valuable for monitoring patients treated with antiplatelet drugs,[5] and is widely used in clinical practice to obtain results with good reproducibility.

Reproducibility of the GC type showed a good coincident rate of 0.72 ($\kappa = 0.37$) between 143 paired samples at an interval of 3–6 months, although the selection bias should be taken into account in considering the results. In this study, the reproducibility of GC type was studied in patients with neither antiplatelet treatment nor acute thrombotic distress. Platelet aggregatability is usually suppressed not only by antiplatelet drugs,[1,6,23] but can be inconsistent in acute phases of thrombotic diseases, since platelets are accelerated to form thrombus or activated platelets have already been consumed.[3,24,25]

Conclusion

Although prognosis of the elderly was influenced by many intermingled factors, our study showed increased platelet aggregatability as an indicator for poor prognosis. It seems that the platelet aggregatability test was useful not only for monitoring patients with antiplatelet treatment, but also in detecting high-risk groups for poor prognosis due to vascular events. Furthermore, it suggests that antiplatelet treatment can be indicated for elderly patients with increased platelet aggregatability which clarifies the cause of the increased aggregatability.

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Original Articles

Implications of Carotid Arteriomegaly in Patients with Aortic Aneurysm

Toshihiko Iwamoto[1,2], Akihiro Kimura[1,2], Toshinori Nakai[1,2], Kiyoshi Kanaya[2], and Shin Ishimaru[3]

[1] *The Brain & Blood Vessel Laboratory,*
[2] *Department of Geriatric Medicine,*
[3] *Department of Cardiovascular Surgery, Tokyo Medical University Hospital, Tokyo, Japan.*

The pathophysiology of aortic aneurysm is complex and it has remained unclear how frequently arteriomegaly, a diffuse dilatation of the artery, is associated with aneurysm. Therefore, ultrasonic study of the carotid artery was conducted to clarify this issue in a large number of subjects. Carotid ultrasonography was performed in 1,108 Japanese men aged 50 or older, and the results of 379 patients with arteriosclerotic aortic aneurysm (AA) were compared with those of 211 patients with peripheral arterial disease, 65 patients with aortic dissection, 232 hypertensive subjects, and 221 normotensive subjects. The carotid diameter was measured bilaterally at two points on the common carotid artery, and we defined carotid arteriomegaly as an arterial diameter in the 95th percentile or above that in the normotensive control group according to the relevant age subgroups. The incidence of carotid arteriomegaly in the AA group (25.9%) was significantly higher than in the other groups ($p < 0.01$) even when adjusted for body height and blood pressure. In the arteriomegaly subgroup, hypertension and cigarette smoking was significantly more frequent than in the nondilated artery subgroup. This study demonstrates that one fourth of patients with aortic aneurysm have arteriomegaly as a generalized systemic abnormality in the arterial wall. ***J Atheroscler Thromb, 2004; 11: 348-353.***

Key words: Arteriosclerosis, Ultrasonics, Hypertension, Cigarette smoking

Introduction

The etiology of aortic aneurysm has been studied from the viewpoint of arteriosclerosis, hemodynamics, genetics, and inflammation (1, 2), although the incidence of arteriosclerotic aortic aneurysm has currently increased among those conditions. Pathological studies show that atrophy of the media with laceration of the elastic lamellae is common in the aneurysmal lesion (1, 2). Many vascular risk factors and atheromatous lesions have been known to contribute to the development of arteriosclerotic aortic aneurysm (1–4). Several studies (5–9), although in a small sample size, have also shown diffuse dilated artery, namely arteriomegaly, or increased stiffness of the artery apart from the aneurysmal lesion, suggesting generalized vascular involvement in patients with arteriosclerotic aortic aneurysm. However, recent study (10) demonstrated no increased diameter if adjusted for blood pressure, suggesting the need to adjust for background factors influencing the diameter and analysis in a larger sample size. Indeed, the diameter has been known to be influenced by age, sex, stature, and the condition at examination (11–13). Therefore, ß°ultrasonic study of the carotid artery was conducted to clarify the frequency of carotid arteriomegaly in a large number of patients adjusted for background factors.

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Address for correspondence: Toshihiko Iwamoto, Department of Geriatric Medicine, Tokyo Medical University Hospital, 6-7-1 Nishishinjuku, Shinjuku-ku, Tokyo 160-0023, Japan.
E-mail: i-wam@ma.kcom.ne.jp
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Subjects and Methods

Subjects

A total of 1,108 Japanese men aged 50 or older were examined consecutively with carotid ultrasonography at our laboratory after routine tests including chest x-ray, abdominal ultrasonography, and determination of ankle brachial pressure index (ABPI) for the screening of aortic aneurysm (AA), aortic dissection (AD), and peripheral arterial disease (PAD). When aortic aneurysm and dissection were suspected on chest x-ray or abdominal ultrasonography, further studies of the chest and abdominal computerized tomography or angiography or both were performed. AA was diagnosed based on these studies, which showed localized dilatation of the aorta more than 40 mm in diameter above the level of the renal arteries (aorta more than 30 mm in diameter below the level of the renal arteries). AD was diagnosed when intima-medial flap was identified in the images. Marfan syndrome, syphilis, and PAD with AA were excluded from this study.

When ABPI was less than 0.9, angiography to diagnose PAD, in which severe stenotic changes were visualized, was done as well as in patients with history of intermittent claudication. This study was performed in accordance with the Helsinki Declaration of 1975 as revised in 1983.

Of 444 patients with dilated aorta, 379 patients had AA (AA group) and 65 patients had AD (AD group). Within 1 month after examination, 141 AA patients received artificial grafts, and all resected specimens were pathologically identified to be atheromatous lesions. In the AD group, the Stanford types A and B were present in 15 and 50 patients, respectively. Of 211 patients with PAD (PAD group), iliac, femoral, and multiple obstructions were seen in 108, 88, and 15, respectively. Two control groups consisted of 232 hypertensive subjects (HT group) and 221 normotensive subjects (NT group), which were confirmed not to have AA, PAD, or AD.

Carotid ultrasonography

Using ultrasonographic equipment (LOGIQ500α with 8.0 MHz or more, GE-Yokogawa Medical Systems, Tokyo, Japan), all patients were examined by a single sonographer. As shown in Fig. 1, posterior oblique view at the cardiac end-systole was used to measure the interadventitial diameter of the carotid artery bilaterally on the common carotid artery at two points 2 cm and 3 cm proximal to the bifurcation (points 1 and 2, respectively). The reproducibility of our technique for determining the diameters at points 1 and 2 was examined for 238 randomly selected samples. The coefficients of variation between 2 measurements taken after an interval of 1 month were 2.8% and 2.6%, respectively.

Dilatation of the common carotid artery was defined as an arterial diameter in the 95th percentile or above that in the NT group according to the age subgroups as follows; subgroup aged 50–64 (n = 51), subgroup aged 65–79 (n = 103), and subgroup aged 80 or older (n = 67). Based on the findings, carotid arteriomegaly was defined as having dilatation at four points, while partial dilated artery was defined as having dilatation at less than four points. The frequency of carotid arteriomegaly was compared not only among the groups, but also with adjustment for body height and systolic blood pressure.

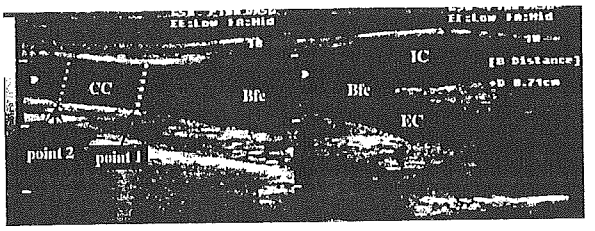

Fig. 1. Measurement of the carotid diameters at points 1 and 2.
The interadventitial diameter of the carotid artery was measured bilaterally on the common carotid artery (CC) at two points, 2 cm and 3 cm proximal to the bifurcation (Bfc). In the two images, IC indicates internal carotid artery, and EC indicates external carotid artery.

Thickness of the intima-media complex (IMT) was also measured between the two points. Localized, thickened IMT of 2.1 mm or more in thickness (plaque) and stenotic lesions occupying more than 70% of the lumen diameter were assessed as carotid lesions (14).

Cardiovascular risk factors

Cases of hypertension were defined as those with a casual blood pressure ≥ 140/90 mmHg or patients taking antihypertensive drugs. Diabetes mellitus was defined as fasting blood glucose concentration ≥ 126 mg/dl or patients receiving nutrition therapy and antidiabetic medication. Hyperlipidemia was defined as a fasting blood cholesterol concentration ≥ 220 mg/dl or cases receiving diet therapy and cholesterol-lowering medication. Cigarette smoking was defined as a smoking index of 200 or more (cigarettes/day × years smoking).

Statistics

Statistical analysis was performed by ANOVA, Fisher's protected least significant difference, and chi-square test with StatView-J 5.5 software (SAS Institution Inc., Cary, NC, USA). A p-value less than 0.05 was considered to indicate a statistically significant difference.

Results

Patient characteristics

There were significant differences in age, body weight, and blood pressure among the groups (Table 1). Regard-

ing the AA and PAD groups, diabetes and cigarette smoking were more frequent in the PAD group than in the AA group. The mean systolic blood pressure was higher in the PAD group than in the AA group, while the mean diastolic blood pressure was higher in the AA group than in the PAD group.

Ultrasonographic findings

Among the groups, the mean diameters of the carotid artery were largest at each point in the AA group ($p < 0.05$). (Table 2) The mean diameters in the PAD group were significantly larger than in the other three groups ($p < 0.05$). The mean diameters in the AD and HT groups were also larger than in the NT group.

High frequency of carotid arteriomegaly was prominent in the AA group (25.9%). In the other four groups, carotid arteriomegaly was more frequent in the PAD and AD groups. Adjusted for body height and systolic blood pressure, the frequency in each group showed a relation similar to the crude comparison, although no significant

Table 1. Background factors of each group.

	AA group	PAD group	AD group	HT group	NT group
No. of cases	379	211	65	232	221
Mean age ± SD, *y*	72.2 ± 7.0 *†	70.2 ± 8.1†‡§	65.0 ± 8.4	72.0 ± 9.5 †	73.5 ± 9.8 †
Aged 65–79, *n* (%)	267 (70.4) †	127 (60.2) †	24 (36.9)	95 (40.9)	103 (46.6)
Mean body height ± SD, cm	163.2 ± 6.3	162.9 ± 6.1	163.7 ± 8.1	163.4 ± 5.7	163.0 ± 5.9
Mean body weight ± SD, kg	59.8 ± 9.3 *‡	57.5 ± 8.9 †‡§	66.0 ± 13.0 †§¶	62.0 ± 9.2	60.4 ± 10.1
Mean SBP ± SD, mmHg	136.8 ± 16.0 §	141.9 ± 16.2 †§¶	137.1 ± 14.4 ‡§	143.3 ± 15.9 §	130.2 ± 12.2
Mean DBP ± SD, mmHg	78.3 ± 10.1 *§	76.4 ± 9.1	76.6 ± 9.7	78.2 ± 9.4 *§	74.9 ± 9.0
Hypertension, *n* (%)	269 (71.0)	145 (68.7)	58 (89.2)	232 (100.0)	0 (0)
Diabetes, *n* (%)	53 (14.0) †	80 (37.9) †‡§	3 (4.6)	49 (21.1)	41 (18.6)
Hypercholesterolemia, *n* (%)	118 (31.1) †	67 (31.8) †	13 (20.0)	91 (39.2) §	54 (24.4)
Smoking, *n* (%)	214 (56.5) †	171 (81.0) †‡§¶	26 (40.0)§	98 (42.2)	55 (24.9)

Abbreviations: AA: aortic aneurysm, PAD: peripheral arterial disease, AD: aortic dissection, HT: hypertension, NT: normotension, SBP: systolic blood pressure, DBP: diastolic blood pressure.
* $p < 0.05$ *vs* PAD group, † $p < 0.05$ *vs* AD group, ‡ $p < 0.05$ *vs* HT group, § $p < 0.05$ *vs* NT group, ¶ $p < 0.05$ *vs* AA group

Table 2. Ultrasonographic findings of carotid arteries of each group.

	AA group	PAD group	AD group	HT group	NT group
No. of cases	379	211	65	232	221
Mean carotid diameter ± SD, mm					
Left: point 1	9.09 ± 1.52 *†‡§	8.83 ± 1.13 †‡§	8.47 ± 1.34 §	8.18 ± 1.04 §	7.81 ± 0.98
point 2	8.98 ± 1.42 *†‡§	8.65 ± 1.15 †‡§	8.24 ± 1.41 §	8.00 ± 1.04 §	7.64 ± 1.05
Right: point 1	9.29 ± 1.54 *†‡§	8.89 ± 1.15 ‡§	8.56 ± 1.31 §	8.24 ± 1.13 §	7.97 ± 0.93
point 2	9.08 ± 1.46 *†‡§	8.70 ± 1.34 †‡§	8.32 ± 1.32 §	8.08 ± 1.22 §	7.83 ± 1.01
Frequency of AM, *n* (%)	98 (25.9) *†‡§	23 (10.9) ‡§	11 (16.9) ‡§	8 (3.5)	3 (1.4)
Adjusted for body height	122 (32.2) *‡§	41 (19.4) ‡§	14 (21.5) ‡§	5 (2.2)	7 (3.2)
Adjusted for SBP	59 (15.6) *‡§	17 (8.1) ‡§	7 (10.8) ‡§	5 (2.2)	6 (2.7)
Mean IMT ± SD, mm					
Left carotid	0.88 ± 0.30 †‡§	0.91 ± 0.37 †‡§	0.72 ± 0.21	0.79 ± 0.25 §	0.72 ± 0.20
Right carotid	0.87 ± 0.31 †‡§	0.90 ± 0.36 †‡§	0.78 ± 0.28	0.76 ± 0.20	0.72 ± 0.18
Cases with plaques, *n* (%)	198 (52.2)	141 (66.8) †	27 (41.5)	100 (43.1)	60 (27.1)
Cases with stenoses, *n* (%)	33 (8.7) †¶	40 (19.0) †‡§¶	1 (1.5)	14 (6.0) §	4 (1.8)

Abbreviations: AA: aortic aneurysm, PAD: peripheral arterial disease, AD: aortic dissection, HT: hypertension, NT: normotension, AM: arteriomegaly, SBP: systolic blood pressure, IMT: intima-media thickness.
* $p < 0.05$ *vs* PAD group, † $p < 0.05$ *vs* AD group, ‡ $p < 0.05$ *vs* HT group, § $p < 0.05$ *vs* NT group, ¶ $p < 0.05$ *vs* AA group

difference was seen between the AA and AD groups.

The mean thickness of the IMT in the AA and PAD groups was larger than in the AD, HT, and NT groups. Carotid lesions were more common in the PAD group, followed by the AA group.

Characteristics of aneurysmal patients with arteriomegaly

Carotid arteriomegaly was seen in 30.9% of thoracic AA, 23.2% of abdominal AA, and 32.0% of thoraco-abdominal AA. Compared with the non-dilated artery subgroup, a higher incidence of hypertension and smoking was seen in the arteriomegaly subgroup. (Table 3) Plaques and increased mean thickness of the IMT were frequent in the arteriomegaly subgroup.

Discussion

We studied Japanese men with the variables adjusted for body height and systolic blood pressure according to the age subgroups. Defining carotid arteriomegaly as above-mentioned, our study showed carotid arteriomegaly in one fourth of the AA group, which indicates the reason for the statistical increase in mean diameter of the carotid artery.

The carotid lumen often enlarges with increased stenosis (15, 16), and our study showed increased frequency of plaques and more thickened IMT in the subgroups of arteriomegaly. However, plaques and stenoses were more common in PAD, and were mostly present in the internal carotid artery. Compared with the increase in diameter (1.2–1.3 mm), the differences in IMT between the arteriomegaly and non-dilated subgroups of the AA group in one artery (0.4–0.5 mm) were small. Therefore, it is concluded that carotid arteriomegaly was not a compensatory change.

There are two types of arteriosclerosis of the large vessels; atherosclerosis and arteriosclerosis in a narrow sense, in which diffuse dilatation occurs with hardening of the vessel wall (17). According to this classification, arteriosclerotic aortic aneurysm is considered to be a form of dilated arteriosclerosis and usually, but not always, associated with atherosclerosis. Within aneurysmal lesions, histochemical study of the vessel wall metabolism showed decreased elastin volume with accelerated activity of elastase and matrix metalloproteinases (1, 2, 18). Atrophy of the media and abnormality in elastin metabolism with loss of elasticity and fragility is suggested to be a major primary cause of arteriosclerotic aortic aneurysm, resulting in dilatation and rupture (1, 2).

It seemed that these aneurysmal changes may reflect those of carotid arteriomegaly in the AA group. His-

Table 3. Differences in background factors and ultrasonographic findings of carotid arteries among aneurysmal patients with or without arteriomegaly.

	Dilated artery		Non-dilated artery	*P* value
	Arteriomegaly	Partially dilated		
No. of cases	98	106	175	
Mean age ± SD, *y*	72.1 ± 6.4	73.5 ± 7.2 †‡	71.6 ± 7.2	$p = 0.0904$
Sites of aneurysm, %				
Thoracic, Abdominal aorta	34.7, 57.1	31.1, 61.3	26.3, 68.6	
Thoraco-abdominal aorta	8.2	7.6	5.1	
Mean body height ± SD, cm	163.7 ± 7.0	161.9 ± 5.6	163.7 ± 6.2	$p = 0.0453$
Mean body weight ± SD, kg	59.9 ± 8.6	58.5 ± 9.8	60.5 ± 9.3	$p = 0.2005$
Hypertension, *n* (%)	85 (86.7) *†	76 (71.7)	108 (61.7)	
Diabetes, *n* (%)	11 (11.2)	15 (14.2)	27 (15.4)	
Hypercholesterolemia, *n* (%)	26 (26.5)	40 (37.7)	51 (29.1)	
Smoking, *n* (%)	62 (63.3) †	68 (64.2) †	74 (42.3)	
Mean IMT ± SD, mm				
Left carotid	1.02 ± 0.36 *†	0.90 ± 0.28 ‡	0.79 ± 0.24	$p < 0.0001$
Right carotid	0.99 ± 0.36 *†	0.89 ± 0.28 ‡	0.80 ± 0.27	$p < 0.0001$
Cases with plaques, *n* (%)	73 (74.5) *†	47 (44.3)	78 (44.6)	
Cases with stenoses, *n* (%)	4 (4.1)	14 (13.2)	15 (8.6)	

Abbreviation: IMT: intima-media thickness.

* $p < 0.05$ *vs* Partially dilated subgroup, † $p < 0.05$ *vs* Non-dilated subgroup, ‡ $p < 0.05$ *vs* Arteriomegaly subgroup

tochemical analysis reported by Baxter *et al.* (19) showed that the ratio of elastin to collagen in aneurysmal patients was decreased in the non-aneurysmal vessel wall similar to that in the aneurysmal vessel wall. It indicated that both aortic aneurysm and carotid arteriomegaly is a manifestation of systemic abnormality of the media, but aneurysmal dilatation tends to occur at predisposing sites such as the abdominal aorta. The reasons for these predisposing sites are related to lower numbers of elastic lamellae, and to characteristic hemodynamics, in which pulse pressure increases at the abdominal aorta (1, 2).

Degradation of the elastic fibers in the media is usually associated with mechanical alteration in stiffness (8–10). Sonesson *et al.* (10) showed increased stiffness of the carotid artery in patients with abdominal AA even without increased carotid diameter, indicating some discrepancy between morphological and biomechanical alterations.

In our study, hypertension and cigarette smoking was frequently associated with carotid arteriomegaly in the AA group. The findings suggested that these vascular risks could promote dilatation of the artery with underlying fragile media (1). Carotid arteriomegaly was frequent not only in the AA subgroups, but in the AD and PAD groups. A common characteristic of these groups was also hypertensive patients with smoking habit, suggesting underlying pathophysiological conditions similar to AA in addition to atherosclerosis (4, 11–13).

Study Limitations

We set up the dilatation criteria on the basis of the data from normotensive subjects, although there is no universally accepted definition of carotid arteriomegaly. Furthermore, our study could not clarify the longitudinal changes of the lumen dilatation in relation to the degradation of the media.

Conclusion

Ultrasonic study showed carotid arteriomegaly in one fourth of patients with aortic aneurysm, which indicated that, in those patients, aortic aneurysm was a representative manifestation of a generalized systemic abnormality in the arterial wall, and that carotid arteriomegaly detected by ultrasonography can be an indicator of aortic aneurysm.

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Prevention of Late Complications by Half-Solid Enteral Nutrients in Percutaneous Endoscopic Gastrostomy Tube Feeding

Jiro Kanie[a] Yusuke Suzuki[a] Hiroyasu Akatsu[b] Masafumi Kuzuya[a] Akihisa Iguchi[a]

[a]Department of Geriatrics, Medicine in Growth and Aging, Program in Health and Community Medicine, Nagoya University Graduate School of Medicine, Nagoya, and [b]Department of Internal Medicine, Fukushimura Hospital, Toyohashi, Japan

Key Words
Percutaneous endoscopic gastrostomy · Enteral nutrients, half-solid · Gastroesophageal reflux

Abstract
Background: Percutaneous endoscopic gastrostomy feeding is accompanied by unique complications, which are not easily controlled. ***Objective:*** In an attempt to decrease complications, we used half-solid nutrients for percutaneous endoscopic gastrostomy feeding in an 85-year-old woman. The patient had been receiving enteral nutrients via percutaneous endoscopic gastrostomy, and we examined whether this approach can reduce complications. She presented with regurgitation of enteral nutrients and recurrent respiratory infections. ***Methods:*** Half-solid enteral nutrients, prepared by mixing liquid enteral nutrients with agar powder, were administered via percutaneous endoscopic gastrostomy. ***Results:*** Symptoms of gastroesophageal reflux disappeared immediately after the start of half-solid enteral nutrient feeding. ***Conclusion:*** Gastroesophageal reflux and leakage, two intractable late complications of percutaneous endoscopic gastrostomy tube feeding, can be alleviated by the solidification of enteral nutrients. Since this method allows quick administration of nutrients, it is also expected to help prevent the occurrence of decubitus ulcers and reduce the burden to the caregiver.

Introduction

Feeding via a percutaneous endoscopic gastrostomy (PEG) tube is a safe and efficient method for patients who cannot maintain adequate oral intake. PEG feeding is accompanied, however, by unique complications which are not easily controlled. The administration of liquid nutrients is often accompanied by complications such as vomiting and diarrhea, although these complications may be minimized if the patient is sitting up during the administration or if the nutrients are administered at a slower rate. Nevertheless, these methods do not completely succeed in eliminating these common complications, and may require the patients and their caregivers to have great patience. In addition, maintaining the same position for many hours may worsen the conditions of patients who have pressure ulcers. Here we report a case in which, by

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Jiro Kanie
Department of Geriatrics, Medicine in Growth and Aging, Program in Health and Community Medicine, Nagoya University Graduate School of Medicine
65 Tsurumai-cho, Showa-ku, 466-8550 Nagoya, Aichi (Japan)
Tel. +81 52 744 2364, Fax +81 52 744 2371, E-Mail yus@med.nagoya-u.ac.jp

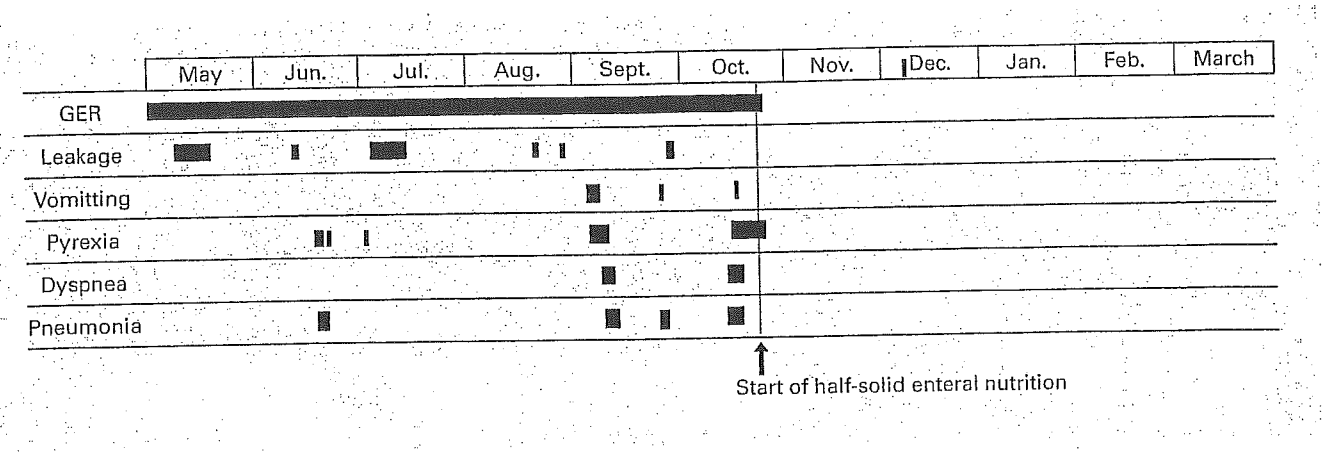

Fig. 1. Reduction of symptoms after half-solid enteral nutrition via PEG.

simply solidifying nutrients, the symptoms due to gastroesophageal reflux (GER) after PEG tube placement were relieved, and the leakage of nutrients from the PEG tube insertion site was alleviated.

Methods

An 85-year-old woman presented with regurgitation of enteral nutrients and recurrent respiratory infections after PEG placement. The patient suffered a cerebral infarction, and underwent PEG insertion on May 4, 2001, at a local hospital. After commencing PEG tube feeding, the following symptoms repeatedly occurred: regurgitation of the enteral feed; leakage of nutrients from the PEG tube insertion site; vomiting followed by pyrexia; dyspnea during the administration of nutrients, and pneumonia confirmed by chest X-ray. The patient often showed facial signs of discomfort during the feed administration. Liquid enteral nutrients were given in a sitting position at all times.

As the complications gradually became more frequent in occurrence, on October 21, 2001, we commenced giving her half-solid enteral nutrients which were prepared by mixing market-available enteral nutrients and agar powder. Half-solid nutrients were prepared by mixing 5 g agar powder with 500 ml liquid nutrients diluted with the same volume of water (1,000 ml total volume). The mixture was distributed into 50-ml syringes and kept in a refrigerator until it was administered via the PEG tubing. The mixture was not liquefied in the stomach due to body temperature. The administration of half-solid nutrients was made by injecting them into the stomach en bloc (injection time <5 min). The patient was not forced to remain in a sitting position during and after the administration.

Results

The symptoms, other than pyrexia, disappeared immediately after the administration of half-solid nutrients, and pyrexia vanished 2 weeks later. Also, the signs of discomfort during the feed administration were no longer noted. We followed the patient for up to 6 months after the start of the half-solid enteral nutrients, and observed no recurrence of the symptoms (fig. 1). At present (February 2004), the patient still remains in a stable condition and no longer suffers from the complications observed before the commencement of half-solid nutrients.

Discussion

PEG feeding is accompanied by unique complications, which occur over a long-term clinical course [1–3]. An increase in vomiting is one of the most common complications [4]. GER is clinically manifested by recurrent vomiting or aspiration. The mechanism by which GER increases in frequency has not yet been clarified.

Ogawa et al. [5, 6] suggested that since the stomach cannot move independent of the abdominal wall after the formation of a gastric fistula, enteral nutrients remain in the stomach longer, thereby increasing the chance of GER. Gastrin, a potent facilitator of peristaltic movement, may not be sufficiently induced by the distension of the stomach seen with slow infusion rates of liquid nutrients. Thus enhanced GER may eventually result. Since the nutrients can be administered in a short time by

our method (<5 min), the stomach wall is expected to be distended to a greater degree and thus stimulate peristaltic movement.

Another disadvantage of slow feed infusion is that patients are forced to remain in a sitting position for long periods while the nutrients are administered, which is unfavorable in terms of the prevention of decubitus ulcers, which are commonly found in patients with PEG feeding.

One of the late complications after PEG tube placement is leakage from the PEG tube insertion site. This is a difficult problem to cope with. There are two causes of leakage: inappropriate fixation of the bumper (including the so-called buried bumper syndrome [7]), and a decrease in the elasticity of the fistular opening, which develops over a long period after PEG placement [8]. The leakage resulting from a decrease in elasticity is intractable. Simply increasing the tube diameter cannot solve this problem [7, 9]. We found, however, that solidification of the enteral nutrients alleviated the leakage in the present case. This may simply be explained by the fact that the solidified nutrients could not be leaked out by the intragastric pressure through the narrow gap between the fistular pore and the tube.

So far, we have administered half-solid nutrients to 17 patients with PEG feeding and followed up the patients for 6 months. During the observation period, we confirmed significant reductions in the complications observed before the commencement of the half-solid nutrients (data not shown).

In conclusion, our experience indicates that the use of half-solid nutrients in PEG feeding and their rapid administration can substantially reduce the risk of GER and may eventually contribute to a reduction in complications as well as an improvement in the quality of life of the patients and their caregivers.

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CORRESPONDENCE

Survival rate after percutaneous endoscopic gastrostomy in a long-term care hospital

Dear Sir,

We previously reported the mortality after percutaneous endoscopic gastrostomy (PEG) in a general hospital.[1] The results showed a higher survival rate (30-day survival rate: 92.5%, 1-year survival rate: 64.0%, 2-year survival rate: 55.5%, mean age±SD at PEG: 75.7±14.1 years) than the results in other studies.[2]

In this study we surveyed the survival rate of 93 consecutive patients older than 65 years (mean age: 80.3±7.4 years) who received PEG by reviewing their charts in a long-term care hospital. Because the hospital has an affiliated nursing home, home-visit nursing and day care centers for the frail elderly, we could track the record of survival in 84.9% of the post-PEG patients at the time of survey. The primary diagnoses whose symptoms required the patients to receive PEG were: cerebrovascular disease (61.3%), Alzheimer's dementia and/or vascular dementia (15.1%) and brain injury (4.3%). Most patients were severely disabled, showing a mean of 5.5±1.2/6 on the score of Cognitive Performance Scale[3] (only one patient showed intact cognitive performance) and a mean of 0.8±3.0/20 on Barthel Index.[4]

Fig. 1 shows the Kaplan–Meier's survival curve after PEG. The survival rate was 88.9% at 30 days, 59.1% at 1 year and 52.0% at 2 years. The mean fully observed survival period was 382.3±485.2 days. Age was a significant predictor for the survival period ($\beta = -18.7$, $P = 0.008$). The relative risks of serum total protein <6.0, white blood count>12,000, and coexisting decubitus at the time of PEG for the death at 1 year after PEG was 1.33 (95% CI; 0.77–2.28, $P = 0.263$), 1.79 (95% CI; 1.10–2.93, $P = 0.080$) and 1.29 (95% CI; 0.78–2.13, $P = 0.228$), respectively.

The 30-days, 1-year and 2-year survival rates of post-PEG patients in a long-term care hospital were lower than those in a general hospital. According to the 2002 annual report released by the Ministry of Health, Welfare and Labor of the government, the mean length of patients' hospital stay was 22.2 days in general hospitals, and 179.1 days in long-term care hospitals in Japan. By the current political pressure of shortening the length of stay in acute hospitals, the number of patients receiving PEG in long-term care hospitals has been constantly increasing. As shown in the results, the patients in long-term care hospitals usually have severe functional disabilities relative to those in acute hospitals. Under the circumstances, it is crucial to build up evidences regarding the post-PEG prognosis in long-term care hospitals.

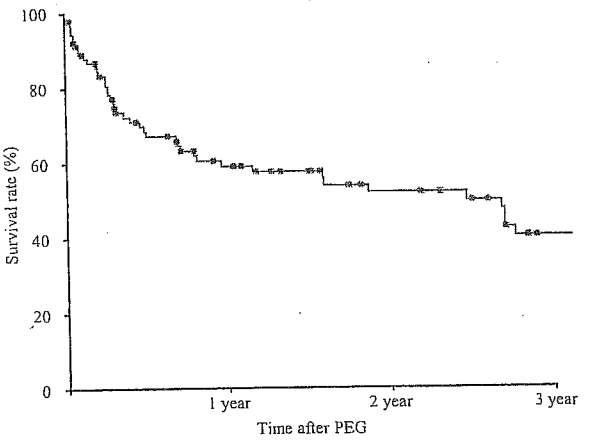

Figure 1 Kaplan–Meier survival curve after PEG. (●) Censored (dead) cases; PEG, percutaneous endoscopic gastrostomy.

In summary, the results indicate lower survival rates for post-PEG patients in a long-term care hospital than those in a general hospital. We believe that the present findings add some insights to the application of PEG in the long-term care.

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Joji Onishi, Masafumi Kuzuya
Department of Geriatrics, Medicine in Growth and Aging, Nagoya University Graduate School of Medicine, 65 Tsurumai-cho, Showa-ku, Nagoya, Aichi 466-8550, Japan
E-mail address: j-onishi@med.nagoya-u.ac.jp
(J. Onishi)

Hiromi Sakaguchi
Kobayashi Memorial Hospital, Japan

The Relationship Between Functional Disability and Depressive Mood in Japanese Older Adult Inpatients

Joji Onishi, MD, Hiroyuki Umegaki, MD, PhD, Yusuke Suzuki, MD, PhD, Katsuhiko Uemura, MA, Masafumi Kuzuya, MD, PhD, and Akihisa Iguchi, MD, PhD

ABSTRACT

Depression is commonly found in older adult patients and is often associated with handicaps. The authors administered the Comprehensive Geriatric Assessment (CGA), including basic activities of daily living (BADL), instrumental activities of daily living (IADL), Mini-Mental State Examination (MMSE), Geriatric Depression Scale (GDS)-15, and a socioenvironmental questionnaire to 198 patients who were admitted to Nagoya University Hospital, to examine the relationship between depressive mood and various physical and socioenvironmental outcomes. The overall GDS-15 score was correlated with the BADL and IADL. The factor analysis extracted 4 factors from the GDS-15 subscales. The factors labeled "loss of morale and hope" and "memory loss and reduction of social activity" were highly correlated with both ADLs, social variables, and the MMSE score. The results reveal that factor analysis of GDS-15 will help in understanding the etiology of depressive mood, thereby contributing to better therapeutic approaches. (*J Geriatr Psychiatry Neurol* 2004; 17:93-98)

Keywords: depressive mood; Geriatric Depression Scale; Comprehensive Geriatric Assessment; factor analysis

Depression is one of the most insidious problems faced by older adults, and its incidence is increasing with the growth of an aging population. Koenig and Blazer reported that the prevalence of major depression was about 1% among community-dwelling older adults and that less severe depressive disorder was present in over 25%.[1] Moreover, they reported that the rate of major depressive disorder in older adult hospitalized patients with illness was more than 10 times greater than that of the unhospitalized aging population. Depression is not only psychologically traumatic but also quite costly[2] because it is related to psychosomatic symptoms resulting in a higher frequency of examination and prescription of drugs. Furthermore, depression also decreases the morale of older people and increases the risk of being housebound. Although it is very important to adequately diagnose and treat depression in its early stage, it often remains unrecognized or untreated.[3] One of the main reasons for this is that depressive symptoms often resemble those of the aging process itself, such as progressive cognitive deterioration or physical disabilities.[4]

The Geriatric Depression Scale (GDS) is a self-administered questionnaire with 30 items[5] and is recommended by the Royal College of Physicians and British Geriatrics Society as a valid screening method for depression in older adults.[6] A short form of the GDS (GDS-15) was developed later[7] and was translated into Japanese.[8] The validity and reliability of the GDS-15 have been confirmed in both community and hospital settings.[9-11] Several studies have subjected the GDS-15 data to a factor analysis, which is a statistical technique to analyze interrelationships within a set of variables, resulting in the construction of a few hypothetical variables. To our knowledge, however, there has been only 1 study involving factor analysis of the Japanese version of the GDS-15, reported by Schreiner et al in poststroke patients.[12] In addition, there have been few studies demonstrating the relationship between GDS-15 factor loading and disabilities in the older population.

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From Department of Geriatrics, Nagoya University Graduate School of Medicine, Japan (Drs Onishi, Umegaki, Suzuki, Kuzuya, and Iguchi), and Department of Interpersonal Communication, Aichi Shukutoku University Graduate School of Communication Studies (Mr Uemura).

Address correspondence to: Joji Onishi, MD, Department of Geriatrics, Nagoya University Graduate School of Medicine, 65 Tsuruma-Cho, Showa-Ku, Nagoya, Aichi, 466-8550, Japan.

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The GDS-15 is included as one of the components in the Comprehensive Geriatric Assessment (CGA), a tool developed in the late 1980s[13,14] to assess not only medical conditions but also overall functional status with respect to physical, psychological, and social problems of the older adults.

Although it is well known that depressive mood is often associated with functional disabilities, the mechanism by which the disabilities cause depressive mood in the older adults remains unclear. We hypothesized that some variables associated with functional disability may be associated with depressive mood. Therefore, we investigated the relationship between depressive mood and physical health and socioenvironmental variables in older adult inpatients. In addition, we attempted to clarify the structure of depression by performing a factor analysis of the GDS-15.

METHODS

Subjects

Among 355 consecutive patients aged 65 and older (mean age ± SD: 77.3 ± 6.8) who were admitted to Nagoya University Hospital between July 1998 and August 2001, patients who were admitted to nongeriatric wards were not included due to the absence of experienced CGA assessment team in the wards. Also, patients with communication impairments due to problems such as severe dementia or consciousness disturbance and patients under intensive care were not included in the study. If a patient was admitted more than once during the study period, only the data from the first admission was used for this analysis. As a result; 198 older adult patients in total were included in the study.

Measurements

The CGA was administered within a week after admission. The CGA included height; weight; Body Mass Index (BMI); blood pressure; basic activities of daily living (BADL), which were measured with the Barthel Index[15]; instrumental activities of daily living (IADL) using Lawton's scale[16]; Mini-Mental State Examination (MMSE)[17]; GDS-15; hearing ability and vision; communicative competence; and living environment including socioeconomic status. We scored IADL by 5 items (IADL-5), excluding food preparation, housekeeping, and laundry items from the Lawton's scale because the study samples included male patients, who did not normally perform these activities. The low scores of BADL and IADL-5 indicate greater functional disability. The GDS-15 is scored so that higher scores indicate a greater degree of depressive mood. The recent research clarified that the sensitivity of the GDS-15 was 97.3% and the specificity was 95.9% for screening major and minor depression when the cut-off score was set at 6/6+ in the Japanese geriatric population.[18] Socioenvironmental status was assessed by Ozawa's scale,[19] which includes items on economic, marital, family status, and the relationship between the patient and his or her family. The GDS-15 was self-administered by the patient. The attending nurse collected all other information by interview and/or assessment.

Statistical Analysis

Correlation coefficients were calculated by Pearson's method for parametric data and Spearman's for nonparametric data. We used the chi-square test with Yates correction and Fisher's exact test for categorical comparisons of the data. Differences in the means of continuous measurements between genders were tested using the Student's t test. In addition, after nonparametric data in the CGA were categorized into 2 groups (subjects with and those without a problem with respect to each parameter measured), the means of the continuous measurements between the groups were also compared by Student's t test. The internal consistency of the GDS-15 was calculated with Cronbach's alpha. Principal component analysis for the GDS-15 was performed with an eigenvalue of 1.0 or more as the extraction criterion, and factors were identified after Varimax rotation. The factor score, which shows the power of a factor's contribution, was calculated by regression method, which cumulated factor loadings of all items of GDS-15. In the present study, a higher score indicates a greater contribution of the factor to depressive mood. Differences in continuous variables among the disease groups were determined by 1-way analysis of variance (ANOVA). Tukey's test was used for multiple comparisons when homoskedasticity was assumed by Levene's method, and Dunnet's test was performed when homoskedasticity was not assumed. Multiple regression analysis, using the equation-building method with the variables of significant measures detected in the univariate analysis, was conducted to identify the variables contributing to GDS-15 scores. Values of $P < .05$ were considered to indicate statistical significance; all tests were 2-tailed. All statistical analyses were performed on a personal computer with the statistical package SPSS for Windows (Version 11.0 SPSS, Chicago).

RESULTS

Table 1 reports CGA variables for all patients, according to their diagnostic category. The mean GDS-15 score of all patients was 5.9 ± 3.8 SD, and 39.3% of the patients had scores above 6. The homoskedasticities were assumed in age, systolic blood pressure, BADL, IADL-5, and GDS-15, but not in BMI or MMSE. Significant intergroup differences were observed on the BADL and IADL-5, but not in BMI, MMSE, or GDS-15. The BADL score in patients with diabetes mellitus was higher than that in patients with collagen disease ($P = .005$), and the IADL-5 score in patients with diabetes mellitus was higher than that in patients

Table 1. Mean Values ± Standard Deviation of Comprehensive Geriatric Assessment (CGA) Variables by Admitting Diagnosis

Admitting Diagnosis	*n (%)*	*Age*	*BMI (kg/m²)*	*sBP (mm Hg)*	*BADL*	*IADL-5*	*MMSE*	*GDS-15*	*GDS > 6*
Neurological disease	40 (20%)	76.5 ± 6.6	20.9 ± 3.9	128.5 ± 23.7	16.9 ± 4.1	4.0 ± 1.3	24.9 ± 4.5	6.3 ± 37	42%
Cardiovascular disease	36 (18%)	77.7 ± 8.4	23.5 ± 3.8	132.8 ± 20.0	18.0 ± 3.7	4.0 ± 1.3	26.0 ± 4.3	5.7 ± 4.0	38%
Diabetes mellitus	34 (17%)	74.2 ± 5.3	23.5 ± 3.1	138.3 ± 19.4	19.0 ± 3.0*	4.5 ± 0.9*	26.6 ± 3.5	4.6 ± 3.5	27%
Psychological disease	20 (10%)	78.5 ± 6.5	20.0 ± 3.4	138.5 ± 22.3	17.9 ± 3.0*	3.1 ± 1.9*	22.4 ± 4.9	7.6 ± 3.8	15%
Gastroenterological disease	14 (7%)	78.9 ± 6.8	21.1 ± 4.8	132.3 ± 14.1	18.2 ± 3.2*	4.2 ± 0.9	25.9 ± 3.8	5.9 ± 4.7	64%
Collagen disease	12 (6%)	77.7 ± 5.1	21.6 ± 4.0	133.5 ± 20.6	14.2 ± 6.5*	3.3 ± 1.7	23.7 ± 4.7	5.4 ± 2.7	17%
Infectional disease	11 (6%)	83.1 ± 4.7	19.9 ± 3.0	122.0 ± 15.7	19.5 ± 0.8	4.8 ± 0.4	27.3 ± 2.8	2.8 ± 1.8	0%
Others	31 (16%)	78.0 ± 7.6	20.7 ± 3.5	142.4 ± 29.0	18.0 ± 3.9	4.3 ± 1.1	26.1 ± 4.1	6.3 ± 4.0	43%
Total	198 (100%)	77.3 ± 6.8	21.9 ± 3.8	133.9 ± 21.7	17.8 ± 3.8	4.1 ± 1.3	25.5 ± 4.3	5.9 ± 3.8	39%

Note: BMI = body mass index, sBP = systolic blood pressure, BADL = basic activities of daily living, IADL = instrumental activities of daily living, MMSE = Mini-Mental State Examination, GDS = Geriatric Depression Scale.

*$P < .05$.

Table 2. Principal Components (Varimax) Factor Analysis of the Geriatric Depression Scale-15

Items	*Factor 1 Unhappiness*	*Factor 2 Apathy and Anxiety*	*Factor 3 Loss of Hope and Morale*	*Factor 4 Memory Loss and Reduction of Social Activity*
1. Satisfied	***0.708***	0.270	0.061	−0.266
2. Dropped activities	0.058	***0.646***	0.350	−0.020
3. Emptiness	0.299	***0.621***	−0.134	0.179
4. Often bored	0.151	***0.675***	0.140	0.233
5. In good spirits	***0.627***	0.216	0.129	0.216
6. Afraid something bad will happen	0.336	***0.572***	0.163	−0.100
7. Feels happy	***0.769***	0.027	0.128	0.101
8. Often feels helpless	−0.186	***0.536***	0.493	0.013
9. Prefers to stay in	0.009	0.095	0.385	***0.445***
10. More problems with memory than most	0.082	0.074	0.043	***0.805***
11. Wonderful to be alive	***0.553***	0.077	0.458	0.033
12. Feels worthless	0.348	0.108	***0.605***	0.242
13. Full of energy	0.061	0.063	***0.753***	0.002
14. Feels situation is hopeless	0.270	0.235	***0.679***	0.090
15. Most people better off than self	***0.487***	0.396	0.013	0.368
Explained variance	2.4	2.2	2.2	1.2
Cumulative percentage of variance explained	16.6	31.5	46.3	54.8

Note: The factor score was calculated by regression method, which cumulated factor loadings of all items of GDS-15. Loadings in italic bold indicate those selected to define the factor.

with psychological disease ($P = .009$). The patients with psychological disease showed the highest mean score of GDS-15, (7.6 ± 3.8 SD). No significant intersex difference was observed in all parameters examined. Antidepressants had been administered to 7.2% of all patients, and to 9.0% of the patients with a GDS-15 score greater than 6.

The internal consistency of GDS-15 was found to be satisfactory, Cronbach's alpha being .83. Factor analysis of GDS-15 extracted 4 factors, whose loading values are shown in Table 2. The cumulative percentage of variance explained was 57.3%. Factor 1 represented "unhappiness," which included the items satisfied, in good spirits, feels happy, wonderful to be alive, and most people better off than self. Factor 2, "apathy and anxiety," was made up of the items, dropped activities, emptiness, often bored, afraid something bad will happen, and often feels helpless. Factor 3, "loss of hope and morale," included the items feels worthless, full of energy, and feels situation is hopeless. Finally, factor 4, "memory loss and reduction of social activity," included the items prefers to stay in and more problems with memory than most.

Table 3. Correlation Between Geriatric Depression Scale-15, Extracted Factors, and Parametric Data

Measure	*GDS-15*	*Factor 1 Unhappiness*	*Factor 2 Apathy and Anxiety*	*Factor 3 Loss of Hope and Morale*	*Factor 4 Memory Loss and Reduction of Social Activity*
Age	0.123	−0.001	−0.108	0.250**	0.166*
BMI	−0.141	0.006	−0.135	−0.121	−0.036
sBP	−0.038	−0.260	−0.040	−0.009	−0.101
BADL	−0.168*	−0.033	−0.044	−0.191*	−0.055
IADL-5	−0.201**	−0.076	0.023	−0.235**	−0.066
MMSE	−0.151*	−0.034	0.050	−0.167*	−0.214**

Note: Pearson's rho used for correlations. BMI = body mass index, sBP = systolic blood pressure, BADL = basic activities of daily living, IADL =instrumental activities of daily living, MMSE = Mini-Mental State Examination.

*$P < .05$. **$P < .01$.

Pearson's coefficients of continuous variables are shown in Table 3. The total GDS-15 score had a significant negative correlation with IADL-5 ($r = -.201$, $P = .005$), BADL ($r = -.168$, $P = .021$), and MMSE ($r = -.151$, $P = .034$). However, there was no significant relationship between the GDS-15 score and age, BMI, or systolic blood pressure.

The score of factor 3 (loss of hope and morale) correlated positively with age and negatively with IADL-5, BADL, and MMSE scores, whereas factor 4 (memory loss and reduction of social activity) showed a significant positive correlation with age and a significant negative correlation with MMSE score. However, there was no significant relationship between the scores of factor 1

Table 4. Relationship of Nonparametric Data in Comprehensive Geriatric Assessment With the Geriatric Depression Scale-15 and Extracted Factors

Measurement	*Percent With Problem*	*Spearman's ρ With GDS-15*	*t Test for Mean Score GDS-15*	*Factor 1 Unhappiness*	*Factor 2 Apathy and Anxiety*	*Factor 3 Loss of Hope and Morale*	*Factor 4 Memory Loss and Reduction of Social Activity*
Gender (male/female)	—	—	NS	NS	NS	−0.22/0.17**	NS
BADL (with/without problem)							
Grooming	7.1%	—	NS	NS	NS	0.75/−0.08**	NS
Feeding	8.1%	−0.087	NS	NS	NS	NS	NS
Bowel continence	12.2%	−0.062	NS	NS	NS	NS	NS
Using toilet	14.2%	−0.122	NS	NS	NS	NS	NS
Ambulation	16.8%	−0.102	NS	NS	NS	0.31/−0.09*	NS
Chair/bed transfer	16.8%	−0.142	7.1/5.6*	NS	NS	NS	NS
Dressing	17.8%	−0.122	NS	NS	NS	NS	NS
Bladder control	19.8%	−0.097	NS	NS	NS	NS	NS
Bathing	25.0%	—	6.9/5.5*	NS	NS	0.27/−0.12*	NS
Using staircase	29.9%	−0.271*	7.4/5.2**	NS	NS	0.33/−0.17**	NS
IADL(with/without problem)							
Going outside	10.4%	—	NS	NS	−0.41/0.10*	NS	NS
Using telephone	11.4%	—	NS	NS	NS	NS	NS
Managing money	20.3%	—	NS	NS	NS	NS	NS
Medication	37.1%	—	NS	NS	−0.14/0.15*	NS	NS
Shopping	39.4%	—	NS	NS	NS	0.21/−0.15*	NS
Physical (with/without problem)							
Seeing	23.1%	−0.141	NS	NS	NS	NS	NS
Hearing	23.0%	−0.091	NS	NS	NS	NS	NS
Communication	7.0%	−0.152*	8.2/5.7*	NS	NS	NS	0.51/−0.48*
Social							
Economic status (dependent/independent)	—	−0.163*	NS	NS	NS	NS	NS
Marital status (with/without spouse)	—	−0.148*	NS	NS	NS	0.20/−0.21**	NS
Familial status (alone/not alone)	—	−0.136	7.2/5.6*	0.50/−0.08*	NS	NS	NS
Family relation (with/without interaction)	—	−0.220*	NS	NS	NS	0.71/−0.03*	NS

Note: NS = not significant. t-test for mean score compared between 2 groups with or without problem for each item.

*$P < .05$. **$P < .01$. Dashes indicate not calculated because the items have less than 3 alternatives

(unhappiness) or factor 2 (apathy and anxiety) and other CGA variables.

The patients were divided into 2 groups depending on their score for CGA variables. Then we compared the difference between the GDS-15 factor scores and these 2 groups using Student's t test. The correlations of nonparametric data with the score of GDS-15 and the extracted factors are shown in Table 4. The GDS-15 score had a significant negative correlation with BADL (using staircase), communicative ability, economic and marital status, and family relationship. Patients having problems in using the staircase, bathing, chair/bed transfer, and communication showed a significantly higher GDS-15 score than the patients without these problems ($P < .001$, $P = .041$, $P = .034$, $P = .028$, respectively). Also, patients living alone showed a significantly higher GDS-15 score than those not living alone ($P = .043$). The statistical analysis revealed that the score of factor 3 (loss of hope and morale) was significantly higher among women ($P = .007$). Factor 3 had a much stronger relationship with some variables of BADL and IADL-5, such as grooming, using staircase, ambulation, bathing, and shopping, than it did with other factors. On the other hand, factor 2 (apathy and anxiety) was inversely correlated with going outside and managing medication.

Multiple regression analysis was performed to predict the score of GDS-15 with significant variables, which were using stairs, bathing, communicative ability, economic status, marital status, familial status, and the total score of MMSE. This analysis elicited a model with an adjusted R^2 of .144 ($P < .001$) (Table 5).

DISCUSSION

The mean GDS-15 score in this study was 5.9, which was higher than those in previous studies. In a recent study of 1343 Japanese community-dwelling older adults, the mean GDS-15 score was 2.0 and 23.7% scored 6 or higher.[20] Meanwhile, Patrick et al reported that the mean score of hospitalized patients in their geriatric rehabilitation unit was 3.8 ± 2.8 SD.[21] The higher GDS-15 scores obtained in this study may imply that worsening medical conditions resulting in admission to the hospital relate to increased depressive symptoms. In particular, the neurological disease group showed the highest mean GDS-15 score, which is in line with findings in previous studies that depression

Table 5. Coefficients of Regression Model for Geriatric Depression Scale-15

Variable	ß	Standardized ß	T	P Value
Using stairs	−2.48	−0.48	−4.27	< .001
Bathing	2.59	0.29	2.44	< .001
Communicative ability	−0.57	−0.04	−0.558	.016
Economic status	−0.48	−0.07	−0.917	.577
Marital status	−0.34	−0.09	−1.25	.360
Familial status	−1.02	−0.17	−2.17	.211
MMSE	−0.04	−0.04	−0.55	.584

Note: MMSE = Mini-Mental State Examination. GDS-15 = −2.48 × (Using stairs) + 2.59 × (Bathing) − 0.57 × (Communication) − 0.48 × (Economic status) − 0.34 × (Marital status) − 1.02 × (Family status) − 0.04 × MMSE. Total adjusted $R^2 = 0.144$, $P < .001$.

frequently occurs after stroke.[10,22,23] In the present study, antidepressants were administered to only 9.0% of the patients who had a GDS-15 score of greater than 6, which supports claims that depression is overlooked by clinicians, or is not treated adequately.[4]

The results of this study are consistent with previous findings that physical disabilities relate to depressive symptoms.[24-27] In the present study, the GDS-15 score was negatively correlated with the BADL and IADL. Three BADL items in particular, using staircase, chair/bed transfer, and bathing, had strong negative correlations with the GDS-15 score. These results indicate that loss of lower body strength and impaired mobility may affect patient's mood. A possible explanation for the difference is that depressive mood may be associated with impaired abilities to maintain normality in life such as immobility, rather than the severity of disabilities.

We also found a weak but significantly negative correlation between the GDS-15 and MMSE scores. The findings of previous studies regarding the relationship between depression and the severity of dementia are varying, which may be attributable to differences in study design.[28] Although many investigators have reported a decrease in the frequency of depression in advanced dementia,[29,30] no such association was found in this study probably because the cognitive impairment of the patients in this study was rather mild with mean MMSE score of 25.5 ± 4.3 SD, and no patients with advanced dementia were included.

Liu et al reported that being female, older, and without spouse were related to depressive symptoms among Chinese older adults.[31] Our results did not demonstrate a significant relationship between the GDS-15 score and either gender or age, but a higher GDS-15 score was significantly related with economic dependence, absence of spouse, and poor family relationship particularly with "living alone."

Thus far, many researchers have reported on the factor analysis of GDS-15, but the relationship between the factors extracted and the physical, psychological, and socioenvironmental status of the older adults has not been extensively investigated. We found that factor 3, "loss of morale and hope," was highly related with BADL and IADL. Meanwhile, factor 4, "memory loss and reduction of social activity," was related with age and MMSE, although factor 1 (unhappiness) and factor 2 (apathy and anxiety) were not correlated with any of those parameters examined, which means they may be normal aspects of disabled state and hospitalization. Some investigators have reported that sense of loss or environmental change can induce depression in the aged.[32,33]

GDS-15 is often included in CGA, which is a useful tool to comprehensively assess older adult patients. The meta-analysis conducted by Stuck et al demonstrated that CGA was effective in improving mortality and in reducing hospitalization.[34] However, there have been few studies using CGA results to identify specific clinical strategies for patient care. The present study demonstrates that factor analysis of GDS-15 helps health care staffs establish better therapeutic strategies for depressive mood of older patients. For example, the present findings suggest that intervention to assist in coping with the functional impairment may decrease depressive symptoms in subjects suffering from them. However, pharmacological interventions may be more appropriate for nondisabled patients.

In conclusion, we carried out a structural analysis of the GDS-15 in older adult inpatients and extracted 4 factors related with functional disabilities. Factor 3, "loss of morale and hope," and factor 4, "memory loss and reduction of social activity," were highly related with ADL, social variables, and cognitive impairment. In addition, the results suggest that factor analysis will allow improved assessment and medical support of older adult inpatients. Thus, we believe that the results have indicated an extended utility of the GDS-15 not only as a simple screening method for depressive mood but also as a tool for better therapeutic approaches.

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Effect of long-term care insurance on communication/recording tasks for in-home nursing care services

Yoshihisa Hirakawa [a,*], Yuichiro Masuda [a], Kazumasa Uemura [b,1], Masafumi Kuzuya [a], Akihisa Iguchi [a]

[a] *Department of Geriatrics, Nagoya University Graduate School of Medicine, 65 Tsuruma-cho, Showa-ku, Nagoya, Aichi 466-8550, Japan*
[b] *Department of Internal Medicine, Nagoya University Graduate School of Medicine, 65 Tsuruma-cho, Showa-ku, Nagoya, Aichi 466-8550, Japan*

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Abstract

The purpose of this research was to clarify the possible changes brought about by the introduction of the long-term care insurance system in terms of number of communication/recording tasks, related nursing services in use, and when and where these tasks were performed. By examining the detailed content of communication/recording tasks, this study also sought to explore the advantages of introducing information technology (IT) systems in nursing service settings. The study was designed before-and-after study in two sessions, February 2000 and August 2000, namely before and after the introduction of Japan's long-term care insurance system. Participants were clients using the institution's in-home nursing services and all staff in a medical institution located in the Mikawa region of Aichi Prefecture, Japan. Following measurements were performed: (1) nursing service in use, (2) type of job, (3) date and time, (4) from whom, (5) to whom, (6) communication tool and (7) content, related to a particular communication. Communication/recording tasks were frequently performed around the starting and closing time of services. Following the adoption of the new system, these tasks tended to occur mostly around the starting time of services. As for the staff, the involvement of the professional carers increased. Regarding content of communication/recording, reports, confirmation and instruction increased. In conclusion, the use of IT driven devices is recommended

* Corresponding author. Tel.: +81-52-744-2364; fax: +81-52-744-2371.
E-mail address: y.hirakawa@k8.dion.ne.jp (Y. Hirakawa).
[1] Tel.: +81-52-744-1997; fax: +81-52-744-2999.

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