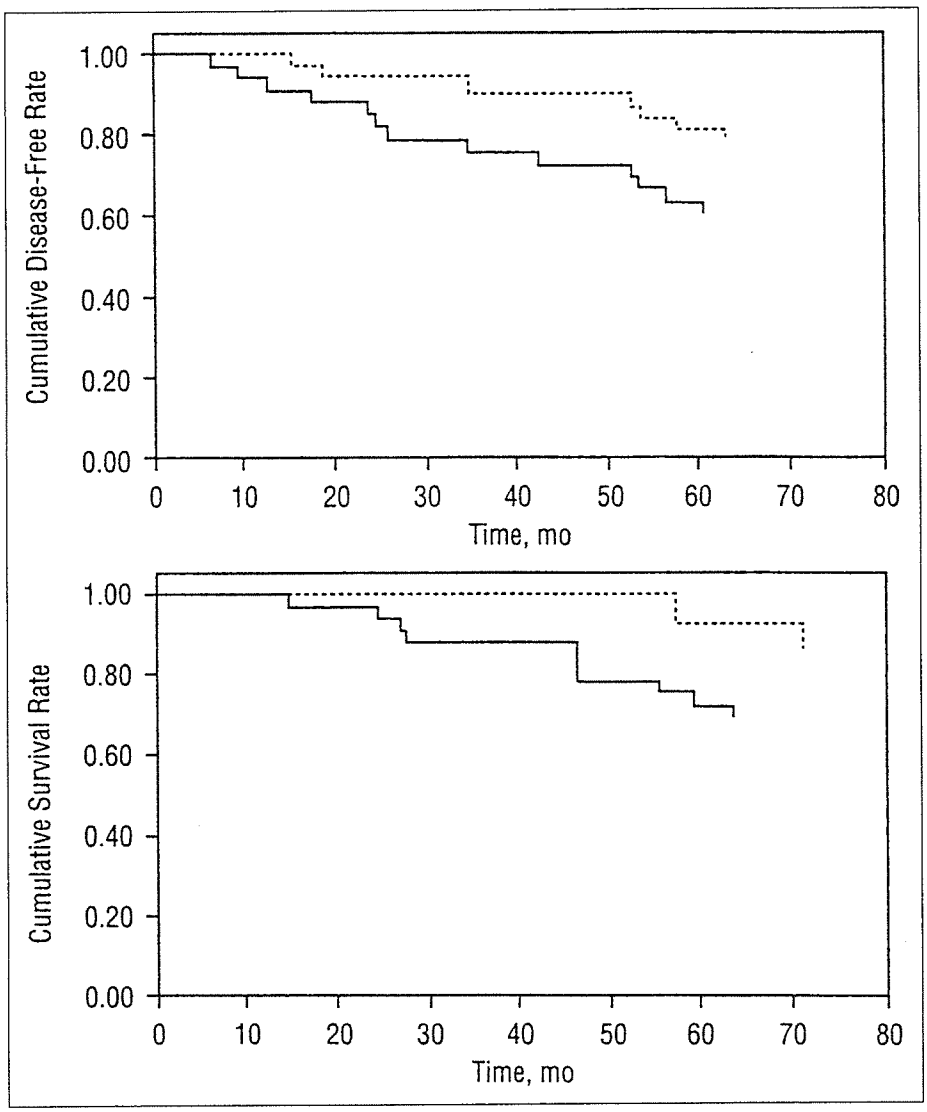

図1　心理的介入と健存率，生存率

悪性黒色腫患者を標準的外科的治療群(実線)と心理的介入を付加した群(破線)とに分け，60～72カ月経過を追ったところ，介入群の方が健存率(上図)も生存率(下図)もともに高かった．(Fawzyら[16], 1993)

実際の治療にあたっては，うつ病の重症度によって使用する向精神薬を選択する．比較的軽症例ではアルプラゾラムが有用であるが，軽症から中等症のうつ病患者には，SSRI(selective serotonin reuptake inhibitor)やSNRI(serotonin-noraderenaline reuptake inhibitor)が主体に用いられる．これらは口渇や羞明，便秘，排尿障害などの抗コリン作用，眠気や鎮静などの抗ヒスタミン作用が少なく，使用しやすい薬物ではあるが，いずれも吐気や嘔吐などの消化器症状をきたすことがあり，胃腸薬と一緒に用いるか服用できない場合もある．また，SSRIは肝臓の薬物代謝酵素であるチトクロームP450系の働きを阻害することがあり，相互作用が起こる可能性のある薬物とは用いない．さらに，SNRIはアドレナリンα_1受容体に作用して排尿障害をきたすことがあるため，その際はα_1ブロッカーの併用が必要になる．

SSRIやSNRIで効果がない場合や重症のうつ病患者には，三環系抗うつ薬(特に抗コリン作用や心毒性が比較的少ないアモキサピンやノルトリプチリン)やその他の環状抗うつ薬を適宜用いる．精神刺激薬であるメチルフェニデートは即効性があるため，予後が限られ早期の効果発現が望まれる患者やオピオイドによる眠気や倦怠感を有する患者に有用である．

先にも述べたように，がん患者では経口投与が困難なこともあり，その場合はクロミプラミンの点滴静注が主体となる．また，わが国においてはスルピリドも点滴静注の形で用いられるが，長期に使用するとドーパミン遮断作用により錐体外路症状が出現する可能性がある．

2. 精神療法

がん患者に対する精神療法について明智ら[14]は，支持的精神療法を基本的な治療技法として，心理的防衛機制としての「否認」，「退行」を原則的に尊重し，治療者の「逆転移」に十分な注意を払いながらアプローチすることの重要性を指摘している．

(1)心理教育的介入

正確な医学的情報を提供することにより，不明確な知識を補い，誤った思い込みを訂正することができ，患者の不安感を改善するとともに非適応的行動を抑制することができる．

(2)支持的精神療法

決まった形式はなく，傾聴，共感，受容，保証，説明，問題解決，場合によっては励ましなどにより，がんに伴って生じた精神的苦痛を軽減し，情緒的安定を図る．

(3)認知療法

自己に対する否定的認知など，患者の思考パターン，行動パターンの偏りを修正し，再構成していく．

(4)リラクゼーション

自律訓練法，アロマテラピー，音楽療法などにより，不安・緊張を軽減させる．

(5)集団精神療法

同じような状況に置かれた患者同士の相互支持の場として機能し，グループ内での精神的援助や日常生活における情報交換を通じて，より適応的な対処方法を身につけていく．この集団療法についてSpiegelら[15]の報告では，転移性乳癌患者のうち，心理社会的介入群50名と対照群36名とに分け10年間経過を追ったところ，介入群が対照群の2倍生存率が高かった．また，図1のようにFawzyら[16]の報告では，悪性黒色腫患者を標準的外科的治療群34名と心理的介入を付加した群34名とに分け，5～6年間経過を追ったところ，介入群の方が健存率も生存率も高かった．一方，Goodwinら[17]は，転移性乳癌患者介入群158名と対照群77名の両群で生存期間に変わりはなかったと報告しており，集団精神療法の効果は確立されているとはいえない．

うつ病のがんに対する影響

これまで長年の間，うつ病はがんの発症にとって危険因子となりうるのかどうかが論議されてきた．しかし，Zondermanら[18]は，General Well-being ScheduleのCheerful vs Depressed subscale (GWB-D)とCenter for Epidemiologic StudiesのDepression (CES-D)の二つのうつ病を測定する心理スケールを用いて，前者が6,913名，後者が2,814名という大規模な，しかも10年近くにわたる追跡調査を行い，うつ病にあると評価された群とされなかった群との間に，がんの有病率や死亡率に有意差はなかったと報告している．またDaltonら[19]は，うつ病で入院した成人患者89,491名を24年にわたって追跡調査し，これらの患者のがんの出現数を期待値との比で検討した．その結果，喫煙に関係したがんも喫煙に関係しないがんも，有意に多いことはなかったと報告している．これらの結果は，うつ病ががんの危険因子とはならないことを物語っている．

おわりに

がん患者におけるうつ病の診断と治療について述べてきたが，何よりもこうしたがん患者の精神的側面が正当に評価されることが第一であり，その上で適切な診断と治療がなされるようにしてゆかなければならない．

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ORIGINAL ARTICLE

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Reliability and validity of the Functional Assessment of Chronic Illness Therapy–Spiritual (FACIT–Sp) for Japanese patients with cancer

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Abstract The reliability and validity of the Japanese version of the Functional Assessment of Chronic Illness Therapy–Spiritual (FACIT–Sp) scale were assessed. This scale was developed in the United States to assess quality of life (QOL) in relation to spirituality. Two surveys were conducted on each of 306 cancer patients. In addition to the FACIT–Sp, the Hospital Anxiety and Depression Scale (HADS) was administered. Cronbach's alpha reliability coefficient, an evaluation of internal consistency, for the FACIT–Sp subscales ranged from 0.81 to 0.91. There were no significant differences between the patients evaluated using the FACIT–Sp subscale and the HADS subscale with regard to degree of religious feelings. The correlation coefficients between the FACIT–Sp and the HADS depression and anxiety scales indicated a moderate correlation. These findings suggest that the Japanese version of the FACIT–Sp scale is satisfactory in terms of reliability and validity and is a useful tool in the study of spirituality among Japanese cancer patients.

Keywords Spirituality · QOL · Cancer · Functional Assessment of Chronic Illness Therapy–Spiritual (FACIT–Sp) · Religious feelings

Introduction

In recent years the traditionally assessed aspects of quality of life (QOL) such as physical, psychological and social well-being and functioning have been supplemented by spiritual aspects of QOL [1, 2, 3]. The importance of spirituality as a central component of psychological well-being is increasingly recognized by doctors and mental-health professionals [4]. A WHO (World Health Organization) expert committee found that "spirituality" is an important element of cancer pain management and defined it as "... those aspects of human life relating to experiences that transcend sensory phenomena. This concept is not equivalent to religion, though for many people the spiritual dimension of their lives includes a religious component. The spiritual aspects of human life may be viewed as an integrating component, binding together the physical, psychological, and social components. Spirituality is often perceived, in clinical practice, as being concerned with meaning and purpose and can be a more immediate issue for those nearing the end of life" [5]. In the field of psychiatry, "Religious or Spiritual Problem" has now specified as a diagnostic category that includes spiritual pain [6]. However, this category is quite broad and difficult to distinguish from religiousness.

In Japan, we have no means for evaluating or measuring a cancer patient's degree of spirituality. This situation has created confusion among medical care providers, especially those responsible for palliative care. In order to study the role of spirituality in QOL for patients with cancer, we evaluated the reliability and validity of the Japanese version of the Functional Assessment of Chronic Illness Therapy–Spiritual (FACIT–Sp) well-being scale.

Materials and methods

This study was performed on patients with cancer selected from the population being treated as inpatients and outpatients at the Research Center Hospital for Charged Particle Therapy, National Institute of Radiological Sciences, Chiba, Japan, during the 3-month period from January to March 2003. Patients were included in the study if (1) they had been told of their cancer diagnosis, (2) they were 18 years of age or older, (3) the time between their first visit to the hospital and the study was longer than 1 month, (4) their condition was not so severe that they could not complete the questionnaire and participate in a brief interview, and (5) they had no severe mental disorder or dementia. Of those who met the inclusion criteria, 320 patients were asked to participate in the study. After providing detailed information on the purpose of the study, informed consent in writing was obtained from 306 patients. The other 14 patients did not want to participate in this study because they did not want to talk about their disease.

The FACIT–Sp scale assesses QOL and contains an additional self-rating scale on spirituality [7]. The FACIT–Sp scale includes 7 physical items, 6 family and social items, 6 emotional items, 7 functional items (herein referred to as FACT–General, FACT–G) and 12 spirituality items (herein referred to as the FACIT–Sp subscale). The FACIT–Sp subscale comprises two factors. One of these (labeled Meaning/Peace) includes eight items and assesses the sense of meaning, peace and purpose in life. The other (labeled Faith) contains four items and measures several aspects of the relationship between illness and one's faith and spiritual beliefs [8].

With these individual subscales, it is possible to evaluate the total QOL. For each question, a reply may be given using a Likert-type response format from "very much" to "not at all", as shown in Table 1. Investigations performed in North America have demonstrated that these scales are reliable and provide a useful tool with clinical applications. Shimozuma [9] translated the instrument into the Japanese language with the permission of the developer. Translation was performed according to FACIT Translation Project Procedures and Guidelines. After a forward and backward translation had been carried out by two native English speakers and two native Japanese speakers, respectively, a breast cancer specialist and a linguistics specialist performed a review and reconciliation.

In order to evaluate the relationship between spirituality and anxiety or depression in our population of cancer patients, the Hospital Anxiety and Depression Scale (HADS) [10] was used. The HADS is a self-rating type questionnaire with 14 items. The reliability and validity of the Japanese language version of HADS for measuring anxiety and depression has been confirmed in a previous study [11]. Additional information recorded during the

Table 1 FACIT–Spiritual well-being subscale instrument. The questionnaire is prefixed by the following instruction to the patient: "Below is a list of statements that other people with your illness have said are important. By circling one number per line, please indicate how true each statement has been for you DURING THE PAST 7 DAYS"

	Not at all	A little bit	Somewhat	Quite a bit	Very much
Sp1. I feel peaceful	0	1	2	3	4
Sp2. I have a reason for living	0	1	2	3	4
Sp3. My life has been productive	0	1	2	3	4
Sp4. I have trouble feeling peace of mind	0	1	2	3	4
Sp5. I feel a sense of purpose in my life	0	1	2	3	4
Sp6. I am able to reach down deep into myself for comfort	0	1	2	3	4
Sp7. I feel a sense of harmony within myself	0	1	2	3	4
Sp8. My life lacks meaning and purpose	0	1	2	3	4
Sp9. I find comfort in my faith or spiritual beliefs	0	1	2	3	4
Sp10. I find strength in my faith or spiritual beliefs	0	1	2	3	4
Sp11. My illness has strengthened my faith or spiritual beliefs	0	1	2	3	4
Sp12. I know that whatever happens with my illness, things will be okay	0	1	2	3	4

present study included the primary site of cancer and the Eastern Cooperative Oncology Group Performance Status (ECOG-PS). Each patient was asked if he/she had faith in something, or if he/she believed in some religion or faith. Each patient was asked to reply: "I believe", "I don't know exactly", or "I do not believe".

Statistical analyses were performed using SAS software (SAS for Windows, release 8.02; SAS Institute, Cary, N.C.). The internal consistency of each subscale was evaluated using Cronbach's alpha coefficient. Factor analysis using promax rotation was also conducted to confirm the subscale structure of the FACIT–Sp scale. Pearson's correlation coefficients of the FACIT–Sp subscales with the four subscales of the FACT–G and the HADS scores were calculated. In addition, inter-subscale correlation coefficients of the FACT–G were estimated. Relationships between religious faith (I believe/I don't know exactly/I don't believe) and the FACIT–Sp score and between religious faith and HADS score were examined using one-way analysis of variance (ANOVA).

The study was carried out with the approval of the Institutional Review Board of the National Institute of Radiological Sciences.

Table 2 Patient characteristics (n=306). Values are number (%), except age in years

Age (years)	
Mean	62.9
Range	22–87
Gender	
Male	164 (53.6)
Female	142 (46.4)
Education (years)	
≤9	60 (19.6)
≥10	246 (80.4)
Employment status	
Full-time	90 (29.4)
Part-time	21 (6.9)
Unemployed	113 (36.9)
Homemaker	66 (21.6)
Other	16 (5.2)
Marital status	
Married	255 (83.3)
Widowed	24 (7.8)
Never married	27 (8.8)
Cancer site	
Prostate	74 (24.2)
Uterus	70 (22.9)
Head and neck	42 (13.7)
Breast	33 (10.8)
Lung	31 (10.1)
Other	56 (18.3)
Therapy	
Radiotherapy only	142 (46.4)
Radio + chemotherapy	84 (27.5)
Radiotherapy + operation	50 (16.3)
Other	30 (9.8)
Performance status (ECOG)	
0	179 (58.5)
1	93 (30.4)
2	30 (9.8)
3/4	4 (1.3)

Results

Patient demographics are summarized in Table 2. The average age of the patients was 62.9 years, and male patients accounted for 53.6% of all patients studied. Greater than 10 years of education was reported by 80.4% of the study population, and 83.3% of the patients were married. Most (58%) of the patients were PS 0, and the majority were in good physical condition. The primary cancer site most frequently reported was the prostate gland (24.2%), and the uterus was the second most common site (22.9%). Descriptive statistics for each scale of the FACIT–Sp questionnaire and the results of internal consistency evaluation based on Cronbach's alpha reliability coefficients, which reflect the degree to which all items in a particular scale measure a single (unidimensional) concept, are shown in Table 3. Cronbach's alpha reliability coefficients for the five subscales were in the range 0.81–0.91.

Table 4 shows the results of factor analysis on 26 items (FACT–G) of the FACIT–Sp questionnaire and the 12 items of the FACIT–Sp subscale. (One item on the FACT–G is a question regarding sexual satisfaction, but because fewer than 50% of the respondents answered this question, it was not included in the analysis.)

In FACT–G, four factors as estimated in the original version were evaluated, and good factor validity was observed. Also, on the FACIT–Sp subscale, two factors were examined and found to be more representative of subject spirituality. The results of the two-factor analysis are shown in Table 3. The results of examining the degree of distinctiveness among the subscales are shown in Table 5. Correlation coefficients of 0.7 or more between

Table 3 FACIT–Sp descriptive statistics

Subscale	Total items	Mean	SD	Cronbach's alpha
Physical well-being	7	21.5	5.5	0.82
Social/family well-being	6	19.2	5.6	0.81
Emotional well-being	6	17.3	5.2	0.83
Functional well-being	7	19.6	5.6	0.86
Spiritual well-being				
Total	12	32.0	9.2	0.91
Items 1–8 (meaning/peace)	8	22.2	6.3	0.89
Items 9–12 (faith)	4	9.8	3.6	0.82

Table 4 FACIT–Sp factor analysis (*GP* FACIT–general physical well-being subscale, *GS* FACIT–general social and family well-being subscale, *GE* FACIT–general emotional well-being subscale, *GF* FACIT–general functional well-being subscale, *Sp* FACIT–spiritual well-being subscale)

Item	Factor 1 (functional)	Factor 2 (emotional)	Factor 3 (physical)	Factor 4 (social/family)	Item	Meaning/ peace	Faith
GP1	0.338	0.343	**0.671**	–0.097	Sp1	**0.740**	0.597
GP2	0.080	0.189	0.389	0.053	Sp2	**0.708**	0.683
GP3	0.296	*0.518*	**0.628**	–0.144	Sp3	**0.795**	0.660
GP4	0.241	0.339	**0.654**	0.003	Sp4	**0.572**	0.338
GP5	0.198	0.375	**0.549**	0.060	Sp5	0.636	*0.682*
GP6	0.350	*0.544*	**0.636**	–0.064	Sp6	**0.838**	0.655
GP7	0.368	*0.444*	**0.755**	–0.107	Sp7	**0.876**	0.612
GS1	0.300	0.054	–0.058	**0.467**	Sp8	**0.496**	0.324
GS2	0.087	–0.071	–0.058	**0.711**	Sp9	0.631	**0.866**
GS3	0.249	–0.066	–0.202	**0.500**	Sp10	0.577	**0.846**
GS4	0.255	0.085	0.004	**0.826**	Sp11	0.388	**0.652**
GS5	0.221	0.042	–0.005	**0.771**	Sp12	0.473	**0.513**
GS6	0.215	0.080	–0.001	**0.624**			
GE1	0.341	**0.717**	*0.404*	0.028			
GE2	*0.447*	**0.490**	0.241	0.208			
GE3	0.355	**0.637**	*0.502*	0.047			
GE4	0.302	**0.754**	*0.445*	–0.049			
GE5	0.188	**0.732**	0.337	0.014			
GE6	0.208	**0.645**	*0.416*	–0.134			
GF1	**0.670**	0.092	*0.406*	0.119			
GF2	**0.698**	0.141	0.326	0.165			
GF3	**0.845**	0.355	0.228	0.255			
GF4	**0.642**	0.366	0.176	0.354			
GF5	**0.469**	*0.424*	0.270	0.102			
GF6	**0.745**	0.399	0.245	0.180			
GF7	**0.747**	*0.449*	0.275	0.207			

Table 5 Pearson's correlation coefficients between FACIT–Sp subscales

	Physical well-being	Social and family well-being	Emotional well-being	Functional well-being	Spiritual well-being		
					Total	Items 1–8 (meaning/peace)	Items 9–12 (faith)
Physical well-being	1	–0.05	0.60	0.42	0.36	0.40	0.23
Social and family well-being		1	0.02	0.28	0.24	0.23	0.20
Emotional well-being			1	0.45	0.54	0.59	0.36
Functional well-being				1	0.67	0.68	0.52
Spiritual well-being					1	1	1

Table 6 Relationships between religious faith, Sp score and HADS score

Religious faith	*n*	Spiritual well-being mean scores			HADS mean scores		
		Total	Meaning/ peace	Faith	Depression	Anxiety	Total
I believe	53	34.5	23.8	10.7	3.96	4.66	8.62
I don't know exactly	85	31.6	21.8	10.0	4.41	5.02	9.44
I don't believe	167	31.5	22.0	9.5	4.74	4.95	9.69
P value[a]	–	0.105	0.136	0.110	0.324	0.799	0.506

[a] One-way analysis of variance based on F statistics: F (2, 302)

scales suggest a strong relationship [12, 13]. In the present investigation, all correlation coefficients were 0.7 or lower, which indicates that each subscale was distinctive. Table 6 shows whether religious feeling are present or not and the intergroup differences between the spirituality scales and the HADS scores. There were no significant differences between the groups in the spirituality scale, anxiety scale, depression scale, or the total score based on whether the patient had religious feelings.

Table 7 shows the correlation coefficients between the FACIT–Sp scale and the HADS subscales (depression scale, anxiety scale, total score); these were 0.58, 0.51, and 0.62, respectively.

Table 7 Pearson's correlation coefficients between HADS score and FACIT–Sp

FACIT–Sp	HADS		
	Depression	Anxiety	Total
Total	0.58	0.51	0.62
Meaning/peace	0.58	0.53	0.40
Faith	0.48	0.62	0.50

Discussion

Fitchett et al. [14], Brady et al. [15], and Peterman et al [8] applied the FACIT–Sp scale to patients with cancer and HIV in the US and identified two-factor models (meaning/peace and faith) after performing factor validity evaluation. In the present study, using Japanese patients, the FACIT–Sp scale also suggested two-factor models. With the purpose of examining whether the cultural and religious differences between Japan and countries in Europe and the US exert an influence on spirituality, we studied the relationship between a reported presence or absence of religious feelings and the spirituality scores. No significant differences were found in the patient's spirituality scores based on the presence or absence of religious feelings, but the difference in spirituality mean scores between the presence and absence of religious feelings may be clinically important. These results support the view that spirituality is not identical with religious feeling and suggest that the FACIT–Sp scale can be used effectively with minimal influence from the different religious attitudes in Japan. Fehring et al. [16] have suggested that there may be a problem of overlap between the emotional scale and the spirituality scale. In the present study, the emotional subscales of the FACIT–Sp scale and the HADS were moderately correlated with the spirituality scale; this suggests that these two scales, while related, may be sufficiently distinct to warrant measurement.

In recent years, several mental health and pastoral care interventions have been developed that specifically target spirituality among patients with cancer [4]. This suggests the possibility of meaning-centered psychotherapy (based on the logotherapy of Victor Frankl) [17]. It is thought that the FACIT–Sp scale can be used as a tool for evaluating the effectiveness of this psychotherapy.

Our investigation of spirituality will be continued in long-term cancer survivors to evaluate the possibility of psychotherapeutic intervention for spirituality in Japan. It would also be interesting to examine the relationship between spirituality and coping with the illness.

In conclusion, in the Japanese version of the FACIT–Sp scale, Cronbach's alpha reliability coefficients of the subscales were in the range 0.81–0.91, and these values compare favorably to those for the original version (0.72–0.87). This suggests that the Japanese version of the FACIT–Sp scale has good internal consistency and appears to perform similarly to the original (English) version. Further, our results indicate that each of the subscales was distinctive. The presence or absence of religious feelings did not exert a strong influence on the spirituality score, the HADS depression or anxiety scale or total score ratings. However, the difference in FACIT–Sp mean scores between the presence or absence of religious feelings may be clinically important. This suggests that the spirituality scale can be used in Japan and is independent of religious feelings. The FACIT–Sp scale should be useful for the study of spirituality among Japanese cancer patients.

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ORIGINAL ARTICLE

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Assessment of peri-operative quality of life in patients undergoing surgery for gastrointestinal cancer

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Abstract The purpose of this study was to assess the pre- and postoperative quality of life (QOL) of patients with gastrointestinal cancer and to investigate the relationship between QOL and various psychological and clinical factors. Eighty-five patients who underwent surgery for gastrointestinal cancer and 26 control patients undergoing surgery for digestive diseases other than cancer were interviewed. Two tests were administered to assess QOL and psychological status respectively: the Japanese-language version of the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 and the Japanese-language version of the Hospital Anxiety and Depression Scale (HADS). Each test was administered before surgery, before discharge, and 6 months after discharge. Gastrointestinal tumors were localized to the stomach, colon, or rectum in 88% of cases and classified as advanced stage or early stage according to staging protocols. Changes in EORTC QLQ-C30 subscale scores over time were compared among advanced stage, early stage, and control patients. All groups showed significant changes in subscale scores of QOL; the scores of the advanced-stage group indicated worse QOL than the early-stage and control groups in a lot of areas. The physical function (PF2) QOL subscore was influenced by diagnosis, postoperative complications, medical equipment at discharge, and the length of admission and negatively correlated with depression and anxiety. These results suggest that QOL in gastrointestinal cancer patients is variable over time and is influenced by various clinical factors. Therefore, consideration of these clinical factors is paramount to the optimal care of gastrointestinal cancer patients.

Keywords Quality of life · European Organization for Research and Treatment of Cancer QLQ-C30 · Gastrointestinal cancer · Surgery · Psychological characteristics

Introduction

Quality of life (QOL) has recently been recognized as a critical determinant of morbidity and mortality in cancer patients [3, 4, 5, 6, 7, 11, 13, 28, 29, 30, 38, 39, 40]. In 1999, the incidence of stomach cancer in the Japanese population was 260 per 100,000 persons, with an overall mortality of approximately 51,000 patients. Stomach cancer comprised 15.6% and 18.6% of all cancer deaths in women and men respectively. While morbidity rates for stomach cancer have remained steady, mortality rates have decreased due to better management. In addition, the incidence of colorectal cancers has increased gradually since the 1950s, corresponding to shifts in the Japanese lifestyle toward Western diet and levels of physical inactivity [14, 15].

While there have been recent studies of long-term QOL in Japanese gastrointestinal cancer patients, there

are few investigations of perioperative and short-term QOL. That means that although the predominant percentage of Japanese cancer patients suffered from gastrointestinal cancer, there were no concrete methods for improving their QOL during the perioperative and short term. Therefore, we decided to investigate QOL levels of gastrointestinal cancer patients during that period and to ascertain clinical factors (including psychological characteristics) that decreased their QOL. We hypothesized that their QOL would get better with the passage of time regardless of the kinds of subscales. Also, QOL would differ from patient to patient depending on their clinical condition; for example, having a malignant or benign tumor and being in the advanced stage or early stage of cancer. However, the other concrete clinical factors that affected their QOL could not be identified by our routine clinical observations. Thus, the goal of the present study was to investigate QOL trends in gastrointestinal cancer patients who underwent surgery and to compare QOL subscores to various clinical and psychological characteristics.

Patients and methods

Patients

From May 2000 to April 2001, 101 patients were hospitalized at Tokyo Metropolitan Okubo General Hospital for primary resection of gastrointestinal cancer. Of this population, patients with Mini-Mental-State examination scores of less than 23 points [8] were excluded from study. Two patients refused to participate in the study from the outset. Prior to the second psychological examination, 12 more patients were excluded (medical incapacity or refusal n=6, death n=6). Another six patients died in the first 6 months after discharge and were excluded before the third and final psychological exam. The final subject population consisted of 85 patients (53 men and 32 women). Twenty-six patients (14 men and 12 women) hospitalized for surgical treatment of gastrointestinal disease other than malignancy during the last 4 months of the study period were also selected and served as controls. As well as subjects, they agreed to participate in this study. Their Mini-Mental-State examination scores were more than 22 points. The total number of surgical cases with benign gastrointestinal disease at the hospital during the study period was 79.

The cancer patients ranged in age from 44 to 87 years (mean±SD: 68.0±10.3) and were hospitalized for an average of 56.6±26.5 days. Indications for surgery were stomach cancer (n=37), colon cancer (n=26), rectal cancer (n=12), esophageal cancer (n=3), pancreatic cancer (n=3), hepatic cancer (n=2), and other cancers (n=2), with primary gastrointestinal cancer accounting for 88% of cases. Surgery was performed via laparotomy in 78 patients (92%) and via laparoscopy in seven patients (8%). Severity of cancer was defined by cancer stage as described in the Japanese Gastric Cancer Association (JGCA) classification of gastric carcinoma [20]. Equivalent diagnostic standards were employed to stage the colon [18], esophageal [19], and pancreatic [21] cancers. Patients with stage 1 and stage 2 tumors were assigned to the early-stage group (n=55; 65%), and patients with stage 3 and stage 4 lesions were assigned to the advanced-stage group (n=30; 35%). The baseline QOL data of the 12 patients who were excluded from the analysis because of early deaths and other reasons was not different statistically to this study's subjects. However, the ratio of advanced-stage group to the early-stage group was higher than that of the subjects.

Patients in the control group ranged in age from 28 to 78 years (mean±SD: 63.5±14.6), and the mean duration of hospitalization was 28.7±22.6 days. Cholelithiasis (n=18; 69%) and choledocholithiasis (n=2; 8%) constituted 77% of the diagnoses among the control population. Fifteen patients (58%) underwent surgery via laparotomy and 11 underwent laparoscopic surgery. None of the control group died or terminated participation during the course of the study. Table 1 shows the characteristics of the cancer patient and control groups. There were no significant demographic differences between the two groups (by unpaired Student's t test or chi-square test).

One author (MM) is the chief doctor who was involved in the informed consent process to all subjects. He and the other three surgeons treated the digestive surgical patients as a team, so they had a well-organized method for processing informed consent and the quality/quantity of information. Basically, the information on the individual patients was open, except for concrete life expectancy of severely ill patients.

Procedures and measures

Following routine admission and stabilization, informed consent was obtained from each patient. We assessed QOL by administering the Japanese-language version of the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 questionnaire [1, 2, 25, 34, 36] and quantified the degree of anxiety and depression by means of the Japanese-language version of the Hospital Anxiety and Depression Scale (HADS) [16, 22, 24, 41]. Each test was administered to patients at three time points: preoperatively, before discharge, and 6 months after discharge.

The EORTC QLQ-C30 is a 30-item cancer-specific test that assesses both patient level of function and symptom prevalence. The five functional subscale domains are physical function (PF2), role function (RF2), cognitive function (CF), emotional function (EF), and social function (SF). The test also comprises three symptom subscales—fatigue (FA), nausea and vomiting (NV), and pain (PA)—as well as six single items that address additional symptoms commonly reported by cancer patients: dyspnea (DY), sleep disturbance (SL), appetite loss (AP), constipation (CO), diarrhea (DI), and financial impact (FI). Two questions on overall QOL and general health status determine the global QOL score (QL2). Subscale and single-item scores may range from 0 to 100. Scores on the functional and global QOL scales correlate positively to a patient's level of function; conversely, a lower score on the symptom scale corresponds to a higher degree of QOL. The validity and reliability of the Japanese-language version of EORTC QLQ-C30 in Japanese cancer patients has been confirmed by Shimozuma et al. [34] and Kobayashi et al. [25]. On the other hand, the cutoff point of HADS is assumed to be 8 or 11 points, so if each total score of HADS-D (HADS-Depression) and HADS-A (HADS-Anxiety) is more than 7 points, it means "suspect;" if more than 10 points, it means "definition" [16]. Zigmond et al. [42] have confirmed the reliability and validity of the Japanese-language version of HADS. Hosaka et al. [17] have compared the HADS test to multiple psychological screening assays, including SDS (Zung's Self Rating Depression Scale) and concluded that only the HADS-D test both distinguishes depression from other psychological states and effectively screens for depression.

Statistic analysis

Subjects were assigned to the early-stage cancer group (group E), the advanced-stage cancer group (group A) or the control group (group C). Comparisons between the three groups were performed

Table 1 Sociodemographic characteristics of the patient and control groups. *NS* not significant

		Cancer patient group	Control group	Chi-square/chi value	*p* value
		(*n*=85)	(*n*=26)		
Gender	Male	53 (62.4%)	14 (53.8%)	χ^2=0.602	NS
	Female	32 (37.6%)	12 (46.2%)		
Cohabitation status	Single	17	9	χ^2=2.414	NS
	Spouse only	30	8		
	Others	38	9		
Employment status	+	39	10	χ^2=0.445	NS
	−	46	16		
Method of surgery	Laparotomy	78 (91.8%)	15 (57.7%)	χ^2=17.012	p<0.0001
	Laparoscopy	7 (8.2%)	11 (42.3%)		
Chemotherapy after discharge	+	37 (43.5%)	0	χ^2=16.976	p<0.0001
	−	42 (49.4%)	26 (100%)		
				Unpaired Student's *t* test/*t* value	
Average age at admission (years)		68.0±10.3	63.5±14.6	t=−1.797	p=0.0751
Average level of education (years)		13.2±2.9	12.4±3.4	t=−0.766	NS
Average length of stay (days)		56.6±26.5	28.7±22.6	t=−4.857	p<0.0001

Values are mean±SD

using the unpaired Student's *t* test or chi-square test. QOL subscale scores for cancer patients only (groups E and A) were analyzed using one-factor analysis of variance (ANOVA); scores for subjects in all three groups over time were compared using two-factor repeated measure ANOVA. The two-factor repeated measure ANOVA utilized one intergroup factor and one intragroup factor (the 3 days on which assessments were made), with post hoc comparisons (Scheffe *F* test; 95% significance).

The relationship of the cancer patients' QOL scores to clinical factors other than disease severity was analyzed using two-factor repeated-measure ANOVA, with one intergroup factor and post hoc comparisons (Scheffe *F* test; 95% significance). The following clinical variables were examined: (1) Age (elderly group, mean age >68 years, *n*=46; middle age group, age ≤68 years, *n*=39), (2) cohabitation status (living alone, *n*=17, 20%; with partner only, *n*=30, 35.3%; with others, *n*=38, 44.7%), (3) employment status (employed, *n*=39, 45.9%; unemployed, *n*=46, 54.1%), (4) education (standard educational background, high school or less, *n*=39; high educational background, *n*=37), (5) past surgical history (previous cancer surgery, *n*=13, 15.3%; prior surgery for other than cancer, *n*=37, 43.5%; no history of surgery, *n*=35, 41.2%), (6) diagnosis (stomach cancer, *n*=35; intestinal cancer, *n*=35. The minority of patients with cancers other than stomach or colorectal cancer were not classified), (7) process leading to hospitalization (more extensive physical examination, *n*=25, 29.4%; follow-up for other chronic disease, *n*=16, 18.8%; symptomatic, consulted a physician, *n*=44, 51.8%), (8) postoperative course (complications; diseased process or phenomenon that is not related to the cancer directly such as sutural insufficiency, passage disturbance, synechia, and ileus, *n*=41, 48.2%; no complications, *n*=44, 51.8%), (9) medical equipment provided at discharge (primarily percutaneous endoscopic jejunostomy tubes for enteral feeding: equipment necessary, *n*=16, 18.8%; no equipment necessary, *n*=69, 81.2%), (10) postoperative treatment plan (chemotherapy, *n*=37, 43.5%; no chemotherapy, *n*=48, 56.5%), and (11) duration of hospitalization (long-term hospitalization, duration of stay mean of >56.6 days, *n*=35; 41.2%; standard-term hospitalization, duration of stay ≤56.6 days, *n*=50; 58.8%).

The relationships of depression and anxiety to QOL were analyzed using two-factor repeated-measure ANOVA with one intergroup factor, followed by post hoc comparisons (Scheffe *F* test; 95% significance). PF2 scores were classified as high (greater than the mean PF2 score) or low (less than or equal to mean PF2 score).

Results

QOL scores in three patient groups undergoing surgery for gastrointestinal disease

Comparison of QOL subscales between the advanced-stage group, early-stage group, and control group across the three exam days showed significant differences in the following QOL subscales: QL2, PF2, RF2, EF, SF, FA, NV, PA, DY, and AP (F=3.21~17.06, df=2,2, p<0.05). Each subscale score of the advanced-stage group was significantly higher (FA, NV, PA, DY, AP)/lower (QL2, PF2, RF2, EF, SF) than those of the early-stage and control groups (p<0.05; Scheffe) (Table 2).

Variations in QOL over time in gastrointestinal cancer patients

QOL subscores for cancer patients showed significant variation across the three exam days: QL2 (F=6.026, df=2,2, p=0.0039), RF2 (F=42.2, df=2,2, p<0.0001), AP (F=14.69, df=2,2, p<0.0001), PF2 (F=44.55, df=2,2, p<0.0001), FA (F=33.75, df=2,2, p<0.0001), CF (F=4.19, df=2,2, p=0.0168), PA (F=7.87, df=2,2, p=0.0006), SF (F=12.88, df=2,2, p<0.0001), SL (F=6.18, df=2,2, p=0.0026), FI (F=4.52, df=2,2, p=0.0123), EF (F=3.57, df=2,2, p=0.0304). Three trend patterns emerged with post hoc analysis. First, QL2, RF2, AP, PF2, and FA preoperative scores deteriorated before discharge, and QL2, RF2, and AP returned to preoperative levels at 6 months postdischarge. Second, CF and PA preoperative scores deteriorated before discharge, with no further change at 6 months postdischarge. Third, SF, SL, and FI scores showed no change between preoperative and dis-

Table 2 Trends in quality of live (QOL) subscale scores. Group A: advanced-stage; group E: early-stage; group C: control group, *QL2* global quality of life, *PF2* physical function, *RF2* role function, *EF* emotional function, *SF* social function, *CF* cognitive function, *FA* fatigue, *NV* nausea and vomiting, *PA* pain, *DY* dyspnea, *SL* sleep disturbance, *AP* appetite loss, *CO* constipation, *DI* diarrhea, *FI* financial impact

	Preoperative			Before discharge			Six months postdischarge			Significant main effect for group
	Group A	Group E	Group C	Group A	Group E	Group C	Group A	Group E	Group C	
QL2	68.1±22.9	76.8±19.9	79.5±22.9	56.6±22.7	69.8±19.1	74.3±18.5	65.3±25.0	78.5±17.8	75.0±24.2	F=6.64, df=2, p=0.002 [a,b]
PF2	87.2±20.8	92.5±19.2	93.9±13.3	60.0±22.1	74.9±21.8	79.2±17.6	75.8±21.2	89.1±16.9	91.1±12.7	F=5.71, df=2, p=0.0045 [a,b]
RF2	77.1±29.4	87.0±23.7	85.4±18.6	38.2±28.9	59.1±27.2	71.5±24.3	63.2±36.4	83.3±23.1	91.0±17.0	F=10.13, df=2, p<0.0001 [a,b]
EF	81.3±19.7	88.5±13.9	91.3±9.0	81.6±21.1	90.5±16.6	90.6±17.6	87.2±12.8	94.1±9.8	94.8±9.8	F=6.68, df=2, p=0.0019 [a,b]
SF	71.5±31.7	77.9±24.4	86.1±16.1	61.1±27.2	72.4±26.3	85.4±13.3	78.5±25.8	89.1±18.5	94.4±11.7	F=7.25, df=2, p=0.0011 [b]
CF	91.0±17.7	95.2±13.1	98.6±4.7	79.2±20.4	90.3±19.4	91.0±22.0	88.9±16.1	88.2±16.6	88.2±14.3	F=2.32, df=2, p=0.1041
FA	21.3±27.6	6.9±14.6	9.3±21.2	53.2±26.2	31.5±25.6	23.1±23.4	37.0±24.0	19.8±23.5	15.3±18.8	F=13.44, df=2, p<0.0001 [a,b]
NV	4.9±20.5	1.8±6.9	0.7±3.4	13.2±17.7	5.2±13.6	2.8±8.0	9.0±22.0	3.3±13.0	0±0	F=5.92, df=2, p=0.0037 [a,b]
PA	7.6±16.3	5.5±13.2	7.6±13.0	20.8±26.6	14.2±17.7	20.1±20.8	20.8±22.7	8.5±15.0	9.0±13.9	F=3.21, df=2, p=.0444 [a]
DY	5.6±16.1	1.8±10.0	5.6±16.1	16.7±26.0	3.6±12.3	12.5±23.7	15.3±26.0	4.8±13.5	8.3±17.7	F=6.17, df=2, p=.003 [a]
SL	26.4±34.0	22.4±29.4	19.4±21.8	25.0±37.1	25.5±29.4	30.6±23.9	15.3±19.6	10.9±25.7	9.7±23.0	F=0.16, df=2, p=.85
AP	18.1±35.4	4.8±16.3	1.4±6.8	47.2±32.5	21.2±27.5	12.5±19.2	26.4±34.0	9.7±20.0	4.2±11.3	F=17.06, df=2, p<.0001 [a,b]
CO	13.9±29.4	15.2±25.5	11.1±16.1	13.9±23.9	22.4±30.1	9.7±15.5	19.4±31.0	9.1±19.7	20.8±27.5	F=0.1, df=2, p=.9049
DI	1.4±6.8	6.7±16.2	0±0	19.4±27.7	7.3±18.9	4.2±11.3	9.7±20.8	9.7±17.8	11.1±18.8	F=1.18, df=2, p=.3109 [c]
FI	6.9±17.0	11.5±24.2	9.7±25.0	15.2±26.3	15.3±21.9	13.9±27.7	6.9±17.0	7.3±17.8	5.6±16.1	F=0.1, df=2, p=.9048

Values are mean±SD
Two-factor repeated measures analysis of variance (ANOVA):
Significant effect for days of test (QL2): F=4.40, df=2,2, p=0.0135
Significant effect for days of test (PF2): F=51.72, df=2,2, p<0.0001
Significant effect for days of test (RF2): F=41.14, df=2,2, p<0.0001
Significant effect for days of test (EF): F=3.56, df=2,2, p=0.0303
Significant effect for days of test (SF): F=12.65, df=2,2, p<0.0001
Significant effect for days of test (CF): F=6.78, df=2,2, p=0.0014
Significant effect for days of test (FA): F=31.01, df=2,2, p<0.0001
Significant effect for days of test (NV): F=3.10, df=2,2, p=0.0472
Significant effect for days of test (PA): F=11.30, df=2,2, p<0.0001
Significant effect for days of test (DY): F=4.30, df=2,2, p=0.0148
Significant effect for days of test (SL): F=8.72, df=2,2, p=0.0002
Significant effect for days of test (AP): F=17.49, df=2,2, p<0.0001
Significant effect for days of test (CO): F=0.40, df=2,2, p=0.6681
Significant effect for days of test (DI): F=6.66, df=2,2, p=0.0016
Significant effect for days of test (FI): F=5.99, df=2,2, p=0.003
[a] Significant differences between group A and group E (p<0.05; Scheffe)
[b] Significant differences between group A and group C (p<0.05; Scheffe)
[c] Significant interaction for days and groups of test

charge time points, and improved at 6 months postdischarge. The EF score increased between the preoperative and 6 months postdischarge time points. There were no significant differences in NV, DY, CO, and DI subscale scores.

Relationships of PF2 scores to clinical factors in gastrointestinal cancer patients

Changes over time in the PF2 subscores of cancer subjects were examined in relation to the 11 clinical factors. The relationships between PF2 scores and diagnosis, postoperative complications, medical equipment at discharge, and the length of admission were found to be significant. PF2 scores were significantly higher in colorectal cancer patients versus stomach cancer patients (F=4.21, df=1,2,

p=0.0439), in the no complications group versus the complications group (F=5.05, df=1,2, p=0.0275), in the no equipment group versus the equipment group (F=9.23, df=1,2, p=0.0033), and in the standard-term hospitalization group versus the long-term hospitalization group (F=11.92, df=1,2, p=0.0009). The remaining clinical factors did not affect the PF2 score in the cancer patients.

Relationship of PF2 scores to depression and anxiety in gastrointestinal cancer patients

The PF2 scores of cancer patients negatively correlated with depression scores (F=22.17,df=1,2, p<0.0001) and anxiety scores (F=7.16, df=1,2, p=0.0087).

Discussion

Level of QOL in cancer patients

QOL scores of the cancer patients in this study may have been influenced by the recent diagnosis of cancer and by the experience of surgery itself. Because of recent advances in medical diagnostic techniques and greater access to healthcare, most gastrointestinal cancers can be detected fairly early, and patients may elect surgery as a treatment option. The QOL values of subjects in this study are presumed to be consistent with those of many Japanese cancer patients other than terminal cancer patients and cancer survivors.

The data from this report show that QOL levels vary with illness severity and with higher (symptom scales)/ lower (functional and global QOL scales) mean scores in the advanced-stage group compared to the early-stage and control groups. Padilla et al. [31] have reported that the long-term health-related QOL of colorectal cancer patients is stable but affected by disease and treatment conditions. Ringdal et al. [33] have reported that cancer prognosis influences QOL. These reports, along with this study's findings, suggest that cancer patients are not a homogeneous group and that illness severity is an important influence on QOL.

Our second finding is that QOL is not a single entity. Subscale trends of QOL over time show significant variations both within a given subscale domain and between domains. Forsberg et al. [9, 10] investigated the pre- and postoperative QOL scores for colorectal and stomach cancer patients: 6-week postoperative QOL scores specific to bowel function and pain were greater than preoperative levels, while scores specific to energy, sleep and mobility deteriorated. Moreover, although 1-year postoperative subscale scores of energy, bowel function, and mobility surpassed preoperative levels, global QOL scores remained unchanged, suggesting variability both between subscale trends and between global and subscale QOL trends.

Trends of QOL in cancer patients

Preoperative global QOL, role function, and appetite loss scores for the two cancer groups under study were deteriorated before discharge, recovering to preoperative levels 6 months after discharge. Physical function, cognitive function, fatigue, and pain scores also deteriorated before discharge but did not recover 6 months later. Social function, sleep disturbance, and financial impact scores remained constant between the preoperative and discharge time points but improved between discharge and 6 months postdischarge; emotional function scores followed a similar pattern. Nausea and vomiting, dyspnea constipation, and diarrhea, symptom scores did not change over time.

Forsberg et al. [9, 10] have reported that postoperative patient reports of well-being do not differ from preoperative levels, although some subscale scores (energy, bowel function, and mobility) improve. In their studies, Forsberg et al. interviewed patients 1 year postoperatively, unlike the 6 months postoperative time point utilized in this paper. Thus, although it is difficult to directly compare our findings to those of Forsberg et al., it appears that our conclusions do not differ in regard to the postoperative recovery of QOL levels.

Relationships between QOL and clinical factors in cancer patients

PF2 subscores were related to diagnosis, postoperative complications, medical equipment at discharge, and the length of admission. The PF2 scores of colorectal cancer patients were higher than those of stomach cancer patients. Previous studies [26, 35] have reported a relationship between surgical method and QOL in gastrointestinal cancer patients but not between diagnosis and QOL. Differences in the functional impact experienced by stomach cancer patients and colorectal cancer patients may account for the difference in QOL between the two groups. PF2 scores were also higher for the no complications group and the no equipment group compared to the complications group and the equipment group, respectively. These variables may reflect illness severity, suggesting that QOL levels are affected by illness severity. However, Greimel et al. [12] investigated the QOL of gynecological cancer and breast cancer patients using EORTC QLQ C-30 and reported that QOL was predicted not by complications, age, and the progress of disease but by severity of surgery and physical score before treatment.

Relationship of QOL to depression and anxiety in cancer patients

PF2 subscores correlated negatively with scores for depression and anxiety. Our previous study [27] showed that illness severity, age, history of surgery, process leading to hospitalization, medical treatment equipment at discharge, chemotherapy after discharge, and duration of hospitalization affected depression and anxiety levels in cancer patients.

Previous authors have utilized the EORTC test to investigate the relationships between psychological factors and QOL. Von Essen et al. [37] used the EORTC-C30 and HADS tests in a population of stomach and colon cancer patients to investigate the relationships between patient satisfaction with medical care, health-related quality of life, and psychological function. The authors concluded that satisfaction with mental care could affect psychological function. Kelsen et al. [23] investigated pain, depression, and QOL in patients with primary pancreatic cancer and concluded that pain and depression scores were lower than expected and that QOL negatively correlated with subjective pain scores. Portenoy et al. [32] reported that symptom prevalence in cancer patients was related to psychological state and was predictive of QOL levels. It is concluded that psychological factors such as depression and anxiety impact QOL and must be carefully considered in the management of gastrointestinal cancer patients undergoing surgery.

The implication from this study and strategy for intervention on the QOL issue

In summary, QOL levels of gastrointestinal cancer patients varied depending on clinical factors, especially in regard to progression of disease and by the aspects of QOL we focussed on. Their QOL levels changed over time, and the transition of QOL levels over the perioperative and short term was different from our hypotheses. In particular, we noted that more QOL aspects decreased before discharge. These results implied that we must always clarify the QOL level of individual patients and the individual clinical factors that lead to decrease in a patient's QOL. Furthermore, we must forecast and ascertain the appropriate point for intervention, as there was a common pattern in QOL transition over time even though their QOL varied. The strategy for improving a patient's QOL is finding the individual clinical factors that decrease his/her QOL and then focus on resolving the problems related to these clinical factors. Furthermore, because our resources are limited, we need to concentrate on the most important QOL factor, which is patient care before discharge. Lastly, we should always strive to give our patients the best treatment possible, because the treatment of cancer is necessary to keep patients' QOL high.

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Psychological state, quality of life, and coping style in patients with digestive cancer

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Abstract

The purpose of this study was to assess the relationships between psychological characteristics such as anxiety and depression, quality of life (QOL) and coping style among patients with digestive cancer. The subjects were 85 in-patients who were scheduled to undergo initial surgery for gastrointestinal cancer. The following psychological tests were administered: Japanese versions of the Hospital Anxiety and Depression Scale, Zung's Self-Rating Depression Scale, the European Organization for Research and Treatment of Cancer (EORTC) QLQ C30 and the Coping Inventory for Stressful Situations. The first 3 tests were performed on three occasions: before surgery, before discharge and 6 months after discharge. The results showed that there was no change over the 3 test administration days for the average scores of anxiety and that the scores of depression increased from before surgery to before discharge and did not return to presurgery levels at 6 months after discharge. Changes in each subscale score of the EORTC QLQ C30 across the 3 days displayed two typical trends. Relationships between the abovementioned trends and individual coping styles showed that the higher the score of "emotion-oriented coping style," the greater the deterioration in QOL subscales. It was suggested that focusing on a patient's coping style, particularly emotion-oriented coping style, is important and that patients likely to adopt a more emotion-oriented coping style should receive special consideration.

Keywords: Digestive cancer; Coping style; CISS (Coping Inventory for Stressful Situations); Anxiety; Depression; QOL (Quality of Life)

1. Introduction

In Japan, cancer has been the most common cause of death since the 1980s. Stomach cancer in particular has consistently been among the top causes of death in men from the early 1980s to the first half of the 1990s and continues to be a major threat to women at the present times [1]. Recently, however, the mortality rate has decreased because of improvements in medical examinations and widespread progress in the management of advanced gastric cancer. The mortality from stomach cancer was about 49,200 patients [1]. However, it has been reported that morbidity rate has remained constant despite early detection and treatment of this malignancy [2]. In Japan, resident-targeted health education about eating habits (i.e., decreasing salinity intake and salty foods) has been practiced for a long time. This is because high salinity intake has been found to be one reason for the high morbidity rate of gastric cancer and cerebral infarction/hypertension in Japan. As a result, although the morbidity rate of cerebral infarction has decreased, that of gastric cancer has not changed much. Furthermore, the incidence of colorectal cancer, a similar gastrointestinal malignancy, has increased gradually since the 1950s, reflecting changes in the Japanese lifestyle such as the incorporation of a Western diet and decreased physical activity [1]. Thus, the number of patients suffering from malignancies of the digestive tract such as gastric cancer and colorectal cancer is increasing in Japan, a trend that is occurring at a lesser extent for other such gastrointestinal malignancies as hepatic cancer and pancreatic cancer. As the proportion of gastrointestinal cancers among all malignancies is increasing, it is anticipated that this will be reflected in a greater need for mental health services for patients with these types of malignancy.

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Recently, indicators of medical outcome for cancer patients have expanded to include not only survival rate but also quality of life (QOL), and comprehensive patient care has accordingly focused on psychological as well as physical aspects. Psychological state and QOL among cancer patients should be considered in the light of factors such as stage of disease and treatment process. Furthermore, it is important to acknowledge the relationship between psychological state/QOL and individual factors such as personality and coping style. Coping style, the individual cognitive response to stressors identified by Lazarus and Folkman [3] in the 1980s, might function as a mediating variable in order to control stress burden. On the other hand, coping style could possibly be the cause or result of a patient's psychological state/QOL.

We therefore investigated the psychological state/QOL process and coping style of patients undergoing surgery for gastrointestinal cancer and reported their QOL and the relationship between their QOL and clinical factors other than coping style in another paper [4]. Advanced-stage, early-stage and control group patients showed significant changes over time in subscale scores of QOL; the scores of the advanced-stage group indicated worse QOL than the early-stage and control groups in many areas. Physical function was influenced by diagnosis, postoperative complications, medical equipment at discharge and the length of admission and negatively correlated with depression and anxiety. These results suggest that QOL in gastrointestinal cancer patients is variable over time and is influenced by various clinical factors. In this paper, we will clarify how individual coping styles are related to the psychological state and QOL among patients with gastrointestinal cancer undergoing surgery. We will test the hypothesis that negative coping styles such as the emotion-oriented coping style are related to a poor psychological state and QOL while positive coping styles such as the task-oriented coping style are related to good conditions.

2. Subjects

Subjects were recruited from 101 patients admitted to the surgical ward of the Tokyo Metropolitan Health and Medical Treatment Corporation Ohkubo Hospital for the surgical management of primary gastrointestinal cancer from May 2000 to April 2002. Patients with cognitive impairment (Mini Mental State score <23 points [5]) were excluded. Two patients did not agree to enter the study, 6 patients subsequently withdrew due to deterioration in physical condition or withdrawal of consent and 6 patients died before discharge, giving a total of 16 patients who were excluded before the second psychological assessment. Consequently, 85 patients (53 men and 32 women) acted as subjects throughout the duration of the study. There was no significant difference demographically between patients who died or dropped out of the study and those who stayed in the study.

Subjects' ages ranged from 44 to 87 (mean±S.D., 68.0±10.3) years. Average admission period was 56.6±26.5 days. Diagnoses and indications for surgery were malignancies of the following organs: stomach (n=37), colon (n=26), rectum (n=12), esophagus (n=3), pancreas (n=3), liver (n=2) and other sites (n=2), with primary gastrointestinal cancer accounting for 88% of cases. With regard to treatment, 78 patients (92%) underwent laparotomy with partial sternotomy and 7 (8%) underwent endoscopic surgery. Extent of neoplastic spread was defined by cancer stage as described in the Japanese Gastric Cancer Association's *Japanese Classification of Gastric Carcinoma* [6]. Similarly, we referred to relevant diagnostic standards to determine the stage in the respective classifications of colonic [7], esophageal [8] and pancreatic [9] cancer. Disease progression was defined from common cancer progress level: patients with stage 1 and stage 2 malignancies were classified as the early-stage group (n=55; 65%) and those with stage 3 and stage 4 disease as the advanced-stage group (n=30; 35%).

The following demographic factors were assessed. With regard to cohabitation status, 17 subjects (20%) reported living "alone," 30 (35%) indicated living "with a partner only" and 38 (45%) described living "with others." As for educational background (highest level of education received), 11 (13%) subjects completed compulsory education, 34 (40%) finished high school or technical school and 31 (37%) were educated to, at least, university level. Regarding employment status, 39 (46%) reported being "employed" while 46 (54%) were "unemployed."

3. Methods

Approval of the hospital's ethical committee was obtained for this study and, following routine admission and stabilization, informed consent was obtained from each patient. Degree of anxiety and depression was investigated using the Japanese version of the Hospital Anxiety and Depression Scale (HADS) [10,11] and the Japanese version of Zung's Self Rating Depression Scale (SDS) [12,13]. QOL was evaluated using the Japanese version of the European Organization for Research and Treatment of Cancer (EORTC) QLQ C30 [14–18]. These tests were administered three times: before surgery, before discharge and 6 months after discharge. In addition, before discharge, we used the Coping Inventory for Stressful Situations (CISS) [19–22] as a coping style measurement tool.

The EORTC QLQ C30 is a 30-item cancer-specific questionnaire comprising five functional scales: physical function (PF2), role function (RF2), emotional function (EF), cognitive function (CF), social function (SF), nine symptom scales and global QOL (QL2) including two questions on patients' overall QOL and general health status assessed by visual analog scale. In this study, in order to analyze the relation of QOL to psychological state and to

coping style, we used the five functional scales and QL2 only. For the functional and QL2 scales, the scores obtained from subscales were converted into a score from 0 to 100, with a higher score indicating a greater level of functioning and better global QOL. Concerning the validity and reliability of the Japanese version of the EORTC QLQ C30, the scale has been used by Shimozuma et al. [17] in investigating the relationship between chemotherapy and QOL and by Kobayashi et al. [18] in evaluating QOL among advanced lung cancer patients. Both studies have confirmed the validity and reliability of the Japanese version of the EORTC QLQ C30 in the assessment of cancer patients.

On the other hand, the CISS is a self-rated questionnaire comprising task-oriented coping style (T scale), emotion-oriented coping style (E scale) and avoidance-oriented coping style (A scale). Each scale has 16 items and so totals 48 items; a higher score in one coping style scale indicates a strong trend toward that coping style. The validity and reliability of the Japanese version of the CISS (especially, the validity in stability over time) have been confirmed by Furukawa et al. [21].

For statistical analysis, changes in psychological state and QOL over the 3 test administration days were analyzed using repeated measure analysis of variance (ANOVA) with post hoc comparisons (Scheffe F test; 95% significance). Multiple regressions (stepwise analysis) were subsequently carried out taking into consideration the set of clinical factors including coping style and QOL measures as independent variables and psychological measures as dependent variables in order to assess the relation of a patient's psychological state to other factors. The set of clinical factors also included demographic data such as age, sex, cohabitation status, educational background and employment status as well as severity of the disease, complications, chemotherapy and medical equipment at discharge. As for cohabitation status, subjects were divided into two groups (i.e., "alone" and "the others," which consisted of "with a partner only" and "with others"). As for educational background, subjects were divided into two groups (i.e., "higher level of education received," which consisted of being educated to, at least, university level, and "the others," which consisted of patients who had completed compulsory education, high school or technical school. Furthermore, as for complication, subjects were divided into two groups [i.e., "complications (n=41; 48%)" and "no complications (n=44; 52%)"]. As for chemotherapy, "chemotherapy (n=37; 44%)" and "no chemotherapy (n=48; 57%)."

Next, multiple regressions (stepwise analysis) were carried out taking into consideration the set of clinical factors including coping style as independent variable and QOL as dependent variable in order to assess the relation of a patient's QOL to other factors. In a further step of data evaluation, subjects were divided into a higher-score group and a lower-score group by their CISS score: a higher-score group whose score was equal or higher than the average of all subjects and a lower-score group whose score was lower than that. The reason why we selected such a cutoff is that there is no original cutoff for the Japanese version of the CISS among a general population. After that, two-factor repeated-measure ANOVA with one between-group factor with post hoc comparisons (Scheffe F test; 95% significance) was carried out to determine how a coping style was related to the factors, which the abovementioned analyses showed to be significantly related to coping style. Furthermore, the multiple regressions were performed again, taking into consideration the set of demographic data as independent variable and coping style as dependent variable, in order to investigate the relationship between coping style and demographic factors.

4. Results

4.1. Psychological state over the 3 test administration days

Changes in HADS-A, HADS-D and SDS scores across the 3 examination days were analyzed (Table 1). In regard to depression, there was a significant difference for scores between the 3 test administration days (HADS-D: F=5.213, df=2, P=.0064; SDS: F=8.101, df=2, p<.0004). Scores before discharge were significantly higher than those before surgery; however, no significant difference was apparent between scores assessed prior to discharge and those assessed 6 months after discharge. In contrast, regarding anxiety, no significant difference was found among the three scores.

4.2. QOL over the 3 test administration days

Results are shown in Table 2. A significant difference in global QOL (i.e., QL2 scores) was evident across the 3 test administration days, and post hoc tests showed that the QL2 score decreased from before surgery to before discharge and returned to preoperative levels at 6 months after discharge (Scheffe F test - before surgery vs. before discharge, before discharge vs. 6 months after discharge: F=6.026; df=2; P=.0030). On the whole, RF2 showed the same trend (Scheffe F test - before surgery vs. before discharge, before discharge vs. 6 months after discharge: F=42.2; df=2; P<.0001). PF2 showed a similar pattern to QL2 in terms of decreasing from before surgery to before discharge and then increasing after discharge; however, this score did not

Table 1
Psychological state over the 3 examination days

	Preoperation	Before discharge	6 Months after discharge	P[a]
HADS-A	2.3±2.8	2.0±3.4	1.7±2.6	NS
HADS-D	1.7±2.8	2.9±3.7	2.7±3.2	.0064
SDS	27.9±7.6	32.5±10.3	30.2±8.7	<.0004

[a] Repeated measure ANOVA.

Table 2
QOL over the 3 examination days

	Preoperation	Before discharge	6 Months after discharge	P^a
QL2	72.5±21.6	64.2±21.7	74.5±21.0	.0030
PF2	90.0±19.7	69.8±22.8	85.1±19.2	<.0001
RF2	82.0±26.6	51.8±29.1	77.2±29.1	<.0001
EF	85.1±17.5	87.7±18.2	92.0±11.2	.0304
CF	93.1±15.3	86.1±21.5	88.4±16.3	.0168
SF	75.9±26.4	69.2±26.5	85.9±21.4	<.0001

[a] Repeated measure ANOVA.

recover to presurgery levels (Scheffe F test - before surgery vs. before discharge, before discharge vs. 6 months after discharge, before surgery vs. 6 months after discharge: F=44.55; df=2; P<.0001). CF decreased from before surgery to before discharge but remained unchanged thereafter (Scheffe F test - before surgery vs. before discharge: F=4.19; df=2; P=.0168). For SF, no significant difference was apparent between before surgery and before discharge, but scores increased after discharge (Scheffe F test - before surgery vs. 6 months after discharge, before discharge vs. 6 months after discharge: F=12.88; df=2; P<.0001). EF progressively increased over the study period, with a significant difference evident between preoperative scores and those assessed 6 months after discharge (Scheffe F test - before surgery vs. 6 months after discharge: F=3.57; df=2; P=.0304).

4.3. The relationship between a patient's psychological state and other factors including coping style and QOL

The relationship between a patient's psychological state and other factors including coping style and QOL was analyzed by multiple regressions. We selected psychological states before discharge because depression was the highest before discharge and anxiety did not change significantly over the 3 administration test days. The results showed that approximately 76.4% of variance in the HADS-A score was explained by age, medical equipment at discharge, EF and CF. Moreover, it was indicated that anxiety (HADS-A) in younger subjects or subjects undertaking medical equipment was higher than that of other subjects and that anxiety in subjects with higher levels of EF and CF was lower than that of subjects with lower levels. As for depression (HADS-D and SDS), the results showed that approximately 76.3%/75.6% of variance in the HADS-D/SDS score was explained by QL2, EF and CF. Depression in subjects with higher levels of QL2, EF and CF was lower than that in subjects with lower levels (Table 3). After all, multiple regressions revealed that a patient's coping style could neither be a principle risk factor (cause) nor result in anxiety and depression before discharge.

Table 3
Final regression model for predicting anxiety and depression

Variables	β	S.E. of β	F	P	R^2
HADS-A before discharge					
Age	−0.051	−0.159	6.924		
Medical equipment at discharge	−1.856	−0.217	11.722		
EF	−0.101	−0.57	51.42		
CF	−0.044	−0.279	11.152	<.0001	.764
HADS-D before discharge					
QL2	−0.035	−0.209	8.738		
EF	−0.048	−0.241	7.476		
CF	−0.102	−0.58	56.119	<.0001	.763
SDS before discharge					
QL2	−0.185	−0.393	29.976		
EF	−0.128	−0.231	6.689		
CF	−0.216	−0.437	30.993	<.0001	.756

4.4. The relationship between QOL and other clinical factors including coping style

We selected QOL scores before discharge as dependent variables because almost all QOL subscales were the lowest before discharge. Multiple regressions revealed that the principle risk factors for QOL before discharge were educational background, employment status, medical equipment at discharge, an emotion-oriented coping style and an avoidance-oriented coping style (Table 4). Focusing

Table 4
Final regression model for predicting QOL

Variables	β	S.E. of β	F	P	R^2
QL2[a]					
Emotion-oriented coping style	−0.859	−0.438	19.809		
Chemotherapy	15.125	0.353	12.884	<.0001	.313
PF2[a]					
Admission period	−0.274	−0.341	12.166		
Avoidance-oriented coping style	−0.634	−0.292	9.844		
Medical equipment at discharge	15.895	0.283	8.41		
Employment status	−9.76	−0.228	5.604		
Sex	−9.247	−0.21	4.679	<.0001	.432
RF2[a]					
Medical equipment at discharge	23.412	0.314	8.48		
Emotion-oriented coping style	−0.689	−0.265	6.024	.001	.178
EF[a]					
Emotion-oriented coping style	−0.828	−0.493	21.187		
Educational background	−8.384	−0.226	4.456	<.0001	.238
CF[a]					
Medical equipment at discharge	19.894	0.37	12.46		
Educational background	−12.395	−0.299	8.131	.0002	.219
SF[a]					
Employment status	16.989	0.318	8.657		
Avoidance-oriented coping style	−0.758	−0.28	6.703	.0012	.173

[a] Before discharge.