Preoperative psychological global well being index (PGWBI) predicts postoperative quality of life for patients with non-small cell lung cancer managed with thoracic surgery

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Abstract

Objective: Non-small cell lung cancer (NSCLC) patients surgically treated often experienced a postoperative disability related to the surgery but did not benefit from a long-term survival advantage (postoperative death and relapse). Therefore, improvement of quality of life (QOL) for all NSCLC patients surgically treated is necessary and the assessment of factors influencing the short-term postoperative QOL is required. Therefore, a prospective study to assess the value of the psychological global well being index (PGWBI) to predict short-term postoperative QOL was conducted. Patients and methods: Prospective study in Academic Hospital’s departments of thoracic oncology and surgery. Socio-demographic and clinical characteristics as well as PGWBI scores of 110 NSCLC patients referred for thoracic surgery were prospectively compared to postoperative QOL evaluated by the mean of the EORTC QLQ-C30 and LC13 questionnaires, completed before hospital discharge. Results: Eighty-four patients completed the postoperative QOL questionnaires. In the univariate analysis, most of the PGWBI scores significantly correlated with the postoperative QOL. Also, patients living alone presented with a significantly higher risk of experiencing a poor postoperative QOL. In the multivariate analysis, patients showing a lower preoperative global health status as evaluated through the PGWBI experienced a statistically significant lower postoperative global QOL (hazard ratio (HR) = 1.39, 95% confidence interval (CI) 1.12—1.74, \( p = 0.003 \)) as well as a reduced physical (HR = 1.32, 95% CI 1.09—1.60, \( p = 0.004 \)) and emotional (HR = 1.21, 95% CI 1.06—1.39, \( p = 0.004 \)) functions. Conclusions: A simple assessment of patients at higher risk of a poor short-term postoperative QOL could be easily performed preoperatively, taking into account certain socio-demographic factors and the results of the QOL assessment using the PGWBI.

Keywords: Lung cancer; Surgery; Quality of life; PGWBI; EORTC QLQ-C30

1. Introduction

Prognosis of non-small cell lung cancer (NSCLC) patients remains poor with an overall five-year survival rate of 15% [1]. In fact, NSCLC patients must belong to the 10% who are qualified for front-line surgery, then survive the operation and following this thereafter present with no relapse enabling them to reach the exclusive "lung cancer survivors club", as named by McManus [2]. This hope of cure makes NSCLC patients suitable for surgery prepared to accept the significant postoperative physical as well as psychological, professional or social disabilities. The presence of such postoperative side effects strongly supports the study of postoperative quality of life (QOL) for NSCLC patients undergoing a surgical resection.

In fact, few studies have considered the postoperative QOL of NSCLC patients. Dales et al. [3] demonstrated the deterioration in QOL during the first three months after thoracic surgery for lung cancer but also highlighted an improvement back to baseline within six to nine months. However, these earliest studies were hampered by important biases such as small numbers of patients, as in the study by...
Zieren et al. \((n=20)\) [4], or low proportions of collected questionnaires, as in the study by Hendriks et al. \((n=31, 34\%)\) [5]. More recently, Handy et al. [6] studied the preoperative QOL of 139 NSCLC patients using the Short-Form 36 health survey (SF36) and demonstrated impaired preoperative physical and emotional functioning, mental health, and energy when compared with a healthy, age-matched control population. At six months, 103 patients \((74\%)\) were evaluated and showed significant further postoperative decline in physical, social, and mental states, as well as bodily pain. When compared with healthy, age-matched control subjects, remarkable and durable physical, emotional, social, and mental impairment as well as bodily pain were found in these patients six months after lung cancer surgery [6]. Myrdal et al. compared 194 NSCLC patients surgically treated with a control group of patients undergoing a coronary bypass surgery (CABG). At the time of analysis (median follow-up, 23 months, range 4–48 months), 132 patients were alive \((68\%)\) and showed QOL SF36 scores comparable to those of CABG patients [7]. NSCLC patients did not show any impairment in social function or mental health status. However, both groups of patients deviated from the normal population in all the subclasses of the SF-36 except for body pain. In addition, the authors suggested that patients who continued to smoke after surgery seemed to have impaired QOL with regards to mental health compared with those who stopped smoking [7]. In a recent work, Win et al. [8] studied 110 patients undergoing thoracic surgery and confirmed an immediate postoperative QOL deterioration with a return to baseline at six months. No preoperative health-related QOL scales postoperative QOL deterioration with a return to baseline at six months. No preoperative health-related QOL scales were significantly associated with poor outcome defined by surgical mortality and/or major complication. However, baseline percentage predicted TLCO was marginally correlated with the six-month global health status \((r=0.22, p=0.05)\), and some preoperative HRQOL scales also correlated with six-month global health status [8]. Finally, 142 NSCLC patients who survived more than five years were included in a study by Sarna et al. [9]. These long-term survivors mainly described themselves as hopeful \((71\%)\). Those survivors with lower mental component scores were associated with distressed mood while lower physical component scores were related to older age, living alone, pulmonary impairment, distressed mood and co-morbid diseases [9].

While these long-term postoperative QOL studies are of importance, more short-term postoperative studies are necessary. In fact, a proportion of 26–32% of patients in the above-mentioned studies did not survive up to six months or more after surgery mainly because of delayed postoperative death or relapse. Accordingly, these patients experienced a postoperative disability related to the thoracic surgery but did not benefit from a survival advantage. Thus, improvement of QOL for all NSCLC patients surgically treated is necessary and an evaluation of the predictive factors influencing the short-term postoperative QOL is required.

The aim of this study was to explore the value of sociodemographic and clinical characteristics as well as Psychological Global Well Being Index (PGWBI) scores of NSCLC patients treated with thoracic surgery, to predict the postoperative short-term QOL.

### 2. Patients and methods

#### 2.1. Patients

This prospective study was conducted at a university hospital over a period of 24 months starting in May 2002. Patients over 18 years undergoing a standard thoracic surgery for a primary non-small cell lung cancer were eligible to participate in the study. The study protocol was approved by an institutional ethics review. All patients provided written informed consent.

#### 2.2. Surgery

The thoracic surgery was standardized as previously described [10]. Briefly, the selection of candidates for surgery was based upon the adherence to published guidelines. The surgical procedure was carried out on the basis of the following principles. Firstly, an anatomical resection as a lobectomy or a pneumonectomy was defined as the standard resection in fit patients, thus excluding atypical resection. Secondly, a routine reinforcement of the main stem bronchus suture in the case of a right pneumonectomy to minimize the particularly high risk of postoperative fistula on that side. Thirdly, a routine mediastinal lymphadenectomy was considered as an essential component of thoracic oncological surgery. Occurrence of a postoperative complication was examined and classified as a minor or major complication. Major complications included prolonged stay or readmission to the intensive care unit, acute respiratory distress syndrome, broncho-pleural fistula, hemothorax, septic shock, myocardial infarction, and severe heart failure defined using internationally available criteria.

#### 2.3. Quality of life data

The patients’ mood state was assessed preoperatively, within the previous month, using the Psychological Global Well Being Index [11]. The PGWBI is a brief self-administered questionnaire which contains 20 items rated on a six-point scale, where a higher score indicates a better quality of life and measures six mood states (anxiety, depressed mood, positive well-being, self-control, general health, vitality). The six mood states are scored as follows: 25 for anxiety, 20 for positive well-being and vitality and 15 for remaining states. The PGWBI was completed by the patients themselves.

The PGWBI has been chosen giving its demonstrated validity and reliability. Furthermore, PGWBI might be easiest to use because of its relatively low number of items \((n=20)\) when compared with SF-36 \((n=36)\) or European Organization for Research and Treatment of Cancer (EORTC) QOL Questionnaire (QLQ-C30) and the specific lung cancer (LC13) questionnaire \((n=43)\).

Within the month after the operation, the patients’ QOL was assessed using the EORTC QLQ-C30 + LC13 questionnaires. The EORTC QLQ-C30 is a self-administered 30-item questionnaire composed of five functional scales (physical, role, emotional, social and cognitive function), three symptom scales (fatigue, gastro-intestinal (GI) symptoms, and pain), and a global QOL scale. This tool has undergone
extensive validation and its measurement properties (reliability, validity, responsiveness) are well described in the literature [12,13]. Overall scale scores were calculated. Raw scores for all the scales were converted to standard scores (0—100).

### 2.4. Data management and statistical analysis

Two patients were lost in follow-up. The overall survival time was defined as the time from the date of surgery to date of death due to any cause. Patients who were alive at the date of the last follow-up were censored on that date plus one day.

Correlation between preoperative PGWBI scores and postoperative EORTC scores were performed using a Spearman correlation test. All the tests were two-sided. A regression analysis was also performed to examine the value of socio-demographic, clinical and PGWBI scores in independently predicting postoperative QOL.

Survival data were updated in February 2005. Probability of survival was estimated using the Kaplan–Meier method. Differences in survival were tested by means of the log rank test.

Statistical significance was defined as \( p < 0.05 \). Statistical analysis was performed using the SPSS version 10.1 software package.

### 3. Results

#### 3.1. Patients

A total of 110 inpatients were assessed for curative thoracic surgery for lung cancer. Of these, 23 were not referred to surgery and were excluded from analysis (induction therapy, \( n = 19 \); refusal, \( n = 1 \); upstaging, \( n = 3 \)). Three additional patients were diagnosed as not resectable at the time of surgery (open and close thoracotomy) and were not studied further. The main socio-demographic characteristics of the remaining patients are summarized in Table 1.

#### 3.2. Surgery

The surgical resection was a lobectomy for 79 patients (94%) and a pneumonectomy for 5 patients (6%) (Table 2). One patient died as a consequence of the surgery. Overall, 34 patients (40%) experienced a postoperative complication. Nine patients (10%) presented a major complication. Three of them required re-operation (bronchial fistula, \( n = 3 \), including one death) and six others were medically treated (acute respiratory distress syndrome, \( n = 2 \); pulmonary embolism, \( n = 1 \); intestinal occlusion, \( n = 1 \); myocardial infarction, \( n = 1 \); severe pneumonia, \( n = 1 \)). Twenty-five patients (30%) presented with minor complications such as bronchial obstruction treated with physiotherapy (\( n = 14 \)), arrhythmia (\( n = 7 \)), recurrent nerve palsy (\( n = 2 \)), pneumonia (\( n = 1 \)), and renal insufficiency (\( n = 1 \)). Three additional patients presented an acute urinary retention related to the use of morphine for postoperative pain management.

#### 3.3. Preoperative QOL

All the 84 patients completed the preoperative PGWBI questionnaire. The median (range) scores for the six PGWBI mood states were as follows: PGWBI anxiety, 18 (4—25);...
PGWBI depression, 13 (3—15); PGWBI well being, 12 (3—20); PGWBI self control, 13 (4—15); PGWBI global health, 11 (2—15); and PGWBI vitality, 14 (0—20).

3.4. Postoperative quality of life

In all, 72 patients completed the postoperative QOL questionnaires (86%). The reasons for the missing responses are operative or major postoperative complications (n = 7) with patients too unfit to complete the questionnaire (n = 5). The median scores (range) for the three symptoms scales were as follows: fatigue, 39 (0—100); GI symptoms, 8.0 (0—50); and pain, 31 (0—100). The median scores for the EORTC-LC13 questionnaire were 22 for dyspnoea (0—100), 33 for coughing (0—100), 33 for chest pain (0—100), and 0 for all the remaining scales. The median scores for the global QOL and the five functional scales and their correlation with patient and disease characteristics are shown in Figs. 1—3.

3.5. Predictive factors of postoperative quality of life

In the bivariate analysis, few socio-demographic factors related to the postoperative QOL. As notable exceptions, patients who are living alone experienced a lower global QOL score (Fig. 1A) while patients older than 60 years and those living in a country area showed a higher emotional function score (Fig. 2B). In contrast, most of the PGWBI scores significantly correlated with the postoperative global QOL, as well as the physical, role and emotional functions (Table 3). In the regression analysis, patients showing a lower

Fig. 1. (A) Median scores regarding global QOL (EORTC QLQ-C30) related to patient and disease characteristics (p < 0.05); (B) median scores regarding physical functional scale (EORTC QLQ-C30) related to patient and disease characteristics (p < 0.05).

Fig. 2. (A) Median scores regarding role functional scale (EORTC QLQ-C30) related to patient and disease characteristics; (B) median scores regarding emotional functional scale (EORTC QLQ-C30) related to patient and disease characteristics (p < 0.05, **p < 0.01).

Fig. 3. (A) Median scores regarding social functional scale (EORTC QLQ-C30) related to patient and disease characteristics; (B) median scores regarding cognitive functional scale (EORTC QLQ-C30) related to patient and disease characteristics.
prospective global health status as evaluated through the PGWBI score presented a significantly lower postoperative global QOL (hazard ratio (HR) = 1.39, 95% confidence interval CI 1.12—1.74, preoperative global QOL score (Spearman test)

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<th>EORTC QLQ C30 scores</th>
<th>Global</th>
<th>Physical</th>
<th>Role</th>
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<td>.53†</td>
<td>.41†</td>
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<td>.57†</td>
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<td>PGWBI anxiety</td>
<td>.36†</td>
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<td>PGWBI depression</td>
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<td>PGWBI well being</td>
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<td>PGWBI vitality</td>
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† p < 0.05.
†† p < 0.001.

Table 3

Combined with the results of a 6-min walk test, has been related to the length of hospital stay in the first 30 days after the surgery (multiple linear regression, \( R^2 = 0.224, p < 0.001 \)) [14]. In another study on 117 patients, Dales et al. [15] concluded that general quality-of-life measures were not good predictors of postoperative morbidity after thoracic surgery. On the other hand, several preoperative or operative factors have been studied in order to predict the long-term postoperative QOL. For example, a poor respiratory status, assessed by the mean of the diffusion capacity of the lung for carbon monoxide (DLCO), contrary to the forced expiratory volume in 1 s (FEV₁), has been associated with a poor postoperative QOL [5]. Similarly, a more extensive pulmonary resection such as a need for a pneumonectomy has been also correlated with a poor postoperative QOL [4—6]. However, the predictive value of a preoperative QOL assessment to detect patients at risk of a poor postoperative QOL had not been studied before.

The published results on the impact of socio-demographic factors on the postoperative QOL are frequently patchy and conflicting. The postoperative SF-36 scores showed no correlation with gender or age [5,6] despite the fact that women experience a range of disruptions in QOL especially the younger ones, and those with depression and co-morbid diseases [16]. The postoperative QOL might also be influenced by the level of education. A poorer QOL has been described for patients with a lower level of education and may be related to the higher proportion of depression experienced by these patients [17]. In addition, SF-36 scores of long-term survivors are lower for patients living alone when compared with patients living in a couple [7]. Although debatable, the marital status may influence prognosis through mechanisms of health behavior and/or social support mechanisms [18]. However, the relationship of NSCLC patients with the family is complex as up to 34% of the patients also perceived serious distress within the family [7]. The influence of the socio-demographic factors on psychological well-being is likely. The psychological distress among NSCLC patients is considerable after surgery. Whereas only approximately 10% of survivors at five years reported fear of second cancer, relapse or metastasis, the QOL assessment shows depression, anxiety, changes in self-concept or changes in appearance in up to 30% of patients [7,19].

Montazeri et al. [20] retrieved more than 50 instruments from the analysis of studies concerning QOL evaluation of NSCLC patients. Considering our experience, EORTC QLQ-C30 plus LC13 and PGWBI questionnaires were found as the most suitable tools for the study of NSCLC patients’ QOL before and just after thoracic surgery. In fact, the Functional Assessment of Cancer T-Lung (FACT-L) that does not directly integrate the treatment-related symptoms and the Lung Cancer Symptoms Scale (LCSS), which combine auto-evaluation by patients and hetero-evaluation by clinicians, were not considered [21,22]. The SF-36 has been extensively applied for the QOL studies of NSCLC patients [5—7]. However, a questionnaire allowing a wide psychological assessment such as the PGWBI has been preferred.

Improvement of the NSCLC patients’ QOL is of a great importance considering that QOL of lung cancer patients more deeply worsen and for a longer time when compared with other cancer patients [18]. A simple preoperative
assessment of the PGWBI scores allows us to highlight those patients at higher risk of poor postoperative QOL. These patients may then be proposed with specific program of information, psychological and/or social support in order to protect their postoperative QOL. Indeed, keeping NSCLC patients with a high QOL should be of paramount importance when we consider the favorable impact on survival reported for patients with a good QOL [23-25].

In conclusion, improvement of the QOL of NSCLC patients managed with thoracic surgery is mandatory considering the sometimes altered QOL before surgery and its further postoperative worsening. A simple assessment of patients at higher risk of a poor postoperative QOL could easily be performed preoperatively, taking into account certain sociodemographic factors and the results of the PGWBI scores.

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References