

ORIGINAL ARTICLE

## Quality of life and pre-operative anxiety level in patients scheduled to undergo thoracic surgery

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### Summary

**Purpose:** Increased preoperative anxiety levels may lead to adverse outcomes. We aimed at assessing the relationship between quality of life (QoL) and preoperative anxiety level during the 4-week preoperative period in patients scheduled to undergo thoracic surgery and we tried to identify patients who could benefit from preoperative supportive measures.

**Methods:** One hundred patients comprised the study population (52 men and 48 women) out of the initial 136, who were scheduled to undergo thoracic surgery. Mean age was 56±15 years (±SD). After obtaining informed consent, participants were asked to answer a questionnaire, through a personal interview, 12 to 15 h prior to their scheduled thoracic operation. The questionnaire included questions on demographics and incorporated the State Anxiety Inventory (STAI) and SF-36 scales.

**Results:** Female patients ( $p=0.023$ ), unemployed pa-

tients ( $p=0.01$ ) and patients that were scheduled for a mediastinoscopy ( $p=0.001$ ) experienced increased anxiety level. Lower scores in several parameters related to the QoL were found to be associated with increased anxiety level. Limitations in patients' ability to work or to perform other everyday activities as a result of mental health problems ( $p=0.006$ ), low vitality ( $p<0.001$ ), bad general mood ( $p<0.001$ ), deteriorated general health ( $p<0.001$ ) and general mental health ( $p<0.001$ ) were associated with preoperative anxiety. No differences were found in anxiety level among lung cancer and non-lung cancer patients.

**Conclusion:** This study showed an inverse proportional correlation between preoperative QoL and anxiety during the 4-week period prior to thoracic surgery. Appropriate pharmaceutical and psychological support may improve patients' anxiety level.

**Key words:** preoperative anxiety, preoperative quality of life, SF-36, STAI, thoracic surgery

### Introduction

Anxiety represents a normal and usual reaction to scheduled surgery [1-4], it is an objective feeling and its grade differs among patients. Increased anxiety level has adverse consequences in patients' physiology, since it provokes increased catecholamine release [1], neuroendocrine stress [2], increased anaesthetic and analgesic demands during surgery, increased postoperative pain [3], nausea and vomiting [4], infections [2] and increased morbidity and mortality [1]. Anxiety may also affect patient's thoughts, feelings, activities and it

is responsible for cognitive and behavioral changes [3].

Anxiety correlates with the patient's attitudes and QoL during the preoperative period [5]. Furthermore, the lower the anxiety level, the better the patient copes with the stress of the perioperative period [1]. Thoracic surgery is usually accompanied by a plethora of complications and pathophysiological changes [6-8] which can be aggravated by increased preoperative anxiety level [1-3].

The aim of the present study was to assess a possible correlation between the QoL during the 4 weeks prior to thoracic surgery and the patients' anxiety level.

Questions regarding patients' habits, but also the evaluation of their physical, social, intellectual and emotional activity allow the medical and nursing personnel to identify patients with increased anxiety level and to intervene as early and appropriately as necessary.

## Methods

The initial study population was a sample of 136 consecutive patients admitted for thoracic surgery to the "Sotiria" Chest Diseases General Hospital, in Athens, Greece, a tertiary, 800-bed teaching hospital, specialized in pulmonary medicine. After obtaining Hospital's Ethics Committee approval, patients were asked to sign informed consent and recruitment was voluntary. A standard questionnaire was answered through a personal interview, 12 to 15 h prior to their scheduled thoracic surgery. After excluding patients suffering from dementia, mental disorders and those unable to process written text, 100 patients comprised the study population. Data were collected from June 2009 to September 2009.

The investigator performing the interviews was blinded as to the diagnosis. The questionnaire included questions on demographic data, on patients' everyday habits, and incorporated two widely used questionnaires: STAI scale and the QoL scale SF-36. STAI is a tool for evaluating stress and includes 20 questions providing a total score that ranges from 20 (no anxiety at all) to 80 (extreme anxiety). STAI scale is related to the emotional status and reflects the present level of anxiety [9-11]. A complete description of the STAI has been previously published [12]. SF-36 scale is a QoL survey consisting of 36 questions. It is a general measure of health, depicting patient's QoL in the preceding 4-week period and can be addressed to many patient subgroups irrespective of their age, diseases they are suffering from, or the type of therapy they receive. In this respect, SF-36 scale is useful in assessing both general population and specific patient subgroups. It has been translated into more than 50 languages as part of an international program of assessment of QoL [13-15]. The present study used the 1998 version 2.0.

### Statistical analysis

Continuous data are presented as mean  $\pm$  standard deviation (SD). Categorical data are presented either as median and range or as frequencies and percentages. Agreement between matched pairs was measured using Spearman's rho correlation. The Kolmogorov-Smirnov test was utilized for normality analysis of the parameters and the Levene's test was used for equality of variance.

Comparison of between-group continuous variables was performed using the one-way ANOVA, and when differences were detected, *post-hoc* Bonferroni test was performed. Comparison between mean values of normal continuous variables was performed using unpaired Student's t-test. The level of statistical significance for all analyses was set at  $p < 0.05$ . All analyses were conducted using the SPSS, version 17.00 (SPSS Inc, Chicago, IL).

## Results

None of the patients refused participation in the study and all the questions were answered. The patient mean age was  $56 \pm 15$  years (range 17-79). The demographic characteristics of the study population are depicted in Table 1. Diagnoses, awareness of the medical condition and type of surgery are shown in Table 2.

Female patients had increased anxiety level ( $48.48 \pm 12.97$ ) compared to male patients ( $42.04 \pm 11.74$ ;  $p = 0.023$ ). Furthermore, patients scheduled to undergo mediastinoscopy ( $55.58 \pm 9.87$ ) were more anxious than those scheduled to undergo thoracotomy ( $42.6 \pm 12.21$ ) or video-assisted thoracoscopy (VAT) ( $34.3 \pm 6.27$ ;  $p = 0.001$ ). Preoperative anxiety was not related to body mass index, use of sedatives, tobacco or alcohol.

According to the SF-36 scale deterioration of several parameters related to the QoL 4 weeks prior to

**Table 1.** Demographic characteristics of the study population (n=100)

Characteristics	Number of patients
Sex	
Male	52
Female	48
Marital status	
Married	76
Single	24
Alcohol consumption	
Social drinker	60
Casual drinker	31
Alcohol abuse	9
Occupation	
Unemployed	6
Employed	54
Retired	40
Educational level	
Elementary school	37
High school	47
University degree	16
ASA status	
1	3
2	82
3	15

ASA: American Society of Anesthesiologists

**Table 2.** Diagnosis, awareness and type of surgery in the study population (n=100)

	<i>Number of patients</i>
Diagnosis	
No cancer	24
Cancer	54
Undiagnosed	22
Awareness	
Well informed	20
Informed	48
Partially informed	29
Not informed	3
Type of operation	
Thoracotomy	70
Mediastinoscopy	12
VATS	10
Other	5
Sternotomy	3

VATS: video assisted thoroscopic surgery

thoracic surgery was found to be associated with increased anxiety level. Limitations in the patients' ability to work or to perform other everyday activities as a result of mental health problems ( $p=0.006$ ), low vitality ( $p<0.001$ ), bad general mood ( $p<0.001$ ), deteriorated general health ( $p<0.001$ ) and general mental health ( $p<0.001$ ) were associated with preoperative anxiety.

On the other hand, no statistically significant correlation was found between preoperative anxiety and limitations in performing physical activities, in dealing with professional problems or problems related to other everyday activities resulting from physical health, social functioning, somatic pain and general physical health (Table 3).

In the subgroup of cancer patients, a significant correlation was observed between the limitation in work capability and other everyday activities resulting from mental health problems ( $p=0.003$ ), vitality ( $p=0.003$ ), general mood ( $p<0.001$ ), general health ( $p<0.001$ ), general mental health ( $p<0.001$ ) and the existence of preoperative anxiety. No other significant correlations were observed.

In the subgroups of patients with benign or non-diagnosed cases, significant correlation was observed between vitality ( $p=0.01$ ), general mood ( $p<0.001$ ) and mental health ( $p=0.009$ ) and the development of preoperative anxiety.

Between-group analysis failed to show any difference in anxiety level between cancer and non-cancer patients. The only significant differences observed were in their social functioning ( $75.56\pm 28.34$  in cancer patients vs.  $62.77\pm 25.89$  in non-cancer patients;  $p=0.021$ ) and general mental health ( $71.67\pm 22.25$  in cancer patients vs.  $61.84\pm 20.70$  in non-cancer patients;  $p=0.025$ ).

**Table 3.** Correlations between each of the preoperative quality of life parameters and preoperative anxiety in thoracic surgery patients as expressed by the STAI scale (n=100)

	<i>Mean±SD</i>	<i>p-value</i>
STAI	43.65±12.3	
Physical functioning	66.55±28.4	0.581
Role-physical	45.00±44.1	0.621
Somatic pain	79.00±27.6	0.232
General health	56.2±20.6	$<0.001$
Vitality	66.95±35.0	$<0.001$
Social functioning	69.68±27.8	0.092
Role-emotional	70.25±41.5	0.006
Mental health	61.70±21.9	$<0.001$
Physical component summary	61.69±22.4	0.082
Mental component summary	67.14± 22.0	$<0.001$

STAI: State Anxiety Inventory, SD: standard deviation

## Discussion

The present study demonstrates the existence of a correlation between the preoperative QoL during the 4-week period prior to a scheduled thoracic surgery and the preoperative anxiety level in these patients. Increased anxiety level was observed in female patients, in unemployed patients, in patients scheduled to undergo mediastinoscopy and in patients with limitations in work capability, or patients with inability to cope with their everyday activities, as a result of mental health problems, reduced energy and increased fatigue, bad general mood, or bad general and mental health. Compared to the study by Lima et al. [16], our study population scored lower in all the parameters of the SF-36 scale. This discrepancy may probably be attributed to differences between the study populations. The study by Lima et al. included lung cancer patients, scheduled to undergo thoracic surgery, ranging from partial lung excision to pneumonectomy, whereas our study included a mixed population, i.e. patients with malignancies and patients with benign pulmonary diseases. However, benign pulmonary diseases are often associated with diminished pulmonary function, dyspnoea, weakness and fatigue [17], all affecting patients' QoL. Furthermore, the literature shows that dyspnoea is associated with depression, anxiety and worse QoL [18,19]. Another important contributing factor to this discrepancy is comorbidities, present in more than 50% of our patients, such as heart disease, chronic obstructive pneumonopathy and diseases of musculoskeletal system.

An association between certain parameters of QoL and preoperative anxiety was established, even though each parameter did not deteriorate to the same extent. This could probably be attributed to the fact that the study was undertaken shortly after the diagnosis was made and/or the decision for an operation was taken.

Probably all these parameters did not have the time to fully express their impact.

It is well accepted that social functioning is an important factor of protection from anxiety and depression [20-22]. Despite the reported correlation between quality of social contact, expression of the feelings, psychological well-being and preoperative anxiety [23], the present study failed to show any significant correlation between the patients' ability to socialize and preoperative anxiety. We suppose that this was due to preexisting strong family bonds which prevented any deterioration of patients' ability to socialize throughout the preoperative period. Family status is a well known factor that affects patients' QoL [24].

Patients with limited everyday activities and concomitant emotional problems had statistically significant higher anxiety level. This could probably be attributed to the fact that the preoperative period included a series of diagnostic investigations, uncertainty and fear of the unknown, resulting in a state of increased emotional stress [1,25,26]. The fear of the postoperative pain and the distance from the family environment, as a result of hospitalization, further accentuated their emotional stress [26]. As a result of this emotional status, patients usually limit their everyday activities, isolate themselves, express reduced interest in their simple daily routine matters and enter in a vicious circle where they are emotionally perished. Sharing their emotions with other people and receiving social support may contribute to the decrease of preoperative anxiety and improvement of emotional status [23,27].

In the present study patients with low energy and increased fatigue developed increased preoperative anxiety level. Low energy could be related to comorbidities such as coronary disease, arrhythmias, vessel pathology, pulmonary hypertension, and chronic obstructive pulmonary disease [28].

Although data in the literature have reported alcohol and tobacco consumption to be positively correlated with preoperative anxiety and low QoL [29-31], the present study failed to show any significant relation between their use and anxiety in patients scheduled to undergo thoracic surgery.

Interestingly, a subgroup analysis between patients with lung cancer and patients with benign lesions did not reveal any differences in anxiety level. This observation can probably be attributed to the fact that despite the benign disease, the fear of a major operation provokes the elevated anxiety level.

The authors recognize several limitations in the present study. It is more possible that patients with a better QoL will participate or have the proper intellectual energy to answer the questionnaire in contrast to those

with an advanced disease whose QoL or their intellectual status (for example brain metastases) may have already been severely affected.

While our results are quite similar with those reported in the literature regarding patients undergoing major operations [12,15-17], we need to underline that the present study exclusively included patients scheduled to undergo thoracic surgery, where the literature is very limited [32-36].

Consequently, the present study provides data on the identification of thoracic surgery patients who are more likely to develop increased anxiety level. Poor QoL and anxiety preoperatively result in poor postoperative QoL, as reported in many other studies in the literature [24,37-39]. The preoperative anxiety level in thoracic surgery patients could be predicted by evaluating their everyday routine, using simple questions. Psychological, social and pharmaceutical support could diminish the preoperative anxiety level and improve the preoperative QoL, leading to improvement of the QoL postoperatively [40,41].

Data in the literature indicate that lung cancer patients with low QoL scheduled to undergo lung resection [42-45] benefited from programs of physical rehabilitation, information, psychological and social support. Programs of aerobic exercise seem to improve maximum oxygen consumption and correlate with changes in vitality during the preoperative period [37]. Physical exercise may probably inhibit the deterioration of QoL and diminish anxiety of patients who have compromised QoL as a result of their decreased pulmonary function [37]. Furthermore, our study indicates that patients with benign diseases scheduled to undergo thoracic surgery had poor QoL and experienced increased preoperative anxiety level.

In conclusion the present study suggests that thoracic surgery patients should be screened for preoperative anxiety, irrespective of the existence of malignancy or not, as they were found to experience the same anxiety regardless the diagnosis. The present study adds some evidence to the existing literature of preoperative anxiety screening in thoracic surgery patients. Further studies are needed in order to fully evaluate the impact of these strategies.

## References

1. Perks A, Chakravarti S, Manninen P. Preoperative anxiety in neurosurgical patients. *J Neurosurg Anesthesiol* 2009; 21: 127-130.
2. Levandovski R, Ferreira MB, Hidalgo MP et al. Impact of preoperative anxiolytic on surgical site infection in patients undergoing abdominal hysterectomy. *Am J Infect Control* 2008;

- 36: 718-726.
3. Rosen S, Svensson M, Nilsson U. Calm or Not Calm: The question of anxiety in the perianesthesia patient. *J Perianesth Nurs* 2008; 23: 237-246.
  4. Gan T. Risk factors for postoperative nausea and vomiting. *Anesth Analg* 2006; 102: 1884-1898.
  5. Douglas PE, Thomas DL, Meade GE et al. Determinants of quality of life in patients following pulmonary resection for lung cancer. *Am J Surg* 2006; 192: 565-571.
  6. Burfeind WR, Jaik NP, Villamizar N et al. A cost-minimization analysis of lobectomy: thoracoscopic versus posterolateral thoracotomy. *Eur J Cardiothorac Surg* 2010; 37: 827-832.
  7. Ferguson MK, Parma CM, Celauro AD et al. Quality of life and mood in older patients after major lung resection. *Ann Thorac Surg* 2009; 87: 1007-1012.
  8. Gezer S, Oz G, Findik G et al. Sleeve resections for squamous cell carcinoma of the lung. *Heart Lung Circ* 2010; 19: 549-554.
  9. Caumo W, Schmidt AP, Schneider CN et al. Risk factors for preoperative anxiety in adults. *Acta Anaesthesiol Scand* 2001; 45: 298-307.
  10. Boker A, Brownell L, Donen N. The Amsterdam preoperative anxiety and information scale provides a simple and reliable measure of preoperative anxiety. *Can J Anesth* 2002; 49: 792-798.
  11. Spielberger GD, Gorsuch RL, Lushene RE et al. The State-Trait Anxiety Inventory. Palo Alto, CA, Consulting Psychologists Press Inc, 1970.
  12. Clark DA, Cook A, Snow D. Depressive symptom differences in hospitalized, medically ill, depressed psychiatric inpatients and nonmedical controls. *J Abnorm Psychol* 1998; 107: 38-48.
  13. Roth R, Lowery J, Davis J et al. Quality of life and affective distress in women seeking immediate versus delayed breast reconstruction after mastectomy for breast cancer. *Plast Reconstr Surg* 2005; 116: 993-1002.
  14. Stewart AL, Hays RD, Ware JE. The MOS short-form general health survey: Reliability and validity in a patient population. *Med Care* 1988; 26: 724-735.
  15. Anagnostopoulos F, Niakas D, Pappa E. Construct validation of the Greek SF-36 health survey. *Qual Life Res* 2005; 14: 1959-1965.
  16. Lima L, da Silva R, Gross JL et al. Assessment of pulmonary function and quality of life in patients submitted to pulmonary resection for cancer. *J Bras Pneumol* 2009; 35: 521-528.
  17. West JB (Ed). *Pulmonary Physiology and Pathophysiology. An Integrated, Case-Based Approach* (2nd Edn). Philadelphia, PA, Lippincott Williams & Wilkins, USA, 2007, pp 31-78.
  18. Douglas P, Thomas M, Meade G et al. Determinants of quality of life in patients following pulmonary resection for lung cancer. *Am J Surg* 2006; 192: 565-571.
  19. Vallès J, Guilera M, Briones Z et al. Validity of the Spanish 8-item short-form generic health-related quality-of-life questionnaire in surgical patients: a population-based study. *Anesthesiology* 2010; 112: 1164-1174.
  20. Sharma A, Sharp M, Walker G et al. Predictors of early post-operative quality of life after elective resection for colorectal cancer. *Ann Surg Oncol* 2007; 14: 3435-3442.
  21. Leskela U, Ryttsala H, Komulainen E et al. The influence of adversity and perceived social support on the outcome of major depressive disorder in subjects with different levels of depressive symptoms. *Psychol Med* 2006; 36: 779-788.
  22. Franks P, Campbell TL, Shields CG. Social relationships and health: the relative roles of family functioning and social support. *Soc Sci Med* 1992; 34: 779-788.
  23. Panagopoulou E, Maes S, Rimé B, Montgomery A. Social sharing of emotion in anticipation of cardiac surgery effects on preoperative distress. *J Health Psychol* 2006; 11: 809-820.
  24. Barlesi F, Doddoli C, Loundou A et al. Preoperative psychological global well being index (PGWBI) predicts postoperative quality of life for patients with non-small cell lung cancer managed with thoracic surgery. *Eur J Cardiothorac Surg* 2006; 30: 548-553.
  25. Kagan I, Bar-Tal Y. The effect of preoperative uncertainty and anxiety on short-term recovery after elective arthroplasty. *J Clin Nurs* 2008; 17: 576-583.
  26. Pritchard MJ. Managing anxiety in the elective surgical patient. *Br J Nurs* 2009; 18: 416-419.
  27. Walker JA. Emotional and psychological preoperative preparation in adults. *Br J Nurs* 2002; 11: 567-575.
  28. Brunelli A, Charloux A, Bolliger C. The European Respiratory Society and European Society of Thoracic Surgeons clinical guidelines for evaluating fitness for radical treatment (surgery and chemoradiotherapy) in patients with lung cancer. *Eur J Cardiothorac Surg* 2009; 36: 181-184.
  29. Saatcioglu O, Yapici A, Cakmak D. Quality of life, depression and anxiety in alcohol dependence. *Drug Alcohol Rev* 2008; 27: 83-90.
  30. O'Connell J, Novins DK, Beals J et al. The relationship between patterns of alcohol use and mental and physical health disorders in two American Indian populations. *Addiction* 2006; 101: 69-83.
  31. Fagerström K, Aubin HJ. Management of smoking cessation in patients with psychiatric disorders. *Curr Med Res Opin* 2009; 25: 511-518.
  32. Oh S, Miyamoto H, Yamazaki A et al. Prospective analysis of depression and psychological distress before and after surgical resection of lung cancer. *Gen Thorac Cardiovasc Surg* 2007; 55: 119-124.
  33. Uchitomi Y, Mikami I, Nagai K et al. Depression and psychological distress in patients during the year after curative resection of non-small-cell lung cancer. *J Clin Oncol* 2003; 21: 69-77.
  34. Uchitomi Y, Mikami I, Kugaya A et al. Physician support and patient psychologic responses after surgery for non-small cell lung carcinoma: a prospective observational study. *Cancer* 2001; 92: 1926-1935.
  35. Rolke HB, Bakke PS, Gallefoss F. Health related quality of life, mood disorders and coping abilities in an unselected sample of patients with primary lung cancer. *Respir Med* 2008; 102: 1460-1467.
  36. Bredda I, Botega N, Toro I. Evaluation of quality of life of patients submitted to pulmonary resection due to neoplasia. *J Bras Pneumol* 2006; 32: 10-15.
  37. Peddle C, Jones L, Eves N et al. Effects of presurgical exercise training on quality of life in patients undergoing lung resection for suspected malignancy. *Cancer Nurs* 2009; 32: 158-165.
  38. Herlitz J, Wiklund I, Caidahl K et al. Determinants of an impaired quality of life five years after coronary artery bypass surgery. *Heart* 1999; 81: 342-346.
  39. Pearson S, Maddern G, Fitridge R. The role of pre-operative state-anxiety in the determination of intra-operative neuroendocrine responses and recovery. *Br J Health Psychol* 2005; 10: 299-310.
  40. Carlsen K, Jensen AB, Jacobsen E et al. Psychosocial aspects of lung cancer. *Lung Cancer* 2005; 47: 293-300.

41. Handy JR Jr, Asaph JW, Skokan L et al. What happens to patients undergoing lung cancer surgery? Outcomes and quality of life before and after surgery. *Chest* 2002; 122: 21-30.
42. Myrdal G, Valtysdottir S, Lambe M et al. Quality of life following lung cancer surgery. *Thorax* 2003; 58: 194-197.
43. Brunelli A, Salati M. Preoperative evaluation of lung cancer: predicting the impact of surgery on physiology and quality of life. *Curr Opin Pulm Med* 2008; 14: 275-281.
44. Mangione C, Goldman L, Orav J et al. Health-related quality of life after elective surgery. *J Gen Intern Med* 1997; 12: 686-697.
45. Brunelli A, Socci L, Refai M et al. Quality of life before and after major lung resection for lung cancer: A prospective follow-up analysis. *Ann Thorac Surg* 2007; 84: 410-416.