Peer reviewed article

Distress and alexithymia in lung recipients – psychosocial strains and associations with chronic allograft dysfunction

Lutz Goetzmann[a], *Sarosh Irani*[b], *Kyrill Schwegler*[a], *Martina Stamm*[a], *Rosemarie Bricman*[b], *Claus Buddeberg*[a], *Christoph Schmid*[b], *Christian Benden*[b], *Richard Klaghofer*[a], *Annette Boehler*[b]

[a] Psychosocial Medicine, University Hospital Zurich, Switzerland
[b] Pulmonary Medicine and Lung Transplant Programme, University Hospital Zurich, Switzerland

Summary

Questions under study: In recent years, distress and alexithymia have been recognised as psychosocial factors related to both somatic and psychosomatic diseases. In this study distress and alexithymia and their associations with physical parameters were investigated in lung recipients.

Methods: The study, which included 76 patients after a lung transplant, measured psychological distress (Symptom Checklist, SCL-K-9) and alexithymia (Toronto Alexithymia Scale, TAS-20). Physical health was assessed by means of lung function (FEV_1), exhaled nitric oxide (eNO), and comorbidity (CCI) at the time of the questionnaire survey. A bronchiolitis obliterans syndrome (BOS) was assessed at the time of the questionnaire survey and one year later.

Results: Mean values of distress were found to be significantly higher in lung recipients than in a normal community sample, and mean values of alexithymia were significantly higher in lung patients than in healthy persons. There is a significant positive correlation between distress and BOS at the time of the questionnaire survey ($p = .008$). Distress is a predictor for new-onset BOS one year after the questionnaire survey ($p = .026$). No significant correlations were found between alexithymia and physical parameters.

Conclusions: Lung transplants go hand in hand with increased alexithymia and psychological distress. In addition, psychological distress may contribute to the development of BOS. This association underlines the importance of psychosocial support after lung transplantation.

Key words: lung transplantation; alexithymia; distress; chronic rejection reaction; bronchiolitis obliterans syndrome

Introduction

Distress and alexithymia are well-known psychological reactions to somatic diseases, as well as being risk factors for the development of somatic and psychosomatic diseases: *distress*, including symptoms such as depression, anxiety, hostility, somatisation, interpersonal sensitivity and psychotic ideation, is frequently found in patients with cancer, chronic pain, multiple sclerosis, and gastrointestinal diseases [1–4]. It is also a risk factor for physical illnesses such as heart disease [5, 6]. After an organ transplant, distress is seen as a typical response to somatic strains and burdens caused by surgery, immunosuppression and the side effects of medication [7–11]. In some studies, pretransplant distress predicts allograft rejection reactions as well as higher posttransplant mortality [12–15].

Alexithymia is described as an impaired capacity for perceiving emotions [16]: alexithymic individuals are not able to recognise and verbalise their emotions; they show very pragmatic thinking and a lack of dreams. Today we differentiate between two types of alexithymia: firstly, alexithymia is associated with a continuous deficit in the anterior cingulate cortex [17]. From this point of view, alexithymia is a stable personality characteristic with an organic correlate. Secondly, alexithymia is understood as a psychological "defence mechanism" against severe emotional strains, caused for example by physical diseases [18–20]. Although alexithymia is seen in cancer, essential hypertension and psoriasis (e.g. 21–23), only very few studies have to date investigated alexithymia in transplant patients. Kubo et al. [24] found that about half of all patients receiving kidney transplants suffered from alexithymia. According to Fukunishi et al. [25], alexithymia was stronger before a liver transplant than after. In a study of heart recipients,

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however, no differences were found before and after transplantation [26].

To our knowledge there have been no studies on distress and alexithymia in lung recipients which focus on interactions with physical health after transplantation. Our first hypothesis in the present study was that patients following a lung transplantation experience increased distress and alexithymia. Our second hypothesis was that these psychosocial factors may contribute to the development of a chronic rejection reaction, because patients affected with psychosocial strains may be more prone to nonadherence. Because cystic fibrosis (CF) patients differ physically from patients with other lung diseases, and have coped with the disease since their early years, we also looked for differences between CF and other lung diseases in terms of psychosocial variables.

The objective of the study was therefore to answer the following questions:

1. How high are the levels of distress and alexithymia in lung recipients? Are there differences in terms of distress and alexithymia between lung recipients suffering from CF and recipients with other lung diseases?
2. What is the relationship between distress/alexithymia and the patient's physical health? Are there correlations between distress/alexithymia and the development of a chronic rejection reaction (BOS) one year after the questionnaire survey?

Methods

Sample and procedure

Between November 1992 and December 2007, 200 patients underwent lung transplant surgery at Zurich University Hospital. The inclusion criteria for the present study were a time gap of three months or more between operation and assessment, and an age of 16 years or more. Sufficient knowledge of the German language was also required. After approval by the Ethics Committee of Zurich University Hospital, patients were briefed by letter prior to the study visit. The questionnaire was handed out during a regular transplant consultation, at which time informed consent was obtained (i.e. questionnaire survey, T0). The physician in charge explained the study, and the patients completed the anonymous questionnaire on the same day. Current physical parameters were recorded on the day of the questionnaire survey. In addition, the correlation was calculated between distress/alexithymia and the development of a new-onset BOS one year later (T1). All patients without BOS at T0 were included in this calculation (n = 65).

Measures

Psychosocial parameters

The Symptom Checklist (SCL-K-9) is a short version of the Symptom Checklist SCL-90-R [27]. The SCL-90-R measures psychological distress and psychopathological symptoms in terms of hostility, obsessive-compulsive symptoms, depression, interpersonal sensitivity, paranoid ideation, anxiety, somatisation, phobic anxiety, and psychotic ideation. The German short version SCL-K-9 is rated on a 5-point Likert scale between 0 (not at all) and 4 (very much), and is computed by nine items showing the highest correlation with the Global Severity Index (GSI-90), a summary of the SCL-R-90 designed to assess overall psychological distress over the preceding seven days. A mean score for the 9 items is computed, the potential range of scores is from 0 to 4; higher values indicate higher distress. The SCL-K-9 has a one-dimensional factor structure, a Cronbach's Alpha of .87, and a mean comparable to that of the GSI-90 [28].

The Toronto Alexithymia Scale (TAS-20) comprises 20 items rated on 5-point Likert scales ranging from 1 (strongly disagree) to 5 (strongly agree) [29, 30]. In addition to the total score (sum score for all 20 items, potential range of scores from 20 to 100), the TAS-20 yields scores for three factor scales: difficulty identifying feelings (DIF, sum score for 7 items, potential range from 7 to 35), difficulty describing feelings (DDF, sum score for 5 items, potential range 5–25), and externally-orientated thinking (EOT, sum score for 8 items, potential range 8–40). Scores on the TAS-20 are generally analysed as continuous variables. Higher values indicate higher alexithymia, more DIF, more DDF, and more EOT). There is a validated German version available with mean values of healthy persons [31].

Physical parameters

The forced expiratory volume in one second (FEV_1) and exhaled nitric oxide (eNO) served as measures of pulmonary function. Spirometry was performed with a mass flow meter (66200 Autobox®, Sensor Medics, Yorba Linda, CA). Criteria for acceptability, reproducibility and predicted normal values were according to those of the European Coal and Steel Community [32]; eNO, which we assess on a routine basis during every consultation (Eco Medics, CLD 88, Munich, Germany), is a nonspecific but sensitive parameter of airway inflammation [33]. Further diagnosis of the underlying disease leading to the lung transplant and the date of surgery were recorded on the day of the questionnaire survey. Bronchiolitis obliterans syndrome (BOS) was looked for on the day of the questionnaire survey (T0) and one year later (T1). The term "chronic rejection" (BOS) was used to describe the condition of BOS according to the criteria of the International Society for Heart and Lung Transplantation [34]. Since the number of lung recipients suffering from BOS is small (8 patients with BOS grade I, 4 patients with BOS grade II and 4 patients with BOS grade III), in our analysis we only differentiated patients with BOS from those without it. We also calculated the Charlson Comorbidity Index (CCI) as used in studies including other adult solid organ transplant recipients (i.e. liver, kidney) [35, 36]. Briefly, comorbidities were defined as follows: chronic kidney disease (defined as serum creatinine of >130 μmol/l or a history of renal transplantation), insulin-dependent diabetes mellitus, neoplasms (history of malignancy, excluding non-melanoma skin cancer), peripheral vascular disease, cerebral vascular disease, and coronary artery disease respectively. The CCI was calculated by assigning a weight of 2 to diabetes mellitus, renal insufficiency, malignancy and stroke, and a weight of 1 to other comorbidities as described previously elsewhere [36].

Statistical analysis

The statistical evaluation was carried out with SPSS 12.0.1 for Windows. The TAS-20 cut-off value was calculated according to the German validation study of Bach et al. [32], following the calculation of Jacobson and Truax [37]. Descriptive statistics data were expressed in absolute numbers, percentage, means and 95% confidence intervals, for comorbidity index median and interquartile range (IQR). To compare patients with a sample of healthy persons / psychiatric patients in the case of alexithymia or a representative community sample in the case of distress, the *t*-test for independent samples was used. To compare CF patients with non-CF patients, an analysis of covariance was performed (covariates: age, sex, time since transplant). The correlations between variables were calculated by Pearson's correlation.

Results

Sociodemographic data, physical data, diagnoses and comorbidity

Ninety-six of the 135 patients still living fulfilled the inclusion criteria. Seventy-six of the 96 patients invited to participate in this survey did so, yielding a response rate of 77%. The largest diagnostic group consisted of CF patients (n = 30, 40%), followed by those suffering from chronic obstructive pulmonary disease (n = 26, 34%). Sixteen patients (27.6%) were diagnosed with BOS one year after this survey (T1), see table 1. In terms of mean age, sex, lung function (FEV_1) and BOS we found no significant differences between responders and nonresponders. Comorbidity: the median of the CCI was 2 (IQR = 1–4), and the most frequent comorbidities were chronic kidney disease (creatinine >130) with 60.5% and insulin-dependent diabetes mellitus with 34.2%.

Mean values and confidence intervals of distress, alexithymia, and values of physical parameters

Table 2 shows the mean values and confidence intervals of distress, alexithymia, and physical parameters (FEV_1, eNO), n = 76.

The mean value of psychological distress (SCL-9-K) is significantly higher (p = 0.03) than that of a German representative community sample (0.55 vs 0.39, p = 0.03). The values of this community sample (n = 2057) are as follows: 56%

Table 1

Sociodemographic data, physical data, diagnoses and comorbidity, n = 76.

Sociodemographic data		Diagnoses	
Sex		Cystic fibrosis	30 (40%)
Female	33 (43%)	COPD5	26 (34%)
Male	43 (57%)	Pulmonary fibrosis	14 (18%)
Age in years (M, range)	45.3 (18–68)	Pulmonary hypertension	3 (4%)
		Other diagnoses	3 (4%)
Physical data		Comorbidity	
Time since Tx[1] in months (M, range)	50 (3-131)	Charlson Index (CCI) Median (interquartile range)	2 (1–4)
BOS (T0)[2]	16 (21.1%)	No comorbidity	18 (23.7%)
BOS (T1)[3]	21 (27.6%)	Chronic kidney disease (creatinin >130)	46 (60.5%)
		Insulin-dependent diabetes mellitus	26 (34.2%)
Recent onset BOS (T0/T1) 4	5 (6.6%)	Other comorbidities	11 (14.5%)

[1] Tx = transplantation; [2] At the time of the questionnaire survey (T0); [3] One year after the questionnaire survey (T1); [4] Newly developed BOS between T0 and T1; [5] COPD = chronic obstructive pulmonary disease.

Table 2

Mean values (M) and 95% confidence intervals (CI) of distress/alexithymia and physical parameters (lung function FEV_1, eNO) at T0, n = 76.

Psychosocial variables	M	CI 95% for M	Norm[4]	M (Healthy persons)[5]	M (Psychiatric patients)[5]
SCL-K-9	.55	0.41;0.69	0.38		
TAS-20	51.79	50.60;52.98		39.88	50.39
– DIF[1]	15.67	15.00;16.35			
– DDF[2]	12.74	12.15;13.33			
– EOT[3]	23.38	22.83;23.93			
Physical variables					
FEV_1	2527	2354;2705			
eNO	10.70	9.17;12.22			

TAS-20: [1] Difficulty identifying feelings, [2] Difficulty describing feelings, [3] Externally orientated thinking, [4] Only available for SCL-K-9, [5] Only available for TAS-20 total score.

females, average age 49 years; range 14–92, 58% married, 8% jobless [28]. The mean values of alexithymia (TAS-20) among lung recipients (M 51.8) are significantly higher than for German-speaking healthy persons (p ≤.001; M 39.88; n = 221; 71% females, average age 41 years, range 21–93; staff of a hospital: n = 88; outpatients visiting the hospital for a screening examination: n = 133; exclusion criteria: psychiatric disorders) and German-speaking inpatients of a university psychiatric hospital (p = 0.028; M 50.39; n = 101; 67% females, average age 33 years, range 18–71; diagnoses: anxiety disorder, n = 67; eating disorder, n = 17, somatoform disorder, n = 7, alcohol abuse, n = 7, and dysthymia, n = 3). In our study 89.5% of all patients had values >45 and were alexithymic according to the German validation study of Bach et al. [31].

Table 3

Correlations between distress/alexithymia and physical parameters (lung function FEV_1, eNO, BOS, Charlson Index CCI) at T0, n = 76.

	FEV_1	eNO	BOS	CCI[4]
SCL-K-9	–.01	–.06	.23[x]	–.03
TAS-20	.01	.08	.14	.03
– DIF[1]	0	.01	.07	.09
– DDF[2]	.08	.03	.11	–.06
– EOT[3]	–.07	.14	.09	–.08

Legend: x p ≤.05; TAS-20: [1] Difficulty identifying feelings, [2] Difficulty describing feelings, [3] Externally orientated thinking, [4] Spearman's rho.

Compared to patients with other lung diseases in our sample, CF patients show no significant differences in terms of alexithymia and distress after checking for age, sex and time since transplant (analysis of covariance).

Correlations between distress/alexithymia and physical parameters

Table 3 shows correlations between distress/alexithymia and physical parameters (FEV_1, eNO, BOS and comorbidity) at the time of the questionnaire survey (T0).

Distress (SCL-K9) correlates positively with the occurrence of a chronic rejection reaction (BOS) at the time of the questionnaire survey (T0). No significant correlation was found between distress/alexithymia on the one hand and age/comorbidity on the other. Comorbidity is not correlated with FEV_1, eNO, BOS, age, and time since transplantation.

The results of the bivariate analysis show that psychological distress at the time of the questionnaire survey (T0) is significantly associated with BOS one year after the survey (T1) (Pearson's correlation 0.324, p = 0.008). The correlations between alexithymia, age, time since transplant (T0) and the diagnosis of CF on the one hand, and the development of BOS one year later (T1) on the other, are not significant.

Discussion

In this study we investigated the degree of distress and alexithymia among lung recipients and the correlation with BOS both at the time of the questionnaire survey and one year later. In summary we found high values of distress and alexithymia after transplant, but no association between alexithymia and physical health. However, chronic rejection reaction (BOS) goes hand in hand with increased distress, and there seems to be some indication that psychological distress may be a contributing factor in the development of BOS.

Distress and alexithymia after lung transplantation

Lung recipients report significantly higher levels of psychological distress (SCL-K-9) than normal controls. Strong psychological distress is related to psychopathological symptoms (e.g. hostility, compulsivity, depression, anxiety etc.). Psychological distress may mirror problems in coping with physical strains, e.g. fear of rejection reactions or pulmonary infections. Comparison of CF patients with lung recipients suffering from other diseases shows that both groups experience similar levels of alexithymia and stress. Although there are physical and disease-related differences between CF and non-CF patients before surgery, the emotional reactions to a lung transplant in terms of alexithymia and distress appear to be similar in both groups. That lung recipients report higher values for psychological distress compared to norms is remarkable, because the majority of studies in lung transplantation have found that transplanted patients usually feel well and report a good quality of life. In some studies it has been found that these patients report the same or less depression and anxiety compared with the general population [8, 9, 38–40]. In contrast to other measures (like the Hospital Anxiety and Depression Scale, for instance), the Symptom Checklist SCL-K-9 seems to be a particularly appropriate tool to assess psychopathological symptoms after organ transplantation.

Why are most of the lung recipients alexithymic? Most probably alexithymia is caused by psychological defence mechanisms such as isolation or denial of affects in stressful or harmful situations [18–20, 41]. Previous studies have revealed that alexithymia may be induced by traumatic experiences both during childhood and later in life [42, 43]. Hence alexithymia in transplant patients may be a psychological response mechanism for coping with the stresses of the posttransplant life situation. Compared to a study in kidney recipients [24], the frequency of alexithymia in our study of lung recipients is clearly higher: in this study some half of all patients receiving kidney transplants suffered from alexithymia; in our study

89% of the lung patients showed alexithymic signs. Moreover, the mean values of TAS-20 among lung recipients in our study are higher than the mean values of heart transplant patients (51.8 vs 46.2) reported by Triffaux et al. [26]. These results show that transplant patients in general suffer from alexithymia, but the values among lung recipients seem to be particularly high. That alexithymia is stronger before a liver transplant than after [25] may indicate that liver recipients now need fewer psychological defence strategies (such as alexithymia), because their health situation is clearly improved. With respect to the cross-sectional study design, we can only assume that after transplantation the majority of lung recipients remain alexithymic, because some of their health risks – such as pulmonary infections or BOS – continue highly stressful. Future prospective studies should investigate the pre-/posttransplant development of alexithymia in lung patients especially. Further, more psychologically subtle studies are needed to answer the question whether patients after lung transplantation would feel themselves more threatened or more involved in medical procedures than other transplant patients, and may therefore be more prone to react towards these strains with alexithymia.

Associations between distress/alexithymia, BOS and comorbidity

In this study significant positive correlations were found between distress and current BOS, but not between alexithymia and BOS. Theoretically two types of interaction between distress and BOS are possible: (1) patients affected with BOS are more likely to react with distress, and patients' awareness that they are suffering from BOS may provoke distress independently of current physical parameters such as FEV_1 or eNO; (2) patients affected with distress may be more prone to nonadherence, which in turn may result in chronic rejection [cf. 44]. On the other hand, we found no significant correlation between distress/alexithymia and the Charlson comorbidity index. Thus, for lung recipients the functioning of their new organ seems to be more important than the strains of accompanying diseases or drug side effects (= comorbidities).

The bivariate analysis regarding distress and the development of BOS one year after the questionnaire survey underline this association between distress and BOS: The results show that distress is significantly correlated with BOS one year later (T1), but not alexithymia or further sociodemographic or physical variables such as age, time since transplant and diagnosis of cystic fibrosis. One explanation could be that distressed patients are not doing well medically at the time of the survey, e.g. are suffering from ischaemic injury or pulmonary infections. These factors could be associated with increased distress at the time of the survey as well as with the development of BOS one year later. Nevertheless, there is no indication that alexithymia is associated with the patient's current health status or may predict a future rejection reaction (BOS). Instead, it is probably the overall physical or psychosocial strain experienced by the patient after lung transplantation, rather than the immediate lung function status, including BOS, which reinforces alexithymia in lung recipients; in other words, alexithymia does not appear to be a psychosomatic risk factor for the development of BOS.

As for the limitations of the study, it must be borne in mind that its explanatory power is restricted by its cross-sectional nature at the time of the questionnaire survey. Further, the correlation between distress and BOS is rather weak. The results are limited by the relatively small sample of lung recipients studied. Also, the small sample size does not allow advanced analyses with multivariate methods. In this context there is a lack of clear causality regarding the connection between distress and the later development of BOS. The hypothesis that distress may predict BOS should therefore be tested in larger samples, assessing the patients – as far as possible – at the same time posttransplant.

Implications for psychosocial treatment and further research

The results of our study show that alexithymia and distress are typical reactions after lung transplantation. Furthermore, psychological distress may contribute to the development of a chronic rejection reaction (BOS). Consequently, psychosocial treatment should identify the main psychological sources of distress after lung transplantation, which may be related partly to transplant-specific stress and partly to general psychological problems aggravated by transplant experiences. The importance of this psychosocial treatment is highlighted by the finding that distress may contribute to the development of a chronic rejection reaction. Regarding alexithymia, it is well-known that stressful experiences during illness and eventual transplantation are coped with by defence mechanisms, and failure to process painful affects may result in psychopathology. Here it is crucial that patients learn through psychotherapy to perceive, describe and integrate these emotional equivalents. However, even if alexithymia were the result of side effects, psychosocial treatment may still help patients to process painful affects and integrate experiences related to the transplant or other areas of their lives [45, 46].

Further research should address the question whether psychological distress and alexithymia are primary or secondary in nature (i.e. toxicity- or emotion-based), or both. Studies could also include imaging methods. Prospective studies with larger samples of lung patients should investigate whether psychological distress actually contributes to the development of a chronic rejection reaction (BOS), or if it instead represents a psychological reaction to the awareness that one is suffering from BOS.

Correspondence:
Lutz Goetzmann, M.D.
Psychosocial Medicine
University Hospital Zurich
Haldenbachstrasse 18
CH-8091 Zürich, Switzerland
E-Mail: lutz.goetzmann@usz.ch

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