Journal of Psychosomatic Research 72 (2012) 427–433

Contents lists available at SciVerse ScienceDirect

Journal of Psychosomatic Research

Profiling illness perceptions to identify patients at-risk for decline in health status after heart valve replacement

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ARTICLE INFO

Article history:
Received 17 October 2011
Received in revised form 7 March 2012
Accepted 8 March 2012

Keywords:
Cardiac surgery
Cluster analysis
Heart valve disease
Illness perceptions
NYHA
Quality of life

ABSTRACT

Objective: Identification of risk factors for decline in health status by profiling illness perceptions before and one year after heart valve replacement surgery.
Methods: Prospective data from N=225 consecutively admitted first time valve replacement patients was assessed before and one year after surgery. Patients were asked about their illness perceptions (Illness Perception Questionnaire-Revised) and mood state (Hospital Anxiety and Depression Scale). Health status was defined by quality of life (Short-Form 36) and New York Heart Association (NYHA) class. Cluster analyses were conducted to identify illness perception profiles over time. Predictors of health status after surgery were analyzed with multivariate methods.
Results: Patients were grouped according to the stability and nature (positive, negative) of their illness perception profile over one year. One year after surgery patients holding a negative illness perception profile showed a lower physical quality of life and were diagnosed in a higher New York Heart Association class than patients changing to positive and patients with stable positive illness perceptions ($P<.001$). Over and above biological determinants, post-surgery physical quality of life and NYHA class were both predicted by pre-surgery illness perception profiles ($P<.05$).
Conclusion: Patients going for heart valve replacement surgery can be easily categorized into illness perception profiles that predict health status one year after surgery. These patients could benefit from early screening as negative illness perceptions are modifiable risk factors.

Introduction

Valve replacement surgery has become a safe procedure to decrease mortality in patients with heart valve disease [1]. Recent studies have shown that patients also benefit from an enhanced functional health status after surgery [2–5]. Cardiac factors such as the preoperative etiology or a reduction in the heart's function as a pump, as measured by the left ventricular ejection fraction, predict mortality [6]. However, patient's post operative health status is better reflected by functional measures, such as walking distance, quality of life and the New York Heart Association functional classification [7,8]. Ideally, patients should receive an accurate prognosis about their likely functional health status after surgery. Moreover, patients being at-risk for a poor functional outcome after surgery should be identified and offered treatment [9]. Therefore, exploring risk factors for decline in functional health status after valve replacement surgery is crucial.

Illness perceptions in cardiac diseases

As the physical, psychological and social characteristics of cardiac patients vary widely, the investigation of risk factors across all patients is challenging [10]. A valuable approach that can be applied to all patients focuses on the perceptions and beliefs, which patients develop about their cardiac disease [11]. According to the Common-Sense Model of illness representation [12] patients make sense of their symptoms by forming causal attributions about the illness, how long they think it will last, if it can be controlled or cured, and what consequences symptoms will have. Various studies in the past two decades have shown that cardiac patients develop a wide range of illness perceptions [13–15] and that these perceptions are associated with disease-related disability [16,17], adherence to medication [18] and recovery [19,20].

In terms of heart valve disease, Rimington and colleagues [7] found that, one year after valve replacement surgery, patients showed an improved walking distance but still reported a reduced physical quality of life. Whereas walking distance was only weakly correlated with preoperative cardiac functions (i.e. left ventricular systolic and diastolic function), it was independently associated with patients' perceptions of control over their condition. Furthermore, correlations

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doi:10.1016/j.jpsychores.2012.03.002

between pre-operative illness representations and post-operative quality of life were also found. These authors propose that functional health status after valve replacement surgery could be optimized by early intervention to modify negative illness perceptions. Indeed, randomized controlled trials on illness perception interventions in patients with myocardial infarction have shown that recovery can be optimized by treating negative illness perceptions [21,22]. However patients' illness perceptions may change during the course of an illness, especially after a cardiac surgery.

Yet, there is very little research examining the stability or change in illness perceptions in patients with cardiac problems [23]. Moreover, no study has examined longitudinal changes following successful surgical treatment, such as valve replacement. Since this type of surgery is usually planned in advance, it is possible to assess illness perceptions prior to surgery and again after a period of recovery. In this way, it should be possible not only to assess the extent to which patients' perceptions change as the result of surgery but also whether any such changes are related to important health outcomes, and whether pre-operative risk factors can be identified.

Profiling illness perceptions

To date, research has focussed on individual components of illness perceptions rather than their overall pattern [24]. However, profiles of illness perceptions would seem to provide a more complete picture of illness schemata which may reflect stable dispositions towards an illness and therefore, may pose a stable risk factor. In an attempt to do this, Hobro and colleagues [25] were able to categorize patients who shared similar illness perceptions about their pain-disorder. Using cluster analysis, they were able to identify two groups of pain patients, whom they referred to as illness 'adapters' and 'non-adapters'. They then used this to comment on the likely needs of these patients as a basis for identifying factors for possible pain management interventions. In a longitudinal design, cluster analysis could be used to investigate the stability of illness perception patterns and define illness perception profiles. If there are stable illness perceptions profiles, risk profiles of negative illness perceptions could be determined to detect these patients at an early stage in order to communicate associated risk and, in turn, offer tailored treatment based on patients' illness perception profile. In terms of heart valve disease, patients at-risk for decline in functional health status after surgery may be early identified before surgery.

Objectives

The purpose of this longitudinal study is to a) investigate profiles of illness perceptions before and after heart valve surgery, b) determine how much change in profiles is related to pre- and post-operative health outcomes and c) test if illness perception profiles are predictive of functional health status one year after surgery.

Methods

Sample

To estimate the sample size a power-analysis was carried out: expecting a medium effect size between two illness perception clusters (Cohen's d=.5) a sample of 180 patients was estimated to detect a significant effect (alpha=.05) with 80% power. Using multiple regression analysis to detect predictors of quality of life a sample size of 180 would allow 15 predictor variables to be used [26]. Allowing for a conservative attrition rate of 20% led to a recruitment target of 225.

351 patients were approached and invited to participate in the study. Of the 232 patients that consented, one died at home prior to admission and six did not have their valve replaced at surgery because of medical decisions. A total sample of 225 patients having their first time valve replacement at St. Thomas' Hospital between January 2003 and June 2005 were enrolled prospectively. The mean age was 67.1 (range 26 to 89) years and 155 (69%) were male. Of these, 202 patients (90%) had an aortic valve replacement and 99 (44%) had concomitant coronary artery bypass grafting. Most (n=146, 65%) received a biological and 79 patients (35%) a mechanical valve. All patients gave written informed consent as directed by St Thomas' Hospital Research Ethics Committee. All patients enrolled were studied in a consecutive manner preoperatively during their admission for surgery; 204 patients were assessed again one year after surgery as outpatients (15 died, 4 withdrew consent and 2 were lost to follow up).

Demographic and clinical variables

Relevant socio-demographic variables age, gender, years of education, working status, and social support were assessed. To determine health status New York Heart Association (NYHA) class, comorbidities, number of drugs taken, left ventricular ejection fraction and type of valve prosthesis were assessed. A six-minute-walking test (Measuremeter, Trumeter, UK) was performed to test exercise tolerance. Patients were advised that the aim was to "measure what represents a normal amount of exercise for you at the moment" and that they could change speed or pause as required; distance walked in 6 min was recorded regardless of pauses or early termination of the test. Damage to the heart was measured with transthoracic echocardiogram (ATL HDI 5000, Seattle, Washington, US or GE VingMed System Five, Horten, Norway); the left ventricular ejection fraction (LVEF) was estimated semi-quantitatively [27].

Questionnaires

Short-Form 36 (SF-36) [28]

The SF-36 is a reliable and well-validated tool to measure quality of life in multiple groups of patients and several recent studies have proven its validity in cardiovascular research. Its 36 items assess both physical and mental health, which are represented by the physical component summary score (PCS) and the mental component summary score (MCS).

Illness Perception Questionnaire — Revised (IPQ-R) [29]

The IPQ-R was developed according to the Common-Sense Model of illness representations [30]. In numerous studies with cardiac patients it has shown good psychometric properties. Patient's perceptions of illness are assessed on 8 sub-scales: *identity* (the symptoms the patient ascribes to their illness), *timeline* (perceived illness duration), *consequences* (the effects on their life), *personal control* (how much influence they feel they have), *treatment control* (how well they rate their treatment efficacy), *coherence* (how well they understand their illness), *timeline cyclical* (the extent to which their illness is perceived as cyclical or permanent) and *emotional representations* (the emotional impact of the illness). Scores on each subscale are derived by summing the responses for each item. No cut-off scores are used but low scores on control subscales and high scores on identity, timeline, consequences, timeline cyclical, coherence, and emotional representations represent negative illness perceptions. These scores are then combined into illness perception profiles using cluster analysis (see Statistical analysis).

Hospital Anxiety and Depression Scale (HADS) [31]

The HADS is a 14-item self-report measure and was developed to screen for emotional distress in medical outpatients. It has proven to be a reliable and well-validated scale in various studies [32,33]. Total scores range from 0 to 21, where a score between 0 and 7 is in the 'normal' range, a score of 11 or more indicates the presence of a moderate or severe mood disorder and a score between 8 and 10 is suggestive of a mild mood disorder.