Patients Experience High Levels of Anxiety 2 Years Following Aneurysmal Subarachnoid Hemorrhage

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Key words
- Anxiety
- Intracranial aneurysm
- Subarachnoid hemorrhage

Abbreviations and Acronyms
aSAH: Aneurysmal subarachnoid hemorrhage
BI: Barthel index
GOS: Glasgow outcome scale
HADS: Hospital anxiety and depression scales
STAI: State trait anxiety inventory
TICS: Telephone interview for cognitive status

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OBJECTIVE: **To explore anxiety levels during the first 2 years after rupture of aneurysmal subarachnoid hemorrhage.**

METHODS: **A consecutive sample of patients with aneurysmal subarachnoid hemorrhage (aSAH) (n = 88, 84.6% of eligible) from a Swedish neurosurgical clinic were followed-up with a prospective cohort design at 3 time points; 6 months, 1 year, and 2 years after the onset. Data were collected by postal questionnaires and telephone interviews: State trait anxiety inventory, Hospital anxiety and depression scales, Barthel index, Telephone interview for cognitive status, and a set of study-specific questions.**

RESULTS: **Most of the respondents scored above the State trait anxiety inventory Swedish norm value on anxiety levels at all 3 follow-up time points. About 59% (n = 52) of respondents scored above the cutoff value for clinical significant level of anxiety in at least 1 time point during the first 2 years after rupture of aSAH. There were no significant differences in levels of anxiety versus the observational period and the 3 follow-up time points. The most significant explanatory variable to high levels of anxiety at all 3 follow-up time points was low perceived recovery.**

CONCLUSIONS: **Levels of anxiety remained high and stable throughout the first 2 years after rupture of aSAH. High levels of anxiety may reduce health-related quality of life substantially. Identification of individuals with high levels of anxiety and supportive care could therefore potentially improve long-term outcome.**

INTRODUCTION

Subarachnoid hemorrhage accounts for up to 7% of all strokes (8), in most cases of spontaneous hemorrhages the cause is a ruptured aneurysm. Data show that health-related quality of life in survivors after rupture of aneurysmal subarachnoid hemorrhage (aSAH) is affected, and symptoms of anxiety or depression are significantly worse when compared with reference populations during the first year of recovery (34, 35), and even up to 10 years after aSAH (48). Anxiety and depression are common neuropsychiatric outcomes after all types of stroke. The cause is not known—no clear relation to location of brain lesions have been found (10), and it has been debated in the literature whether anxiety and depression after stroke are reactions to life changes or if it is an organic result of biochemical changes from neurological damage (46).

The proportion of patients suffering from anxiety and depression after aSAH differs considerably between studies and range between 11% and 38% for anxiety symptoms, and 9% and 23% for depression symptoms (21, 22, 30, 44, 47). Longitudinal studies are scarce, and report conflicting results. Powell et al. (31, 32) reported significantly more anxiety and depression in patients with aSAH when compared with matched healthy controls at 3, 9, and 18 months after the onset. Hellawell et al. (12) followed patients 6, 12, and 24 months after aSAH and found anxiety and depression symptoms similar to that of the general population. Elevated anxiety levels have been found in patients with aSAH living with an unsecured aneurysm, and more symptoms of depression have been associated with low neurological outcome (22). Predictors for good mental health after aSAH have been found to be male gender and absence of physical symptoms (19).

When assessing anxiety in the general population, it tends to be lower in ages more than 50 years old in employed men and women, when compared with younger colleagues in the population (37). The proportion of individuals in the general population reporting anxiety symptoms have been estimated to be approximately 20%, and 15% reports symptoms of depression (25).

The primary objective of this study was to explore anxiety levels during the first 2 years after rupture of aSAH.

METHODS

A prospective cohort design was used, with 3 follow-up time points: 6 months, 1 year, and 2 years after the aneurysm rupture.

Sample Population

Patients were identified from the database for admitted patients at Karolinska University hospital in Stockholm, Sweden. All

consecutive patients acutely admitted for intracranial aneurysm rupture from March 2006 to September 2007 were considered for enrolment. Inclusion criteria were: 1) Swedish citizenship to enable follow-up, 2) a sufficient health condition allowing participation (Glasgow outcome scale [GOS] >2 at hospital discharge), and 3) able to communicate in Swedish. The results presented in this article are part of a larger study; patient experiences during the first 2 years are described elsewhere (49).

Data Collection

A request of study participation, study information, and self-reported questionnaires were sent to the participants' homes approximately 6 months after hospitalization for aneurysm rupture. When questionnaires were returned, a structured telephone interview was conducted for collecting data on activities of daily living and cognitive status, and to collect any missing data. The same procedure was repeated 1 and 2 years after the rupture. Demographic data and clinical variables, such as neurological grade at admission graded into Hunt & Hess classification (14), GOS (15) at discharge, and aneurysm treatment, were retrospectively collected from patient records.

Measures

Levels of anxiety were assessed with State trait anxiety inventory (STAI). The STAI measures state and trait anxiety on two different scales (29). In the present study the STAI state scale was used. The STAI state scale consists of 20 statements, which encourages respondents to describe how they feel at the time of completion of the questionnaire, by rating on a 4-point scale: not at all, somewhat, moderately, and very much. The STAI state scores range from 20 to 80; higher scores indicate higher levels of anxiety (37). The Swedish norm mean value for STAI state is 33.2 (9). A cutoff score of 39/40 has previously been used to detect clinically significant symptoms of state anxiety (23). Construct validity of the STAI has been evaluated in different populations, showing higher mean values in stressful situations compared with nonstressful situations (37).

Hospital anxiety and depression scales (HADS) includes 14-item statements to detect states of anxiety and depression. The statements are divided into 2 subscales: 1 for anxiety (HADS-A) and 1 for depression (HADS-D) (52). Each subscale score ranges from 0 to 21. Scores $\geq$8 identify mild cases, scores 11–15 identify moderate cases, and scores $\geq$16 identify severe cases (36). HADS has been proven to be a valid and reliable instrument for anxiety and depression in patients with both somatic and mental problems (3, 13, 38) and in stroke patients in several studies (16). HADS has previously been used after aSAH (22, 44, 47).

Cognitive function was evaluated using the Telephone interview for cognitive status (TICS) (4). The TICS is an 11-item interview that evaluates orientation, attention, verbal memory, long-term memory, motor function, and language. The maximum score is 41 and scores below 31 indicate cognitive impairment (4). TICS has been shown to be a valid and reliable instrument to detect dementia after stroke (2, 7) and has previously been used for cognitive assessment after aSAH (20, 27).

Mobility and activities of daily living was assessed using Barthel index (BI) (26). BI consists of 10 variables, the sum of the scores range from 0 to 100. A higher score is associated with a greater likelihood for ability to live independently at home (26).

A set of study-specific questions was also used. Comorbidity at follow-up was based on the question "Do you suffer from, or have symptoms of, any other medical condition, except for the aneurysm rupture, yes or no?" and "If yes, please describe." Reported comorbidities were categorized into International Classification of Diseases categories (45). Perceived recovery was rated on a 4-point scale: not at all, partly, mostly, and fully recovered. To investigate social support from close family, a question on family situation was also included: "Which is your current family situation, married, cohabiting, or living alone?"

Ethical Considerations

A signed informed consent was obtained from each participant. In the study information voluntary participation was emphasized and confidentiality was guaranteed. The participants were informed that their decision whether to participate or not, or interrupt participation, would not affect their future care. The Regional Ethics Committee, Stockholm, Sweden, approved the study (Dnr. 2006/283-31/3).

Data Analysis

To analyze eventual differences between nonresponders and responders included in the study, independent samples *t*-test (age at rupture) and χ^2 tests (sex, aneurysm treatment clipping/coiling, aneurysm location anterior/posterior circulation) were used. In normally distributed data (STAI, TICS) differences in mean values between follow-up time points were analyzed with repeated measures one-way analysis of variance. Friedman's 2-way analysis by ranks was used to analyze differences between follow-up time points in nonparametric data (HADS total and subscales, BI). To further study level of anxiety measured with STAI, subgroup comparisons were made, using independent samples *t*-test. Men and women were compared, as well as respondents differing in age. Respondents aged 15 to 50 years were compared with those aged 51 to 89 years. Respondents were also compared for occurrence of comorbidities (with comorbidities vs. without comorbidities), Hunt & Hess grade (grade I–III vs. grade IV–V), aneurysm treatment (clipping vs. endovascular treatment), and occurrence of unsecured aneurysm (all aneurysms occluded vs. any unsecured aneurysm).

Stepwise multiple regression analysis was used to explore how STAI varied with sex, age, aneurysm location (anterior/posterior circulation), neurological grade (Hunt & Hess), neurological outcome (GOS), aneurysm treatment, comorbidity, unsecured aneurysm, cognitive function (TICS), functional status (BI), social support, and perceived recovery. All explanatory variables were entered as dummy variables (0/1).

Internal consistency of STAI, HADS total, and HADS subscales, was tested with Cronbach alpha. Statistical analyses were performed with SPSS version 15 (SPSS Inc., Chicago, USA). The level of significance was set at $P < 0.05$.

RESULTS

General Characteristics of Sample Population

Characteristics of the sample population are presented in Table 1. Figure 1 shows a flow chart of the data collection for all 3 follow-up time points. There were no