J Rehabil Med 2004; 36: 63–69

POSSIBLE INTERPRETATION OF SUBJECTIVE COMPLAINTS IN PATIENTS WITH SPONTANEOUS SUBARACHNOID HAEMORRHAGE

Aaro Toomela,[1] Aleksander Pulver,[2] Tiiu Tomberg,[3] Anu Orasson,[3] Arvo Tikk[3] and Toomas Asser[3]

From the [1]Departments of Special Education, University of Tartu, [2]Department of Psychology, Tallinn Pedagogical University and [3]Department of Neurology and Neurosurgery, University of Tartu, Estonia

Objective: **To analyse factors related to subjective non-cognitive and cognitive complaints in patients with spontaneous subarachnoid haemorrhage.**

Subjects: **Twenty-seven patients with subarachnoid haemorrhage and 27 age-, sex- and education-matched healthy controls.**

Methods: **A battery of cognitive tests measuring visuo-spatial abilities, verbal abilities, and fine-motor skill, Brief Social Support Questionnaire, and Life Orientation Scale were individually presented to all participants.**

Results: **Cognitive complaints were related to low social support but not to cognitive performance. Complaints about headaches and dizziness were also related to decreased cognitive performance. Above-normal optimistic life-orientation was related to the absence of complaints in patients with subarachnoid haemorrhage. Healthy participants were best discriminated from patients with subarachnoid haemorrhage by less satisfactory social support system and decreased fine motor skills in the latter group.**

Conclusion: **Change in social support network may be an important resource for increasing quality of life in patients with subarachnoid haemorrhage not only through help provided by supporters but also indirectly, through increasing subjective well-being. The absence of subjective complaints in patients with subarachnoid haemorrhage is not necessarily related to better objective condition but rather to inadequately optimistic life orientation.**

Key words: subarachnoid haemorrhage, complaints, social support, life orientation.

J Rehabil Med 2004; 36: 63–69

Correspondence address: Aaro Toomela, University of Tartu, Department of Special Education/School of Teacher Education, Salme 1a, EE-50103 Tartu, Estonia. E-mail: aaro.toomela@ut.ee

Submitted May 22, 2002; Accepted August 11, 2003

INTRODUCTION

Neurologists, clinical neuropsychologists and other professionals often rely on patient self-report when making decisions about diagnosis and treatment. Assumption that patient report of cognitive status and cognitive change can be relied upon when malingering can be ruled out is called a myth by Dodrill (1), however. Indeed, many studies have shown that patient reports about their status cannot be taken literally. Findings in adult lymphoma patients (2), in patients after cardiopulmonary bypass (3), in multiple sclerosis (4, 5), in Lyme borreliosis patients (6), in patients with epilepsy (1, 7, 8), in Persian Gulf War veterans (9), in elderly individuals (10, 11) and HIV-infection patients (12) have demonstrated that a relationship between cognitive complaints and other psychological factors is not universal. In some groups cognitive complaints can be related to objective difficulties in cognitive performance, in other groups cognitive complaints are related to affective *and* cognitive problems, and sometimes cognitive complaints are related only to affective factors. It is important, however, that subjective complaints in most studies indicate some problems in patients, but that the problems are not necessarily those reported by them. Thus, the reason why patients complain should be established separately in every case.

In this study relationships of subjective complaints with several other factors in patients with subarachnoid haemorrhage (SAH) were studied. It has been demonstrated that SAH is associated with problems in different domains of functioning. First, in majority of patients decrease in cognitive performance (memory, attention, executive functions) has been observed (13–17). Second, SAH is related to affective problems (depression, anxiety, increased emotional lability) (13, 14, 16, 18). Third, social insecurity and decline in familial and social functioning has been observed both in patients with SAH (13, 16, 19) and their relatives or partners (20). Finally, as with other groups of patients, in SAH subjective cognitive complaints do not correlate very well with objective cognitive performance. Objective cognitive performance is much lower than subjective performance (14).

In sum, SAH is associated with cognitive and emotional problems. In addition, social functioning is impaired. All these 3 domains may be related to subjective complaints. In our study on subjective complaints in patients with SAH novel aspects were taken into account. First, cognitive and non-cognitive subjective complaints were reported. Second, as complaints on memory or attention may actually be related to problems in other cognitive areas we included in our study measures of different cognitive functions and fine-motor skill. Third, instead of emotional state (depression, anxiety) we assessed optimistic or pessimistic life-orientation that, theoretically, would be more appropriate psychological construct related to inaccurate self-report. Optimistic life-orientation is related to better adaptation, buffering stress, and more effective coping styles (21–24). Finally, we

 ISSN 1650–1977
DOI 10.1080/16501970310017414

directly measured social support and satisfaction with social support (25, 26), as factors that may also be related to inaccuracies in self-reports.

METHOD

Participants

Fifty-four persons participated in the study. Twenty-seven were patients (12 men, 15 women; mean age 46.7 years, SD = 12.64, range 24–68 years) admitted to the Departments of Neurology and Neurosurgery at the Tartu University Hospital in 1995, who survived SAH and agreed to participate in the study. Diagnosis of SAH was based on clinical course, results of computerized tomography and lumbar puncture, if needed. Only those patients who had primary SAH from a ruptured arterial or arteriovenous aneurysm or non-aneurysmal perimesencephalic haemorrhage were included in this study. The outcome was graded according to the Glasgow Outcome Scale (27) in the following categories: good recovery (patients with no or mild neurological symptoms, who can continue one's previous activity); moderate disability (patients with moderate neurological deficiency, which restrict their activity, but can function independently); severe disability (patients with severe neurological deficiency, who cannot function independently). The outcome assessment revealed a good recovery in 21 patients (78%), 5 patients (18%) suffered from moderate disability and 1 patient (4%) had severe disability. Five patients had primary education, 17 patients had secondary education, and 5 patients had a university degree. The time interval between SAH and assessment varied between 4 and 43 months (mean = 15.8, SD = 11.4). It is noteworthy that the patients in this study may be younger, better educated, and have less neurological deficits than ordinary SAH patients. It might be possible that older and less educated patients with more severe neurological deficit were not motivated to participate in this study.

The control group comprised 27 age- (±5%), sex- and education- (primary education-secondary education-university degree) matched healthy persons without signs of brain damage and with no subjective complaints, which were estimated with questions with "yes" or "no" answers, on headache, dizziness, absent-mindedness, or memory problems.

Procedure

All participants were tested and interviewed individually in a quiet room by a speech therapist who was not aware of the research question. In the beginning of a session participants were shortly interviewed about their current status and subjective complaints. After that cognitive tests were presented in a random order. In the end of the session participants were instructed how to complete the social support and optimism inventories. The inventories were given to participants. Healthy participants completed and returned inventories immediately after the session. The participants with SAH completed and returned inventories either immediately after the session or completed the inventories at home and returned them by post.

Subjective complaints. All participants were asked to answer "yes" or "no" to the following questions: "Have you had headaches during last month?"; "Have you felt dizziness during last month?"; "Have you been excessively absent-minded last month?"; "Have you had memory problems during last month?"

A note should be made in respect of the complaint on dizziness. In original we used a word "*pearinglus*", which literally translated means "head-going in circles". "*Pearinglus*" is a word that can be translated in both ways, as "vertigo" and as "dizziness"; we used the latter version but it is important to remember that there is no difference between "vertigo" and "dizziness" for a lay-person. At the same time, the word has a clear meaning for a person.

Glasgow Outcome Scale. Outcome was graded according to the Glasgow Outcome Scale (27). A score 5 was assigned to good recovery category, a score 4 to moderate disability and a score 3 to severe disability. A score 5 was also assigned to all healthy participants.

Cognitive tests. Cognitive tests comprised tests for visual-spatial processing, fine-motor skills, verbally guided attention, picture-naming vocabulary and short-term verbal memory.

Mental rotation ability was measured by 3 tests. *Moomies test*, *Parallelogram test* and *Hands test* were presented to participants. Moomies test comprised 6 line drawings of a comics figure Moomie in upright position. Every drawing was presented to a participant together with 3 rotated (45° to 270°) Moomie figures. Participants were asked to indicate which of the 3 rotated figures corresponds to the target figure. Number of correct answers was recorded. Parallelogram test and Hands test were adapted from Luria (28, p. 371). In the Parallelogram test an empty parallelogram was presented to participants together with a rotated parallelogram with a small circle in one corner. A participant was asked to indicate where in the empty parallelogram the circle should be drawn to get identical images. The number of correct answers in 5 trials was recorded. In the Hands test, 6 line drawings of hands (3 left and 3 right) were presented. A participant was asked to indicate or say which of the hands, left or right, is represented on a picture. We did not require participants to give verbal answers. It was sufficient to raise the hand that corresponded to that on the picture. The number of correct answers was recorded. For subsequent analyses *Mental Rotation* score was computed as a sum of Moomies test, Parallelogram and Hands test results.

Perceptual analysis ability was measured by the *Embedded figures task*. A line drawing, rich of details, of a house in a garden was presented to participants. Then 10 separate line drawings (5 with objects and 5 with a contour that belonged simultaneously to 2 or more objects in the complex picture) were presented one-by-one. Participants were asked to show exactly where in the complex picture the target object or contour is. Number of correct answers was recorded.

We also measured an ability to read 2-dimensional images as 3-dimensional. We designed *Block Construction* test to measure that ability. Participants were given Lego blocks of 2 different sizes and asked to build constructions presented in line drawings. There were 6 such drawings. All constructions were extended in 3 dimensions. Number of correct constructions was recorded.

Fine-motor skill was measured with 2 tasks. First, participants were given a string with a "needle" (3 mm × 70 mm) and a small box with 40 beads with a diameter of 8 mm, and were asked to thread beads on a string as quickly as they could. The number of beads a participant put on a string in 20 seconds was recorded. Second, participants were given a box with 50 conical pegs (15 mm high) that could be put one onto another to build a tower. Participants were asked to build a tower as quickly as they can. Number of pegs in the tower built in 20 seconds was recorded. Both tasks were chosen as measures of a fine-motor skill because we were interested in measuring motor performance, which is cognitively as simple as possible to avoid confounding effects from other measures. A summary score of the 2 tasks was created as a measure of fine motor skill.

Vocabulary for objects was measured by the *Picture Naming* task where a set of 25 photographs of common objects was presented to participants. Number of correctly named pictures was recorded.

Figure Finding task was used for measuring *verbally guided attention*. This task measures an ability to identify an object in the array by verbally defined characteristics. Ten cards with 16 triangles and rectangles were presented to a participant. Some of the figures had a dot beneath a figure. The figures were arranged into a 4 × 4 array. Every card had a different pattern of figures. Participants were asked to find one of the figures following a verbal definition of the figure. This task is a modified version of a task proposed by Rommetveit (29). Rommetveit defined similar figures that were arranged into 4 × 4 arrays by their shape (triangle, rectangle), colour (black, white), size (small, big) and presence/absence of a dot beneath a figure. In our study figures were defined by their shape, dot, and spatial position relative to other figures. Only 1 figure in the array corresponded to the description. For example: "Please show me a triangle with a dot beneath it which is under the rectangle without a dot beneath it." Number of correct identifications was recorded.

Verbal short-term memory was tested with 4 verbal free recall tasks. The 4 most informative lists out of 10 used by Toomela et al. (30) in a study of patients with traumatic brain injury were chosen for this study. There were 4 lists of 16 items each that were read to participants. The lists can be characterized as follows. *Relatively unrelated words*: nouns without obvious semantic or linguistic similarities (e.g. house, sun, car, hand, etc.); *Taxonomically related words*: 8 animal names and 8 names of vehicles; *Declined words*: a word "*tuba*" (room) in 8 singular and 8 corresponding plural cases (there are 14 cases in Estonian. A word may also be in a singular or in a plural form. Correspondingly, there are 28 possible forms of a word, 14 in a singular and 14 in a plural form. So, 16 from possible 28 forms of the word were included); Finally, one list was composed of 16 phonologically regular *non-words*.

The order of items in a list was randomized for all subjects (Thus, the organization principles of lists were only implicit for subjects). We used the standard instruction: "I am going to read a list of words. Listen carefully, for when I stop you are to say back as many words as you can remember. It doesn't matter in what order you repeat them. Just try to remember as many as you can (31, p. 438)."

The number of correctly recalled words was recorded. Sum of 4 scores was created to characterize *verbal short-term memory*.

Social support. Social support was assessed using the adapted Estonian version (32) of the Brief Social Support Questionnaire (SSQ) developed by Sarason et al. (25) based on a 7-item self-report measure. The SSQ yields scores for a) perceived *number of social supports* (SSQ-N) and b) *satisfaction with social supports* that are available (SSQ-S). Participants identify individuals who provide them support in difficulties, give help, emotional uplift, care, and trust. Mean ratings across relationship categories yielded summary scores for relatives and non-relatives. Social network size was calculated as the total number of all social support contacts listed. Participants were also asked about the satisfaction with social supports, the response choices varied from 1 ("not satisfied") to 6 ("very satisfied").

Life orientation. To characterize life orientation – optimistic or pessimistic – of the participants, the adapted Estonian version (33) of the Life Orientation Scale (21) with 12 statements was used. The response choices varied from 0 ("I do not agree with this") to 4 ("I totally agree with this"). The summary score of all items was calculated. The higher the score, the more optimistic life orientation characterizes the participant. The Life Orientation Scale estimates life orientation at the time of completing the scale. Thus, in patients this scale estimates life orientation after SAH.

Statistical analysis

In this study we were interested in factors associated with subjective complaints. For each complaint, participants could be divided into 3 groups: healthy participants with no complaints (H), Participants with SAH and no complaints (SAH-NC), Participants with SAH and the complaints (SAH-C). As all predictors were continuous variables and dependent variables were nominal variables, we used Discriminant Function Analysis (DFA) for discovering statistically significant predictors. DFA is used to determine which variables discriminate between 2 or more naturally occurring groups. DFA is multivariate analysis of variance reversed: in DFA the independent variables are the predictors and the dependent variables are the groups. DFA answers the question: Can a combination of variables be used to predict group membership? DFA finds a set of linear combinations of the variables, whose values are as close as possible within groups and as far apart as possible between groups. The linear combinations are called *Discriminant Functions (or Roots).* If there are 3 groups, 2 discriminant functions can be calculated. First function separates 1 group from the other 2 groups, and the second function separates the groups that were not separated by the first function. Groups are spaced along the various discriminant functions according to their mean discriminant scores (*Means of Canonical Variables*) for each group on a function. If there is a big difference between the mean discriminant scores, the discriminant function separates the groups. DFA also answers the question: Which variables contribute to the discrimination between groups? If a variable significantly contributes to the separation of groups, its removal significantly reduces the discriminatory power of the discriminant function. If there is more than 1 discriminant function, correlation between a root (i.e. discriminant function) and predictor variable tells into which root a particular variable contributes.

Similarly with Multiple Regression Analysis, DFA can be performed in different ways. In stepwise discriminant function analysis, a model of discrimination is built step-by-step. Specifically, at each step all variables are reviewed and evaluated to determine which one will contribute most to the discrimination between groups. That variable will then be included in the model, and the process starts again. The stepwise procedure is "guided" by the respective F to enter and F to remove values. The F value for a variable indicates its statistical significance in the discrimination between groups, that is, it is a measure of the extent to which a variable makes a unique contribution to the prediction of group membership.

DFA also produces classification functions, which can be used to determine to which group each case most likely belongs. The better predictor variables discriminate between groups the better the observed classification of cases corresponds to the classification predicted by classification functions. Analysis of predicted classifications allows better understanding of which groups are better separated by DFA and which groups are not.

RESULTS

We conducted 4 Forward Stepwise Discriminant Function Analyses, 1 for each complaint. A non-conservative F-to-enter value 1 was used for reducing the risk of missing interesting variables due to chance-effects of order of entry (34). It should be mentioned that groupings in different analyses were partly overlapping: Healthy persons were always in the same group. In addition, depending on the number of complaints, one participant with SAH could belong to both the No Complaint or Complaint group. Nevertheless, participants with SAH belonged into different SAH groups in many cases because of the number of complaints: all 4 complaints were found only in 2 patients, 1 patient had 3 complaints, 11 patients had 2 complaints, 6 patients had 1 complaint, and 7 patients did not have any complaints.

Mean scores of predictors for each group are described in Table I. Statistically significant predictors for each analysis are described in Table II.

Dizziness

Two discriminant functions were calculated. The first Root separated statistically significantly H-group from SAH-NC group, with SAH-C group falling between these 2 groups (Wilks' Lambda = 0.30, $\chi^2_{(14)} = 58.58$, $p < 0.0001$, Means of Canonical Variables were −0.91, 1.27 and 0.18 for H, SAH-NC and SAH-C groups, respectively). The second Root separated statistically significantly SAH-C from SAH-NC group, with H group falling between these 2 groups (Wilks' Lambda = 0.60, $\chi^2_{(6)} = 24.83$, $p < 0.0004$, Means of Canonical Variables were–0.30, −0.45 and 1.78 for H, SAH-NC and SAH-C groups, respectively).

Overall 76% of the participants were correctly classified. 15% of healthy participants were incorrectly classified as SAH patients and 26% of SAH patients were incorrectly classified as healthy. In addition, 78% of SAH-NC patients and 44% of SAH-C patients were correctly classified into respective groups. Analysis of discriminant functions together with characteristics of predictors, described in Table I and Table II, determines which role predictors have in discriminating between groups. SAH patients, compared with the H-group, are characterized by relatively low scores on Figure finding task. Relatively high scores on Life-orientation scale characterize SAH-NC group. SAH-C group is characterized by relatively low scores on Figure

Table I. *Mean scores (SD in parentheses) of predictors for each group*

Predictor	Healthy, no complaints (n = 27)	Subarachnoid haemorrhage: Dizziness No (n = 18)	Dizziness Yes (n = 9)	Headache No (n = 20)	Headache Yes (n = 7)	Memory problems No (n = 14)	Memory problems Yes (n = 13)	Absentmindedness No (n = 17)	Absentmindedness Yes (n = 10)
GOS	5.0 (0)	4.7 (0.6)	4.9 (0.3)	4.7 (0.6)	4.7 (0.4)	4.8 (0.6)	4.7 (0.5)	4.8 (0.6)	4.7 (0.5)
Mental rotation	14.4 (1.7)	13.3 (2.1)	12.9 (2.3)	13.0 (2.1)	13.7 (2.4)	13.2 (1.9)	13.2 (2.5)	13.8 (1.7)	12.1 (2.4)
Embedded figures	8.0 (1.4)	7.2 (1.9)	6.6 (2.5)	7.0 (2.0)	7.0 (2.7)	6.9 (2.3)	7.1 (2.0)	7.5 (1.9)	6.2 (2.3)
Block construction	5.4 (.8)	5.0 (1.0)	4.6 (1.0)	4.9 (1.0)	4.7 (1.1)	4.9 (.9)	4.9 (1.1)	5.1 (.9)	4.4 (1.1)
Fine-motor skill	26.8 (3.5)	21.9 (4.0)	23.1 (4.5)	21.7 (4.2)	24.1 (3.4)	22.3 (3.4)	22.4 (4.9)	23.7 (2.7)	20.1 (5.2)
Picture naming	24.5 (0.9)	23.9 (1.1)	23.8 (1.0)	24.1 (.9)	23.3 (1.3)	23.9 (1.0)	23.9 (1.1)	23.9 (1.1)	23.8 (.9)
Figure finding	10.0 (0)	9.4 (0.8)	8.4 (1.7)	9.1 (1.3)	9.1 (1.2)	9.1 (1.5)	9.1 (0.9)	9.4 (0.9)	8.7 (1.6)
Verbal short-term memory	29.0 (7.0)	23.8 (5.8)	24.6 (7.3)	24.3 (5.9)	23.6 (7.5)	25.4 (6.3)	22.6 (6.1)	26.1 (5.6)	20.7 (6.1)
Social support (SS)	24.4 (9.2)	24.1 (8.7)	29.9(10.8)	27.1 (9.8)	23.0 (9.5)	29.6 (11.0)	22.2 (6.5)	29.7 (9.1)	19.8 (7.6)
Satisfaction with SS	35.3 (2.8)	32.4 (4.2)	33.0 (4.3)	32.4 (4.5)	33.1 (3.1)	34.5 (4.1)	30.5 (3.2)	34.1 (3.8)	30.0 (3.5)
Life orientation	19.3 (4.4)	22.6 (4.0)	17.9 (4.7)	22.3 (4.2)	17.4 (4.5)	22.2 (6.3)	19.7 (5.2)	22.0 (4.9)	19.3 (4.1)

GOS: Glasgow outcome score

finding task and Life-orientation scale, and relatively high score on Social support scale.

Headache

Two discriminant functions were calculated. The first Root separated statistically significantly SAH-NC from H group, with SAH-C group falling between these 2 groups (Wilks' Lambda = 0.29, $\chi^2_{(16)} = 58.87$, $p < 0.0001$, Means of Canonical Variables were −1.03, 1.58 and −0.55 for H, SAH-NC and SAH-C groups, respectively). The second Root separated statistically almost significantly SAH-C from other groups (Wilks' Lambda = 0.75, $\chi^2_{(7)} = 13.85$, $p < 0.054$, Means of Canonical Variables were −0.31, −0.09 and 1.44 for H, SAH-NC and SAH-C groups, respectively).

Overall, 81% of the participants were correctly classified. 15% of healthy participants were incorrectly classified as SAH patients and 19% of SAH patients were incorrectly classified as healthy. In addition, 90% of SAH-NC patients and 43% of SAH-C patients were correctly classified into respective groups. Analysis of discriminant functions together with characteristics of predictors, described in Table I and Table II, suggests that SAH-NC group is characterized by relatively low scores on Mental rotation, and relatively high scores on Life-orientation scale and Social support (even though correlation of the latter measure with the Canonical Root is very low). SAH-C group, in turn, is characterized by relatively low scores on Picture naming task and Life-orientation scale.

Memory problems

Two discriminant functions were calculated. The first Root separated statistically significantly H group from SAH-NC, with SAH-C group falling between these 2 groups (Wilks' Lambda = 0.39, $\chi^2_{(12)} = 46.01$, $p < 0.0001$, Means of Canonical Variables were 0.95, −1.13 and −0.76 for H, SAH-NC and SAH-C groups, respectively). The second Root separated statistically significantly SAH-C from SAH-NC group, with H group falling between these 2 groups (Wilks' Lambda = 0.76, $\chi^2_{(5)} = 13.06$, $p < 0.023$, Means of Canonical Variables were −0.07, −0.66 and 0.86 for H, SAH-NC and SAH-C groups, respectively).

Overall 76% of the participants were correctly classified. 11% of healthy participants were incorrectly classified as SAH patients and 15% of SAH patients were incorrectly classified as healthy. In addition, 71% of SAH-NC patients and 54% of SAH-C patients were correctly classified into respective groups. Analysis of discriminant functions together with characteristics of predictors, described in Table I and Table II, suggests that H group is characterized by relatively high scores on Fine motor skill task. SAH-NC is characterized by high scores on Life-orientation scale. SAH-C group, in turn, is characterized by relatively low scores on Satisfaction with social support scale and Social support scale.

Absentmindedness

Two discriminant functions were calculated. The first Root

Table II. *Results of discriminant function analysis. Statistically significant predictors for each group and correlations between predictors and canonical roots for each root*

			Correlations variables – canonical roots (Pooled-within-groups correlations)[1]	
Predictor	F-remove (2,46)	*p*	Root 1	Root 2
Dizziness				
Figure finding task	8.58	<0.001*	**−0.37**	**−0.74**
Life-orientation	7.39	<0.002*	**0.32**	**−0.33**
Social support (SS)	3.23	<0.049	0.01	0.28
Headache				
Life-orientation	9.65	<0.001*	0.29	**−0.33**
Picture naming	4.76	<0.014	−0.12	**−0.71**
SS	4.74	<0.014	0.12	−0.12
Mental rotation	3.95	<0.027	−0.26	−0.12
Memory problems				
Satisfaction with SS	5.40	<0.008	**0.36**	**−0.89**
Life-orientation	5.24	<0.009	−0.22	**−0.32**
Fine-motor skill	3.88	<0.028	**0.60**	−0.13
SS	3.42	<0.042	−0.13	**−0.51**
Absentmindedness				
Life-orientation	4.49	<0.017	−0.10	**−0.48**
Satisfaction with SS	4.29	<0.020	**0.50**	**−0.50**
Fine-motor skill	4.14	<0.023	**0.66**	−0.21

[1] Correlations between Predictors and Canonical Roots >0.3 (marked bold) are eligible for interpretation (cf. Ref. 34, p. 540).
* Significant with Bonferroni's adjustment for avoiding the risk of mass significance (*p*-value is adjusted with the number of predictors, 11).

separated group H statistically significantly from SAH-C group, with SAH-NC group falling between these 2 groups (Wilks' Lambda = 0.35, $\chi^2_{(12)} = 50.26$, $p < 0.0001$, Means of Canonical Variables were 0.99, −0.61 and −1.63 for H, SAH-NC and SAH-C groups, respectively). The second Root separated SAH-C from SAH-NC group, with group H falling between these 2 groups (Wilks' Lambda = 0.77, $\chi^2_{(5)} = 12.85$, $p < 0.025$, Means of Canonical Variables were 0.18, −0.73 and 0.75 for H, SAH-NC and SAH-C groups, respectively).

Overall 80% of the participants were correctly classified. Fifteen percent of healthy participants were incorrectly classified as SAH patients and 15% of SAH patients were incorrectly classified as healthy. In addition, 76% of SAH-NC patients and 70% of SAH-C patients were correctly classified into respective groups. Analysis of discriminant functions together with characteristics of predictors, described in Table I and Table II, suggests that group H is characterized by relatively high scores on Fine motor skill task. SAH-NC group is characterized by high scores on Life-orientation scale. SAH-C group, in turn, is characterized by relatively low scores on Life-orientation scale, and Satisfaction with social support scale.

DISCUSSION

Our study design and methodology allowed us to determine the contribution of neuropsychological functioning, life-orientation and social support to subjective complaints in patients with SAH. Complaints of dizziness and headaches, recognition of which does not require metacognitive abilities, were in SAH patients related to decreased cognitive functioning and relatively pessimistic life-orientation. There were also differences between these complaints. Dizziness was related to decrease in verbally guided attention and relatively high level of social support, whereas headaches were related to decrease in picture naming and social support. Overlap between groups and relatively small number of participants in the Complaining group does not reliable interpretation of such differences. It can be speculated that dizziness and headaches may be related to different localizations of brain damage, as verbally guided attention is more related to frontal executive systems and picture naming to temporal-occipital systems (28, 35). That difference would also account for increased social support in patients with dizziness as patients with lesions to frontal systems may be less independent than patients with other localizations of brain damage. The possibility that dizziness reported by patients is a limbic symptom not related to frontal lobe dysfunction also cannot be ruled out. Further studies are needed for replicating the results.

Subjective cognitive complaints, in turn, were not related to objective cognitive measures at all. Complaining patients with SAH were characterized by low level of social support and low level of satisfaction with social support.

Statistically, life-orientation contributed significantly to the presence or absence of complaints. It was not pessimistic orientation that was related to all complaints but optimistic orientation that characterized SAH patients with *no complaints*. In these patients level of optimism was higher than that of healthy persons or SAH-patients with complaints. That finding is in agreement with the study of Ljunggren et al. (14) who found that in SAH patients objective cognitive performance was lower than could be expected by subjective complaints. From our data, it is not clear whether pessimistic life-orientation leads to complaints or complaints lead to pessimistic life-orientation. In either case, however, our data suggest that life orientation should be taken into account in the interpretation of subjective complaints of SAH patients.

Finally, our battery of tests and scales, that included tests for cognitive performance and fine motor skills, and inventories for social support and life-orientation, differentiated quite well between healthy persons and patients with SAH (85–89% of healthy persons were correctly classified as healthy and 74–85% of patients were correctly classified as SAH-patients in different analyses).

Alternative explanations to our findings should be taken into account. There may have been confounding variables, such as time passed after SAH, presence of epileptic fits, different types of SAH, differences in rehabilitation procedures, earlier brain injuries and other disorders, drug use and alcohol abuse, that were not taken into account in the analyses. It would require a much larger sample to enter so many variables into analysis. All such confounding variables, which may affect brain functioning, however, would also affect performance on measures of brain functioning – cognitive functioning, fine-motor skills, or life orientation – we did enter into analyses. Thus, our results do not necessarily suggest the exact reason why complaints emerge. Nevertheless, the results suggest that in case of SAH diagnosis, either because of SAH or because of SAH and problems indirectly related to SAH, subjective complaints are related to life orientation, social support, satisfaction with social support, and, with some complaints, to cognitive functioning.

The results of this study have implications for rehabilitation. First, both social support and satisfaction with social support appeared to be related to subjective complaints. It is important that social support network, differently from permanent brain damage, for example, can be changed. Thus, rehabilitation specialists should consider the possibility that change in the social support network may be an important resource for increasing quality of life in patients with SAH not only through help provided by supporters but also indirectly, through increasing subjective well-being.

We also found that absence of complaints in SAH was related to above-normal optimistic life orientation. That situation may create a complicated situation for rehabilitation specialists. On the one hand, subjectively it is much easier for patients with SAH to cope with problems related to their disease with optimistic life-orientation. On the other hand, such optimistic attitude is inadequate, patients who are satisfied with their current situation may be less motivated for active participation in rehabilitation. In any case, life orientation of SAH patients should be assessed and taken into account for understanding differences in subjective well-being of SAH patients. It may appear that absence of subjective complaints in SAH patients is not related to better objective condition but rather to inadequately optimistic life orientation.

ACKNOWLEDGMENT

This research was supported by the Estonian Science Foundation Grant No. 4444.

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