Long-Term Health-Related Quality of Life After Spontaneous Nontraumatic Subarachnoid Hemorrhage: Self and Proxy Reports in a 10-Year Period

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Key words
- Long term
- Partner
- Quality of life
- SF-12
- SF-36
- Subarachnoid hemorrhage

Abbreviations and Acronyms
BP: Bodily pain
GH: General health
MCS: Mental component summary
MH: Mental health
PCS: Physical component summary
PF: Physical functioning
PQUASCH: Proxy Questionnaire on Subarachnoid Hemorrhage
QUASCH: Questionnaire on Subarachnoid Hemorrhage
RE: Role—emotional
RP: Role—physical
SAH: Subarachnoid hemorrhage
SF: Social functioning
SF-12: Medical Outcomes Study 12-Item Short Form Health Survey
SF-36: Medical Outcomes Study 36-Item Short Form Health Survey
VT: Vitality


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BACKGROUND: **This study sought to examine health-related quality of life several years after spontaneous nontraumatic subarachnoid hemorrhage. Recent studies report impairments to be improved as far as normal levels. We question such an improvement in our own patient population over a period of 10 years.**

METHODS: **The Medical Outcomes Study 36-Item and Medical Outcomes Study 12-Item Short-Form Health Surveys on health-related quality of life were used to question 236 patients and 235 proxies. The patients were assigned to 5 groups according to the time that had elapsed since their hemorrhage: 1 year N = 22, 2 years N = 36, 5 years N = 86, 8 years N = 61, and 10 years N = 31. Analyses of variance (ANOVA, Kruskal-Wallis) and correlation (Spearman, Kendall tau) were used in an exploratory approach. Significance was established as $P \leq 0.05$.**

RESULTS: **Over a period of 10 years, health-related quality of life is found to be impaired, and is reported as such by the patients themselves and their proxies. Comparison of the mean values between the groups, ie, 1, 2, 5, and 10 years, revealed no significant differences in health-related quality of life. The calculations with a view to correlations between the group means and time since hemorrhage also produced only very weak correlations of no significance.**

CONCLUSIONS: **Health-related quality of life is impaired over a period of 10 years. Spontaneous nontraumatic subarachnoid hemorrhage should be regarded as a chronic cerebrovascular condition.**

INTRODUCTION

In medicine, the term "health-related quality of life" covers a number of criteria designed to approximate a definition. Objectives, values, and principles are encompassed by these criteria, e.g., safety and length of a lifetime, a defined level of health, the freedom to seize opportunities, or personal and social recognition. Yet health-related quality of life is also influenced by other determinants, such as the existence of economic and health-related conditions for achieving the ideals placed upon a culture or goals it has set for itself (12). Health-related quality of life is impaired after spontaneous nontraumatic subarachnoid hemorrhage (SAH) (7, 8, 14, 16). Nonaneurysmal SAH does not preclude the possibility of impaired quality of life (3). With respect to the different factors that influence health-related quality of life, often the time between the hemorrhage and the questionnaire is stated (18). So far, the disruptions to quality of life have been described as permanent (20, 21). Some domains can certainly be improved, but general limitations persist. The situation is also unaffected by an improvement in residual physical effects (9). Recent findings from a large-scale longitudinal study have revealed, however, that a patient's health-related quality of life improves after 10 years. In fact, after 12.5 years it seems to be better than in the healthy population (7).

We have studied our own patient population with a view to different quality of life parameters over a period of 10 years. Furthermore, we have examined the correlation between the progress of time and the aspects of quality of life.

PATIENTS AND METHODS

Patients

Patient data, clinical scores, and details of treatment course were documented electronically for all patients having suffered spontaneous, nontraumatic SAH between 1998 and 2008. Spontaneous nontraumatic SAH was diagnosed by computed tomography, magnetic resonance imaging, or lumbar puncture. Computed tomography angiography or digital subtraction angiography was

subsequently used to gain insight into the source of the hemorrhage. If there was no proof of aneurysm or another source of bleeding, and proof of basal hemorrhage with classic symptoms, it was assumed that nonaneurysmal, spontaneous SAH was the case. The quality of life survey included all patients who, according to our files, were still alive. The time elapsing since hemorrhage was grouped as follows: 1 year, 2 years, 5 years, 8 years, and 10 years.

Assessment of Health-Related Quality of Life

The Questionnaire on Subarachnoid Hemorrhage (QUASCH) was created for documenting health-related quality of life, the abridged form of which was issued to the patients' proxies as the Proxy Questionnaire on Subarachnoid Hemorrhage (PQUASCH). They comprised the German MOS-36/12-Item Short Form Health Survey (SF-36/SF-12) (5), questions from the Sickness Impact Profile (2), and questions we had devised ourselves. Only the standardized scores of SF-36/SF-12 were included in the calculation. The SF-36 has the following subscales: physical functioning (PF), role—physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role—emotional (RE), mental health (MH), and 2 component summaries: physical (PCS) and mental (MCS). Quality of life is expressed in dimensionless scores between 0 (worst) and 100 (best). The questionnaires were circulated together with stamped addressed envelopes. Patients and proxies should have filled out their surveys without influence by the other. If help for the patients was need, it should only have been given in a manual way.

Statistical Analyses

In an exploratory approach to discover whether the time elapsing after hemorrhage has an influence on quality of life, we used analyses of variance to compare mean values as well as calculating correlations.

Unifactorial ANOVA was used for orientation because it is relatively robust against failed normal distributions. The Fisher Least Significant Difference, Scheffé, and Bonferroni post hoc tests were included. Because failed normal distribution cannot be ruled out, ordinally scaled variables appear, and there are more than 2 groups, mean values were likewise compared using the nonparametric Kruskal-Wallis test. Based on the ANOVAs, a significant difference in the quality of life scores should be demonstrated according to the different numbers of years. Unifactorial ANOVA and the Kruskal-Wallis test demonstrate that there are significant differences in a group of mean values. The post hoc tests, either with paired comparisons of the means or subset comparisons, reveal which mean values differ significantly from one another.

The significance of the various quality of life scores (after years) gives no indication of the strength of the correlations. To this end, a rank correlation coefficient is calculated. Because of the exploratory nature of the approach, the correlation was first calculated on the basis of equidistance (Spearman). The correlations were also calculated using Kendall tau—b and c, however, because ordinally scaled, nonnormal distributed data arise from small samples. The t test was used for straightforward comparisons. Significance was established as $P \leq 0.05$. The study was conducted with the agreement of the local ethics committee.

RESULTS

Evaluable questionnaires were returned by 236 patients (QUASCH) and 235 proxies (PQUASCH); 159 (67.4%) women and 77 (32.6%) men took part, whose mean age was 50.76 (SD 12.38) and 49.51 (SD 11.91) years, respectively. In 218 (92.4%) patients, the source of the bleeding was identified as an aneurysm. No source could be identified in 18 (7.6%) patients. They were classified as having nonaneurysmal, spontaneous nontraumatic SAH. A breakdown of the clinical scores is provided in Figure 1 (4, 10, 11, 23, 24). There was no significant difference in mean age between the sexes ($P = 0.745$). The breakdown of the groups according to time is as follows: 1 year $N = 22$, 2 years $N = 36$, 5 years $N = 86$, 8 years $N = 61$, and 10 years $N = 31$.

According to the subscale and summary score, health-related quality of life was affected in 49% to 73% of the patients. The mean values of the entire patient population are presented in Figure 2, and those of the proxies in Figure 3. The patients were seen to be affected in particular in their emotional and physical roles (RE, RP), as well as social and physical functioning (SF, PF) (Figure 2). The proxies reported a greater impairment in physical rather than mental health (Figure 3).

There were no significant differences in terms of time in any of the subscales and summary scores of the patient questionnaires (Table 1). This is the case in particular in the homogeneous subsets of the post hoc tests (ANOVA). Therefore, the time elapsing since hemorrhage has no significant influence on the mean quality of life values. Quality of life is permanently impaired over the 10-year period.

The calculations for correlation prove only to be very weak ($r \leq 0.075$). The corresponding tests for significance elicit no values below the established level (Table 1). Thus no relevant relationship can be ascertained between the time since hemorrhage and changes in the quality of life scores.

The survey of the proxies also revealed no significant differences in average quality of life after a number of years. Here, the quality of life was claimed to be permanently impaired, as in the patient survey ($P \leq 0.9$). Only a minimal correlation was found between the time since hemorrhage and the quality of life scores ($r \leq -0.1$) (Table 2).

DISCUSSION

Although the treatment outcome in patients having survived a spontaneous nontraumatic SAH improved, spontaneous SAH is a condition with a high rate of mortality and morbidity (6). Even after being treated successfully, it should be viewed as a chronic cerebrovascular condition. Reports of long-term survival after spontaneous SAH are varied. In the 1990s, Mori et al. reported a cumulative probability of survival at 1 month, 6 months, and 5 years of about 86%, 79%, and 67%, respectively (17). The likelihood of survival according to Ronkainen et al. is approximately 87%, 87%, 82%, 74%, 66%, and 56% after 6 months, 1, 5, 10, 15, and 20 years, respectively. They found that compared with the normal population, the mortality rate is 4.5 times higher in all patients after SAH, and twice as high in patients with a good outcome (Glasgow Outcome Scale grade V) 12 months after