Marriage and Partnership Integrity After Aneurysmal Subarachnoid Hemorrhage: Small Alterations in Neurologic Status Matter Most

Daniel Schöni[1], Lara Lauber[1], Christian Fung[1], Johannes Goldberg[1], René Müri[2], Andreas Raabe[1], Thomas Nyffeler[2], Jürgen Beck[1]

■ OBJECTIVE: **Common sequelae of subarachnoid hemorrhage (SAH) include somatic and/or cognitive impairment. This can cause emotional stress, social tensions, and difficulties in relationships. To test our hypothesis that more severe somatic and cognitive impairments increased the likelihood of disruption of a relationship after SAH, we assessed the integrity of marriage or partnership status in a well-evaluated subset of SAH patients.**

■ METHODS: **Our sample comprised 50 SAH patients who were discharged to a neurologic, in-house rehabilitation center between 2005 and 2010. Deficits on admission to the rehabilitation center were divided into 18 categories and grouped into minor and major somatic deficits, as well as cognitive deficits. Clinical outcome scores, marital/partnership status, and duration of partnership before ictus were recorded. A follow-up questionnaire after 4.3 (2012) and 8.8 (2017) years was used to assess changes in marital/partnership status. Possible predictor parameters were estimated and included in a stepdown regression analysis.**

■ RESULTS: **In 2012, after a mean follow-up of 4.3 years, 8 of the 50 SAH patients were divorced or separated, whereas after 8.8 years only 1 additional relationship had ended. In our regression model analysis, a "short duration of relationship" before SAH and the presence of a "few minor somatic deficits" were associated with a higher likelihood of divorce or separation in the near future and remained unchanged at long-term follow-up.**

■ CONCLUSION: **Contrary to our hypothesis, neither the presence of severe somatic or cognitive deficits nor clinical evaluation scores reliably predicted divorce or separation after SAH.**

INTRODUCTION

Aneurysmal subarachnoid hemorrhage (SAH) is a life-threatening disease with an estimated case fatality rate of 8.3%–11.5%.[1-3] Although recent medical advances have led to increased survival, the percentage of SAH patients who regain independent function varies from 36% to 55%.[2,4,5] However, dependency—physical and cognitive impairment combined—persists in up to 80% of SAH patients 1 year after the incident.[4,6] Besides somatic and neurocognitive deficits, SAH patients often suffer from depression, anxiety, and loss of control over their behavior and emotions, which severely limits their quality of life, daily activities, and working capacity.[7,8] Therefore an appropriate early medical rehabilitation program with long-term family support is essential to improve the outcome after SAH or stroke.[9] However, continuous support of dependent patients might place enormous stress on the patient himself or herself, the spouse or partner, family members, and friends.

Key words
- Aneurysmal subarachnoid hemorrhage
- Divorce and separation rate
- Long-term follow-up
- Neurologic deficits
- Neuropsychologic deficits
- Partnership integrity
- Rehabilitation

Abbreviations and Acronyms
CI: Confidence interval
GOSE: Extended Glasgow Outcome Scale
mRS: Modified Rankin scale
SAH: Subarachnoid hemorrhage
SD: Standard deviation

From the Departments of [1]Neurosurgery and [2]Cognitive and Restorative Neurology, Bern University Hospital, Bern, Switzerland

To whom correspondence should be addressed: Daniel Schöni, M.D. [E-mail: daniel.schoeni@insel.ch]

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A study on traumatic brain injury patients showed that physical impairments can lead to family disruption, separation, or divorce in 20%–22% of cases 5–10 years after the injury.[10] Studies in 1997 and 1999 in SAH patients showed similar findings, where marital status and family functioning were reported unchanged roughly 2 years after the incident in about 80% of cases.[11,12] The purpose of the present study was to evaluate marital status changes in SAH patients more than 20 years later. First, we were interested to find out whether the divorce rate of SAH survivors in Switzerland is higher than average. Secondly, we wanted to assess whether more severe somatic and cognitive deficits have a greater influence on the divorce and separation rate. Clinical grading schemes such as modified Rankin scale (mRS), extended Glasgow Outcome Scale (GOSE), and demographic data points were integrated in our regression analysis to predict the integrity of family ties in the near future. To enable close clinical follow-up in this cohort, as well as precise classification of the neurologic and neuropsychologic deficits present after SAH, only SAH patients who had been treated in our in-house rehabilitation center were included in the present study.

MATERIAL AND METHODS

Our sample comprised patients who had suffered an SAH between January 2005 and December 2010 and had been transferred to an in-house, neurocognitive rehabilitation center for further treatment. Patients transferred to an external neurocognitive rehabilitation center were excluded from the study as they could not be closely followed up. To assess the recovery potential, a standardized and extended patient examination and interview were performed. The decision on admission to the in-house rehabilitation center was then taken by a consultant neurologist specially trained in neurorehabilitation. Factors such as age, clinical status, frame of mind, and rehabilitation potential were taken into account. Deficits identified during clinical evaluation on admission to the rehabilitation center were divided into 18 categories and grouped into major and minor somatic deficits and cognitive deficits (**Table 1**).[13] The mRS score at discharge was retrospectively evaluated together with the relevant demographic data, such as age at incident and date of hospital referral. A telephone interview in December 2012 included a questionnaire on the patients' clinical status to determine their GOSE score. Further questions concerned marital or partnership status and duration of marriage or partnership before SAH, as well as divorce or separation after SAH. An additional follow-up telephone interview in February 2017 inquired about marital or partnership status in the longer term. To obtain equal group distribution and allow comparison, a sex-adjusted dichotomization was performed on all explanatory variables, resulting in a stepdown regression analysis of follow-up in 2012 and 2017. The cut-offs for dichotomization of the explanatory variables are shown in **Figure 1**. For "age" the sex-adjusted dichotomization cut-off was 50 years, and for "duration of relationship" it was 20 years. Descriptive statistics (mean and standard deviation [SD]) and the stepdown regression analysis were calculated using IBM SPSS Statistics (Version 22.0, IBM Corp., Armonk, New York, USA). Graphs and tables were generated with GraphPad Prism 6 (GraphPad Software Inc., La Jolla, California, USA). Statistical significance was defined as $P < 0.05$.

Table 1. Overview of Deficit Categories, as Described by Fung et al.[13]

Somatic Deficits		
Major	**Minor**	**Cognitive Deficits**
Cranial nerve deficits		
■ Visual field deficits ■ Facial nerve palsy, etc. ■ Diplopia due to oculomotor/abducens/trochlear nerve palsy	■ Reduced trigeminal nerve function ■ Lateralized Rinne or Weber, etc. ■ Oculomotor deficits such as impaired smooth pursuit eye movements ■ Mild facial nerve palsy	■ Speech ■ Apraxia ■ Attention ■ Executive function memory ■ Visuoconstruction ■ Visual function orientation
Motor deficits		
■ M3* and weaker	■ M4* and greater	
Eating		
■ Dependently	■ Independently	
Mobility		
■ Bedridden, passive mobility	■ Walking with aid (walking cane/frame)	* Muscle strength was assessed according to the British Medical Research Council Scale.
	Reflexes	
	■ Asymmetries, pathologic reflexes/sensory deficit	

RESULTS

Of 428 patients treated for SAH between January 2005 and December 2010, 50 were transferred to the in-house rehabilitation center. The study cohort comprised 29 women and 21 men with a mean age of 52.34 years (SD ± 8.02). Patients were interviewed after a mean period of 4.3 years (2012) and 8.8 years (2017) after discharge from the rehabilitation center. Two patients were lost to the first follow-up (2012), and another 2 were lost to the second follow-up (2017) and therefore excluded from the analysis. Overall, 6 patients died during the study period. The cause of death of 4 patients was unknown, 1 died of heart failure, and 1 died of a hepatocellular carcinoma. To gather information on the patients who had died, the spouse or a close family member was interviewed. The mean duration of the relationship before SAH was 21.16 years (SD ± 10.78) with a range of 2–51 years. At the time of the first telephone interview in 2012, 40 patients (83.3%) were still married or in the same relationship and 8 patients (16.7%) were separated or divorced. In 2017, one additional male patient was