



**The Royal College of  
Surgeons of England,  
Clinical Effectiveness Unit**



**Society of British  
Neurological Surgeons**

# National Study of Subarachnoid Haemorrhage

For data collected in all 34 NSUs in the UK and Ireland  
Between 14 September 2001 to 13 September 2002

## Executive Summary and Recommendations

On behalf of the: Society British of Neurological Surgeons, The British Society of Neuroradiologists,  
Clinical Effectiveness Unit, The Royal College of Surgeons of England

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# Executive Summary

The National Study of Subarachnoid Haemorrhage collected information on patients who had a subarachnoid haemorrhage (SAH) and were admitted to a neurosurgical unit (NSU) in the UK and Ireland between 14 September 2001 and 13 September 2002. The aims of the study were to describe the characteristics of patients, the care given to them in an NSU and their outcome at six months, as well as to investigate the factors that influence outcome.

## *Background*

SAH is a type of haemorrhagic stroke caused by bleeding in the subarachnoid space around the brain. The incidence of SAH in the UK is approximately 8 per 100,000 population. SAH is most often caused by a rupture of a cerebral aneurysm (70%), which causes blood to leak into the subarachnoid space around the brain. Arteriovenous malformations are another relatively frequent cause of SAH (10%). A traumatic head injury can also lead to SAH. In most of the remaining patients, the cause of SAH is unknown. All patients with SAH, except those with a traumatic head injury, were eligible for inclusion in this study. However, only patients with a confirmed aneurysm form the focus of this study. Patients in whom the SAH had a different aetiology or those in whom an aneurysm could not be confirmed were excluded.

## *Patients included in the study*

All 34 NSUs in the UK and Ireland participated in the study. 3174 patients were included. Of these patients, 2397 (76%) had a confirmed aneurysm and 56 (2%) had an arteriovenous malformation. The presence of an aneurysm was not confirmed in a further 718 (22.6%). This was due to a negative angiography in 486 (15.1%) patients and in 232 (8%), patients, investigations to identify vascular pathology were not performed due to early death or a poor physical condition of the patients.

## *Characteristics of patients with confirmed aneurysms*

The median age of the 2397 patients with a confirmed aneurysm was 52 years. 66% of them were women. A large proportion of the patients (79%) were considered to be in good neurological condition at admission. CT scans demonstrated only a small amount (or no blood) in the subarachnoid space in 37% of patients, a medium amount in 32%, and a large amount in 31%. The majority of aneurysms were considered small (i.e., less than 10mm), 70% and were anterior circulation aneurysms (89%). 44% of patients had a concurrent medical condition such as hypertension (22%) or ischemic heart disease (6%).

## *Mode and timing of repair procedure*

Of the 2397 patients, active repair was attempted in 2,198 patients with a confirmed aneurysm (92%). 1,269 (53%) were treated by surgical clipping and 905 (38%) by endovascular coiling. A further 24 patients underwent another type of repair (e.g., wrapping of aneurysm with muslin, depositing onyx glue in the aneurysm) and 199 patients (8%) received no repair.

The proportion of patients who underwent coiling increased over the study period. This increase was most likely to be due to the dissemination of results from the International Subarachnoid Aneurysm Trial (ISAT). ISAT is a multicentre randomised trial that compared the efficacy and safety of endovascular coiling with surgical clipping in SAH patients. Recruitment to ISAT halted early after planned interim analysis showed an absolute difference of 7% in the proportion of patients who were dependent or dead 1 year after SAH in favour of coiling (24% for coiled and 31% for clipped). In our study, the proportion of patients coiled increased by 17%, from 37.2% of the 1752 patients treated before ISAT stopped recruitment (May 2002) to 53.8% of the 645 patients repaired after ISAT stopped recruitment.

Of the 2198 patients who underwent a repair procedure, 32% were treated within 2 days of the haemorrhage, a further 39% between 3 and 7 days, 10.4% between 8 to 10 days and a further 18% after 10 days. Patients who were treated with coiling were discharged earlier than patients who were treated with clipping (median length of stay 15 days and 18 days, respectively).

In 528 of the 2397 patients with a confirmed aneurysm (22%), there was a deterioration of neurological condition before any repair was carried out. In 188 patients deterioration led to a delay of the repair procedure (8%), and in 130, to a cancellation (5%). Of the 2198 patients who underwent a repair, 711 (32%) suffered deterioration after the procedure, most commonly as a result of cerebral ischaemia 485 (22%). Patients who underwent clipping were more likely to suffer cerebral ischaemia than patients who underwent coiling (25% and 19% respectively). Hydrocephalus was another cause of deterioration after a repair, 141 (6%), there was no difference between patients clipped and coiled. A re-bleed occurred in 44 (2%) of the 2198 patients who underwent a repair. Re-bleeding was slightly more common in coiled patients, 29 (3.2%), than those clipped, 14 (1.1%).

#### *Hospital and six-month outcome*

2125 patients with a confirmed aneurysm (89%) were discharged from the NSU alive. Of these surviving patients, 984 (45%) were discharged home, 960 (46%) went back to the referring hospital, and 170 (9%) were admitted to a rehabilitation centre.

At six months, all 2397 patients were followed up to assess functional outcome. Outcome was defined as unfavourable if the patient was severely disabled (dependent) or had died. Overall, 829 patients with a confirmed aneurysm had an unfavourable outcome (38%). There was no significant difference in the unfavourable outcome at six months in patients treated with clipping (34.9%) and coiling (33.7%).

There were no significant differences in the proportion of patients with an unfavourable outcome across the 34 participating NSUs when case-mix differences and the multilevel nature of the data were taken into account.

### *Risk factors*

In the 2174 patients whom were treated by either clipping or coiling, risk factors associated with an unfavourable outcome were:

Higher age, poorer neurological condition on admission, a larger amount of blood in the subarachnoid space according to the CT scan, aneurysms that were large (greater than 10mm), posterior circulation aneurysms, and the presence of any comorbid condition such as hypertension and ischemic heart disease.

Sound evidence on the best timing of surgery is still lacking. There was also some evidence in this study, that an unfavourable outcome was lower in patients who underwent repair 2 to 3 days after the haemorrhage (26% unfavourable) compared those repaired in less than 2 days (39% unfavourable) and those treated later than 3 days (32% unfavourable).

## **Recommendations**

- With the change in practice witnessed in this study towards coiling, it is important to audit practice and to assess long term outcome
- The risk factors for an unfavourable outcome identified in this study (age, neurological condition on admission, blood in the subarachnoid space according to the CT, size and site of aneurysm, and presence of comorbid conditions such as hypertension) should be recorded in any audit of practice and assessment of outcome.
- Mortality and complications (such as re-bleeding and re-admissions) should be measured as a minimum in any audit of SAH patients, although an additional measure of functional status at 6-12 months is recommended.

The report does not wish to add to the recommendations for treatment made by the ISAT study.