Unruptured Intracranial Aneurysm Natural History

- DWI-based deep learning radiomics nomogram for predicting the impaired quality of life in patients with unruptured intracranial aneurysm developing new iatrogenic cerebral infarcts following stent placement: a multicenter cohort study
- Conservative management of 661 patients with unruptured intracranial aneurysms: an observational study over 4 decades
- Flow reversal bypass surgery for giant intracranial aneurysms: illustrative cases
- Natural history of small incidental intracranial aneurysms: a systematic review and pooled analysis on the influence of follow-up duration and aneurysm location on rupture risk reporting
- Predicting the natural history of unruptured brain arteriovenous malformations: external validation of rupture risk scores
- Understanding decision making for preventive interventions: The unruptured intracranial aneurysm example
- Risk factors for bleeding in patients with arteriovenous malformations associated with intracranial aneurysms
- Treatment of small intracranial aneurysms using the SMALLSS scoring system: a novel system for decision making

Although the unruptured intracranial aneurysm diagnosis (IA) has become more frequent, its natural history and management still remain controversial ¹⁾.

Unruptured intracranial aneurysms (UIA) are common in the adult population, but only a relatively small proportion will rupture. It is therefore essential to have accurate estimates of rupture risk to target treatment towards those who stand to benefit and avoid exposing patients to the risks of unnecessary treatment. The best available UIA natural history data are the PHASES study see PHASES score. However, this has never been validated and given the known heterogeneity in the populations, methods and biases of the constituent studies, there is a need to do so. There are also many potential predictors not considered in PHASES that require evaluation, and the estimated rupture risk is largely based on short-term follow-up (mostly 1 year). The aims of this study are to: (1) test the accuracy of PHASES in a UK population, (2) evaluate additional predictors of rupture and (3) assess long-term UIA rupture rates.

Methods and analysis: The Risk of Aneurysm Rupture study is a longitudinal multicentre study that will identify patients with known UIA seen in neurosurgery units. Patients will have baseline demographics and aneurysm characteristics collected by their neurosurgery unit and then a single aggregated national cohort will be linked to databases of hospital admissions and deaths to identify all patients who may have subsequently suffered a subarachnoid haemorrhage. All matched admissions and deaths will be checked against medical records to confirm the diagnosis of aneurysmal subarachnoid haemorrhage. The target sample size is 20 000 patients. The primary outcome will be aneurysm rupture resulting in hospital admission or death. Cox regression models will be built to test each of the study's aims.

Ethics and dissemination: Ethical approval has been given by South Central Hampshire A Research Ethics Committee (21SC0064) and Confidentiality Advisory Group support (21CAG0033) provided

under Section 251 of the NHS Act 2006. The results will be disseminated in peer-reviewed journals²⁾

Many factors are involved in management of patients with unruptured intracranial aneurysms. Site, size, and group specific risks of the natural history should be compared with site, size, and age-specific risks of repair for each patient ³⁾.

Pooled multivariable analyses of individual data are needed to identify independent risk factors and to provide more reliable risk estimates for individual patients ⁴⁾.

Studies on natural history of unruptured intracranial aneurysms suggest 10 year cumulative bleedingrelated mortality and severe morbidity of no less than 7.5%. In the study of Krisht et al., surgical clipping resulted in an 0.8% rate of mortality and 3.4% permanent morbidity. This suggests that surgical clipping has the potential of a superior outcome to the natural history of patients who have an estimated life expectancy of no less than 10 years ⁵.

1)

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