NHS National Services Scotland

SAIVMs national audit report *2011*

AVM embolisation complications

Audit Standards

The Scottish Government's report *Delivering for Health* required mechanisms for the assessment of performance in neurosciences against standards, and action plans to address areas of improvement. The SAIVMs Steering Committee has approved standards for the care of adults with intracranial vascular malformations (IVMs) in Scotland.

Audit of AVM embolisation

In this report we audit complications following endovascular treatment of brain arteriovenous malformations (AVM) that had been diagnosed in 1999-2003 and 2006-2010. We included all endovascular procedures that had been done on this cohort of patients prior to 31 July 2011. We determined the risk of death, focal neurological deficit, or radiographically-confirmed cerebral infarction or haemorrhage within 30 days of a procedure (or prior to the next procedure, if another occurred within 30 days). A project coordinator collected the relevant data from imaging reports, hospital case notes, and GP records. Adverse events were identified by a clinical fellow and then independently validated by one of two neurologists.

The arbitrary standard for this audit was the median acute complication risk after embolisation (25%) reported in published studies (*JAMA* 2011; 306: 2011-9), although we are in the process of meta-analysing these data to better estimate 30 day complications to compare with this audit.

Outcome of embolisation

Of 459 adults newly diagnosed with an AVM in Scotland in 1999-2003 or 2006-2010, 171 (37%) underwent intervention, of whom 90 (53%) were female, 102 (60%) had initially presented with intracranial haemorrhage, and 68 (40%) had multiple procedures (262 AVM embolisations and 26 coilings of associated aneurysms).

Complications occurred within 30 days of 40/262 (15%, 95% confidence interval [CI] 11 to 20) AVM embolisations and 5/26 (19%, 95%CI 9 to 38) aneurysm coilings. The 30 day complication rate after AVM embolisation was not influenced by mode of AVM presentation (odds ratio [OR] 1.2, 95%CI 0.6 to 2.3) or AVM Spetzler-Martin grade (I-II versus III-V; OR 0.8, 95%CI 0.4 to 1.6). Over time, Onyx use increased (where the agent was specified, 36/105 procedures 2004-2011 versus 19/106 procedures 1999-2003; OR 2.4, 95%CI 1.3 to 4.5), and complications after embolisation seemed to become more frequent (chi-square for trend p=0.06).

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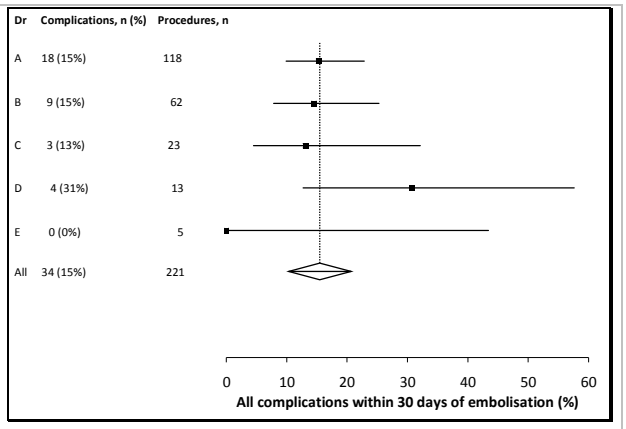
Procedures in Scotland

Of 262 AVM embolisations, the neuroradiologist undertaking 31 procedures was unknown, and ten procedures were conducted by neuroradiologists outside Scotland, leaving 221 procedures, 34 (15%, 95%CI 11 to 21) of which were followed by complications in 30 days.

There were no statistically significant differences between interventional neuroradiologists in Scotland in the characteristics of the patients they treated.

The 30-day complication rates for the 221 procedures are quantified and illustrated in the plot above for each interventional neuroradiologist, who we anonymised with the codes A-E. In comparison to neuroradiologist A, who had conducted the largest number of AVM embolisations on this cohort, the others' complication rates were not statistically significantly different (after adjustment for patient age, prior haemorrhage, and AVM Spetzler Martin grade). We found a non-significant difference when comparing D's complication rate (31%) to the complication rates of all other interventional neuroradiologists combined (14%); OR 2.6, 95% CI 0.8 to 9.1. Lastly, we compared the complication rates of the first 13 embolisations performed by neuroradiologists A, B, C and E with D, and found that D's complication rate was higher than the others' (OR 19.1, 95% CI 1.9 to 191.8).



Summary

The overall 30-day complication rate after AVM embolisation in Scotland (15%) did not exceed the audit standard, although the validity of the audit standard needs to be improved. Case-mix-adjusted comparisons of individual neuroradiologists did not reveal statistically significant differences between them, though crude comparisons of the first epochs of their practice did.

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