Management of small unruptured intracranial aneurysms in Australia and New Zealand

Ben McGuinness

Abstract

Aim To evaluate current management of small unruptured anterior circulation cerebral aneurysms in New Zealand and Australia.

Method A survey was performed of 35 neurosurgeons and interventional neuroradiologists practising in Australia and New Zealand regarding their management of five representative cases of anterior circulation aneurysms ranging from 3–6 mm in size.

Results There was a 64% overall active treatment rate with patient age being the most important determining factor. For the 4 cases under the age of 50 years there was a 78% active treatment rate. Other factors influencing decision making are discussed.

Conclusion Despite controversial available literature to guide management most small anterior circulation aneurysms in New Zealand and Australia would be recommended for active treatment by microsurgical clipping or endovascular coiling, particularly in younger patients.

Intracranial aneurysms are present in 2-6% of the population. Therefore small unruptured and mostly asymptomatic aneurysms are relatively commonly found on brain imaging studies performed for other reasons. Management decisions regarding these aneurysms are often difficult for specialists who are usually subsequently consulted once such an aneurysm is found.

The International Study of Unruptured Intracranial Aneurysms (ISUIA) study has the largest number of patient-years of any published cohort series and found a 0% rupture risk for anterior circulation aneurysms (excluding posterior communicating aneurysms) <7 mm in size in patients without a prior history of subarachnoid haemorrhage. This is at odds both with other published papers on this topic and the fact that approximately 50% of patients presenting with subarachnoid haemorrhage have an index aneurysm that is <7.5 mm in size.

This survey sought to assess the degree to which practitioners in Australasia believe that small unruptured anterior circulation aneurysms should be treated. There are many unique patient factors other than aneurysm size which influence clinical decision making. These include patient age, gender, smoking history, family history, co-morbidities, aneurysm aspect ratio and morphology, aneurysm location, relationship to branch vessels and perceived unique inherent treatment risks. Secondary aims of this study were to assess the relative importance given to these factors.
Methods

A prospective database of patients discussed at the Auckland City Hospital (Auckland, New Zealand) combined Neuroradiology-Neurosurgery meeting was reviewed over a 12-month period from June 2009 to June 2010. Five representative patients with small anterior circulation unruptured aneurysms requiring management decisions were selected.

Posterior circulation and posterior communicating artery aneurysms were not included as these have a higher rupture risk in the ISUIA study. In addition none of the patients had a history of prior subarachnoid haemorrhage (higher risk group 2 patients in ISUIA) or multiple aneurysms.

Interventional Neuroradiologists and Cerebrovascular Neurosurgeons in New Zealand and Australia were surveyed regarding their management of these patients. Respondents were given available representative CTA, MRA or DSA images of each aneurysm along with size of aneurysm, aspect ratio, age and sex of patient, smoking history and relevant comorbidities or family history (imaging and data available by request from the author).

Results

There were a total of 35 respondents consisting of 22 interventional neuroradiologists (INRs) and 13 neurosurgeons, of which 2 were dual trained in microsurgical clipping and endovascular techniques. There was reasonable representation from all the major metropolitan areas except for a lack of neurosurgical respondents from Queensland or Western Australia (Figure 1).

Response rate was reasonable at approximately 52%. This consisting of 13 out of an estimated 35 (37%) neurosurgeons that are thought to be regularly involved in cerebrovascular work and 22 out of 32 (69%) interventional neuroradiologists.

Overall decision to treat rate for all 5 aneurysm cases (anterior circulation and ranging from 3-6 mm size) was 64% (68% neurosurgeons and 62% INRs). When case 2 (74 year old patient) is excluded then there is a 78% treatment rate for patients less than 50 years of age (Table 1).
Table 1. Treatment recommendations for cases presented

<table>
<thead>
<tr>
<th>Patient</th>
<th>Patient age</th>
<th>Aneurysm size (mm)</th>
<th>Percentage treating</th>
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<tbody>
<tr>
<td>1</td>
<td>21</td>
<td>3</td>
<td>71</td>
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<tr>
<td>2</td>
<td>74</td>
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<td>6</td>
<td>94</td>
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</table>

When a decision was made to treat an aneurysm neurosurgeons (excluding dual trained specialists) chose endovascular treatment as the best management strategy in 38% of cases (14 of 38 treatments) while INRs chose microsurgical clipping as the best management strategy in 24% of cases (16 of 68 treatments).

The case with the greatest crossover in suggested treatment was for a 6 mm anterior communicating artery aneurysm in a 47-year-old male with significant cardiac and peripheral vascular disease co-morbidities. Despite 94% of specialists advising treatment, 60% (6 of 10) of neurosurgeons chose endovascular treatment and 57% (11 of 21) of INRs chose microsurgical clipping.

When looking at the factors involved in deciding whether to treat an aneurysm, patient age was overall the most commonly cited factor in arguing both for and against treatment (Figures 2 and 3).

The four most common reasons cited when treatment was recommended were patient age in 64% out of 112 cases, aneurysm shape 35%, aneurysm aspect ratio 26% and a low perceived risk of treatment procedure 21%.

When treatment was not recommended the four most common reasons given were aneurysm size 44% of 63 cases, patient age 43%, comorbidities 30% and a high perceived risk of treatment procedure 22%.
Discussion

The management of small anterior circulation unruptured cerebral aneurysms remains controversial despite multiple published retrospective and prospective cohort studies evaluating the risks of such aneurysms. There are no randomised trials evaluating
patient outcome of active treatment versus conservative management of unruptured aneurysms.

Data from the ISUIA publication indicate that small anterior circulation aneurysms less than 7 mm in size in patients without a prior history of subarachnoid haemorrhage have a negligible risk of rupture over a 5 year period (0% in this study). These findings are at odds with other cohort studies and cause considerable unease amongst practitioners counselling such patients. Methodological criticisms have suggested that the ISUIA studies are not representative of clinical practice. Data from the United States suggests a large number of small unruptured aneurysms are being treated despite the findings of ISUIA.

Cohort studies mainly from Japan and Finland have shown a higher rupture risk for small aneurysms ranging from 0.5%–2.3% per year. The Finland study has the longest median duration of follow up of any study at nearly 20 years and had annual rupture rate of 1.1% per year for 2–6 mm aneurysms (although most patients in this group would fall into the higher risk ISUIA group 2 patients i.e. with a prior history of subarachnoid haemorrhage).

The most plausible explanation given for the discrepancy between the incidence of SAH and the prevalence of unruptured aneurysms is that most small aneurysms that rupture do so at or shortly after the time of aneurysm formation (the so-called high risk period). Mathematical analysis confirms the feasibility of this theory although there is uncertainty about the duration of the high risk period.

Despite the small number of cases presented in the survey it is reasonable to conclude that the majority of practitioners in Australasia would recommend treatment of small (<7 mm) unruptured anterior circulation aneurysms in patients under the age of 50 (treatment rate of 78% in this survey). It is also clear from this survey that age is the most important factor in deciding whether to treat or not. For those that decide not to treat aneurysm size was shown to be an equally important factor as age, likely demonstrating the influence of the ISUIA study on these practitioners.

Aneurysm shape was commonly cited when arguing for treatment of an aneurysm in this study. Previous cohort studies using multivariate analysis of this factor including an irregular shape, large aspect ratio or presence of a daughter sac has suggested that it confers an increased risk of rupture.

An interesting finding from this survey was the tendency of practitioners to choose the opposite modality of treatment from what they personally perform for treatment of ACOM aneurysms. The implication being that these aneurysms are perceived as perhaps more difficult to treat for both microsurgical clipping and endovascular practitioners. This may be a spurious finding due to the unique patient factors of this case but could be evaluated with a survey involving larger numbers of ACOM aneurysms.

Limitations of this survey include the small number of cases shown to each specialist, incomplete response rate (in particular the relative under-representation of neurosurgical practitioners) and the fact that such a survey cannot truly replicate a proper clinical consultation with a patient.
This study has shown that despite ambiguous available evidence to guide decision making, most practitioners actively involved in aneurysm treatment in Australia and New Zealand would recommend treatment of small (<7 mm) unruptured anterior circulation aneurysms in patients under the age of 50 (78% treatment rate in this survey).

Competing interests: Nil.

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References: