Uncertainty and agreement in the management of unruptured intracranial aneurysms

Clinical article


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Object. The management of unruptured intracranial aneurysms remains controversial. The goal of this study was to evaluate the clinical community agreement in decision making regarding unruptured intracranial aneurysms.

Methods. A portfolio of 41 cases of unruptured intracranial aneurysms with angiographic images, along with a short description of the patient presentation, was sent to 28 clinicians (16 radiologists and 12 surgeons) with varying years of experience in the management of unruptured intracranial aneurysms. Five senior clinicians responded twice at least 3 months apart. Nineteen cases (46%) were selected from patients recruited in the Canadian UnRuptured Endovascular versus Surgery trial, an ongoing randomized comparison of coil embolization and clip placement. For each case, the responder was to first choose between 3 treatment options (observation, surgical clip placement, or endovascular coil embolization) and then indicate their level of certainty on a quantitative 0–10 scale. Agreement in decision making was studied using k statistics.

Results. Decisions to coil were more frequent (n = 612, 53%) than decisions to clip (n = 289, 25%) or to observe (n = 259, 22%). Interjudge agreement was only fair (k = 0.31 ± 0.02) for all cases and all judges, despite substantial intrajudge agreement (range 0.44–0.83 ± 0.10), with high mean individual certainty levels for each case (range 6.5–9.4 ± 2.0 on a scale of 0–10). Agreement was no better within specialties (surgeons or radiologists), within capability groups (those able to perform endovascular coiling alone, surgical clipping alone, or both), or with more experience. There was no correlation between certainty levels and years of experience. Agreement was lower when the cases were taken from the randomized trial (k = 0.19 ± 0.2) compared with nontrial cases (k = 0.35 ± 0.2).

Conclusions. Individuals do not agree regarding the management of unruptured intracranial aneurysms, even when they share a background in the same specialty, similar capabilities in aneurysm management, or years of practice. If community equipoise is a necessary precondition for trial participation, this study has found sufficient uncertainty and disagreement among clinicians to justify randomized trials.

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Key Words • unruptured aneurysm • management • uncertainty • randomized trial • interobserver variability • vascular disorders

Evidence for rational decision making regarding the best management of unruptured aneurysms remains elusive. In the absence of evidence about the best course of action, what are decision makers (patients or clinicians) to do? Admittedly, uncertainty is uncomfortable: “The natural tendency of man is not to press home a doubt, but to cut inquiry as short as possible...and to make the speediest return into the world where one can act.”

One way to address this problem is to ask for expert opinions, or for guidance from a panel of expert specialists. This procedure is commonly followed to develop guidelines in our field. Panels of experts can be asked about paradigmatic patient circumstances, or paradigmatic types of aneurysms. If consensus is found, it would seem that the “majority vote” would be the rational thing...
Community uncertainty in the management of unruptured aneurysms

to do; after all, “we do well to trust collective judgment of experts, since in the absence of objective criteria, what better criteria could there be than the decision of the expert group?”

However, this expedient solution is not without difficulties, which becomes particularly evident when opinions differ widely. How much confidence can we have in the collective judgment of a group of experts, when they themselves disagree? One additional problem is that the approach of relying on expert opinion rather than the results of trials and inquiry, if performed routinely, can form a barrier to change. Establishing unquestioned guidelines can block research and progress, and potentially permit the propagation of error and morbidity: “It is custom and example that persuade us, rather than any certain knowledge. And yet a majority vote is worthless as a proof of truths that are at all difficult to discover.” In the absence of reliable evidence regarding the best thing to do, should we enshrine the results of the most contemporary expert vote, or should we foster an environment of admitted uncertainty, where experts are encouraged to inquire?

One way to make progress in decision making regarding the management of unruptured intracranial aneurysms is to compare outcomes of the most common management strategies in a clinical trial. A common conception regarding the propriety of randomly allocating treatment options prescribes that a sufficient level of community uncertainty or equipoise should exist between the treatment options being compared. In this concept, trials can be justified when there is sufficient disagreement in the expert community regarding the options undergoing evaluation. With this perspective, we have investigated the agreement of various aneurysm experts in making decisions regarding the management of patients with unruptured intracranial aneurysms. Results of this investigation could inform the community as to which opinions are currently prevailing, give insight regarding the notion of equipoise, and hopefully encourage clinicians to participate in ongoing trials on the management of unruptured intracranial aneurysms.

**Methods**

**Study Population**

An electronic portfolio of 41 cases of patients with unruptured intracranial aneurysms was prepared that included an angiographic image of an aneurysm, along with a short history of the case; for example, a 48-year-old woman with headaches, 8-mm middle cerebral artery (MCA) aneurysm, and positive family history of aneurysms. For each case, clinicians had to choose between 3 treatment options (observation, endovascular, and surgical), and rate their level of certainty regarding their choices on a scale from 0 to 10. Undisclosed to those polled, the portfolio was constructed to include 19 patients from the Canadian Unruptured Endovascular versus Surgery (CURES) trial, a trial comparing clipping and coiling of unruptured intracranial aneurysms, which we expected would be offered treatment, but for whom there would be uncertainty in the treatment modality chosen. To attempt to construct a sample representative of clinical practice and to capture balanced proportions between the 3 choices (and thus avoid paradoxes), these 19 CURES cases (comprising 46% overall) were complemented by 22 selected non-CURES cases (54%). Fifteen of those cases (37%) were expected to have observation selected as a frequent option; these were < 7 mm anterior circulation aneurysms, supposedly having a very low risk of rupture. Four of these 15 cases were posterior circulation aneurysm patients (10%) for whom coiling was expected to be a frequent choice, and 11 (27%) were MCA bifurcation aneurysm patients, for whom clipping was anticipated to be a frequent choice. The mean overall age of the patients was 54 ± 13 years (range 24–76 years), and in the CURES cases 55 ± 10 years; 63% of the patients were women, as were 63% in the CURES cases. The mean overall aneurysm size was 8.0 ± 4.2 mm, and was 9.7 ± 4.6 mm in the CURES cases. There were 37 anterior circulation aneurysms and 4 posterior circulation aneurysms, with 11 MCA, 7 anterior communicating artery, 5 posterior communicating artery, 5 ophthalmic artery, 4 carotid bifurcation, and 9 other aneurysms in various locations.

Two of the presented cases were duplicates of the same aneurysm, presented in slightly different projections, with an accompanying history that differed only in the age of the patient. This produced 2 pairs of cases in which the impact of age on decision making could be assessed: a 7-mm right MCA aneurysm was presented as if harbored by a 40-year-old, and then a 74-year-old patient, and a 12-mm left MCA aneurysm was presented as if harbored by a 39-year-old, and then a 69-year-old patient. The questionnaire is available in supplementary material online (Appendix I).

**Portfolio Judges**

The portfolio was independently evaluated by 28 judges, who were assured of anonymity, but who provided some demographic information. There were 16 radiologists and 12 surgeons, 6 of whom were cross-trained (able to deliver both surgical and endovascular care). Respondents were from 17 different academic centers in North America (Canada and the US) and Europe. Clinicians had been practicing for 0–5 years (n = 10), 5–10 years (n = 6), or more than 10 years (n = 12). Five judges, all with more than 10 years of experience treating aneurysms, answered the questionnaire twice (more than 3 months apart) to generate the intrajudge evaluations.

**Statistical Methods**

Proportions of concordant readings and $\kappa$ statistics were calculated using SPSS software (version 20, IBM Inc.). The $\kappa$ values reflect agreement beyond chance, with a score of 0 no better than flipping a coin, 1 representing perfect agreement, and $-1$ representing perfect disagreement. Kappa values were interpreted in terms of strength of agreement according to Landis and Koch: $\leq 0.0$ poor, 0.0–0.2 slight, 0.21–0.4 fair, 0.41–0.6 moderate, 0.61–0.8 substantial, and 0.81–1.0 almost perfect agreement. Confidence in decision making along a scale of 0–10 was analyzed with ANOVAs.
Results

Decisions to coil were more frequent (n = 612, 53%) than decisions to clip (n = 289, 25%) or to observe (n = 259, 22%). Interjudge agreement was only fair (κ = 0.31 ± 0.02) for all cases and all judges (Table 1). Overall, disagreements in decision making were found to exist at the level of individuals, not between groups. In other words, surgeons disagreed with each other and with radiologists, and radiologists also disagreed with each other. Having greater experience did not influence the strength of agreement; both the least and the most experienced clinicians had only fair agreement with other judges of similar number of years of experience. Sharing a type of practice (those who can perform coil embolization or those who can perform clip placement) did not improve agreement. Kappa values showed lower levels of agreement in decision making regarding the CURES cases as compared with non-CURES cases (Table 1).

When the same judges considered the same portfolio, with 3 months between evaluations, intrajudge agreement for all cases was found to range from moderate to almost perfect (κ = 0.44–0.83 ± 0.1). However, κ values translated into only slight to moderate intrajudge agreement in 4 of 5 judges when decision making concerned CURES cases on 2 different occasions (Table 2).

There was almost perfect agreement in management choices for 4 of 41 cases: observation was selected for a 2-mm right MCA aneurysm in a 76-year-old, and for a 2-mm anterior communicating artery aneurysm in a 67-year-old. Two cases were almost unanimously sent for coil embolization: a 12-mm basilar tip aneurysm (in a 36-year-old) and a narrow-necked 12-mm posterior communicating artery aneurysm in a 42-year-old (Fig. 1A). In these 4 cases, self-assessed certainty levels were maximal: (> 8.7 ± 1.0 for each scenario).

If agreement is said to occur when at least 80% of experts select the same treatment option, then there was agreement for 10 (24%) of 41 patients. Two of these 10 patients had been recruited in the CURES trial. Although some aneurysms were unequivocally sent for coil embolization (3 ophthalmic artery, 2 basilar apex artery, and 2 large posterior communicating artery aneurysms), no aneurysms were universally believed to be best managed by surgery. On the opposing pole of the spectrum, disagreement was maximal with a significant difference in treatment choices between surgeons and radiologists for 3 of 41 cases (all of which were included in the CURES trial), consisting of 3 different MCA aneurysms measuring 8, 10, and 12 mm. In these 3 cases, each specialist believed that the treatment offered by their respective specialty was the best management choice (Fig. 1B).

Despite disagreement in choice of management for more than 76% of cases, certainty levels were almost uniformly on the high end for all cases (means ranging from 6.5 ± 1.9 to 9.4 ± 1.3 on a scale of 0–10). Certainty levels were lowest (but still in the range of 6–7/10) for small (5–6 mm) anterior circulation aneurysms (Fig. 1C). There was no significant correlation between self-assessed degree of certainty and years of experience.

The cases that were presented in duplicate to evaluate the impact of patient age on decision making also showed variability, perhaps in relation to size of the aneurysm. Age did influence treatment decisions for the 7-mm right MCA aneurysm: observation was selected in 58% of cases when the patient was 74 years old, as compared with 0% when the patient was 40 years of age. However, when the

<table>
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<th>CURES Trial Patients</th>
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<tr>
<td></td>
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<td>no. of patients</td>
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<tr>
<td>0–5</td>
<td>0.302 ± 0.036</td>
<td>0.329 ± 0.049</td>
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<td>5–10</td>
<td>0.297 ± 0.049</td>
<td>0.365 ± 0.065</td>
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<tr>
<td>&gt;10</td>
<td>0.345 ± 0.036</td>
<td>0.389 ± 0.044</td>
</tr>
<tr>
<td>specialty</td>
<td></td>
<td></td>
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<tr>
<td>radiologists</td>
<td>0.347 ± 0.027</td>
<td>0.360 ± 0.031</td>
</tr>
<tr>
<td>surgeons</td>
<td>0.314 ± 0.021</td>
<td>0.373 ± 0.032</td>
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<tr>
<td>coil embolization ability</td>
<td>0.336 ± 0.028</td>
<td>0.352 ± 0.032</td>
</tr>
<tr>
<td>clip placement ability</td>
<td>0.295 ± 0.060</td>
<td>0.423 ± 0.076</td>
</tr>
<tr>
<td>both coiling and clipping ability</td>
<td>0.326 ± 0.033</td>
<td>0.357 ± 0.051</td>
</tr>
<tr>
<td>overall</td>
<td>0.309 ± 0.015</td>
<td>0.351 ± 0.020</td>
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* κ ± SD.
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The main finding of this survey is that substantial variability in decision making exists regarding how best to manage patients with unruptured aneurysms. Discrepant recommendations were made at the individual level, and judges’ decisions did not follow according to their number of years in practice, specialty backgrounds, or ability to place a clip, coil, or both. Wide discrepancies were present within all subgroups of decision makers. If the best management decision for an individual patient is the consensus of a panel of experts, and if consensus is defined as agreement of at least 80% of those polled, such consensus occurred in only 24% of cases. It appears reasonable to conclude that for most patients, one decision cannot rationally be justified over another by consulting experts treating aneurysms, and the best management option often remains unknown. In contrast to this collective community uncertainty, individuals had high certainty levels regarding their treatment choices. While two judgments regarding the same particular cases by the same judge at least 3 months apart were more consistent, intrapersonal discrepancies were still important as agreement was only moderate for most observers for the same judge at least 3 months apart were more consistent. If the judges’ decisions did not follow according to their number of years in practice, specialty backgrounds, or ability to place a clip, coil, or both. Wide discrepancies were present within all subgroups of decision makers. If the best management decision for an individual patient is the consensus of a panel of experts, and if consensus is defined as agreement of at least 80% of those polled, such consensus occurred in only 24% of cases. It appears reasonable to conclude that for most patients, one decision cannot rationally be justified over another by consulting experts treating aneurysms, and the best management option often remains unknown. In contrast to this collective community uncertainty, individuals had high certainty levels regarding their treatment choices. While two judgments regarding the same particular cases by the same judge at least 3 months apart were more consistent, intrapersonal discrepancies were still important as agreement was only moderate for most observers for most cases, decreasing to fair for cases selected from the CURES database.

Clinical care often involves making decisions under uncertainty. When evidence is lacking, this process may appear rather complex. On what basis are decisions made when there is no clear evidence as to what to do? Rare events—such as aneurysmal ruptures in conservatively managed patients, or even complications of treatment, when they occur in 5% of patients or fewer—cannot be reliably monitored nor can the incidence be estimated by single individuals. Given the scarcity of index events that can occur with or without treatment, or for different types of patients, it is not possible for an expert opinion to be founded on direct personal experience. Observational and epidemiological studies can monitor thousands of patients, but because decisions regarding which management strategy to employ are made prior to inclusion in the registry, irreparable bias is introduced into the data. The poor quality of the data to guide the experts in formulating their recommendations undoubtedly contributes to the variety in management options chosen. This survey nonetheless revealed some decisional trends regarding vague categories, such as patient age and aneurysm size. Most experts would favor conservative management of small aneurysms in older patients, and coil embolization appears to be preferred for posterior circulation aneurysms. But even vague heuristics and guidelines that emphasize personalized case-by-case decisions remain confronted with the findings of the survey: that the way patients and aneurysms are eventually categorized by different decision makers, or by the same decision maker at various times, leads to great variability in clinical recommendations.

Studies of variability in decision making are fundamentally different from interobserver variability in the interpretation of test results, and process or quality assurance studies. These latter studies aim to identify sources of variability, and if possible, eliminate them to approximate an accepted gold standard. In a variable decision-making study, although we identify the disagreement, the goal is not to arbitrarily set a standard and insist on adherence to that standard despite the lack of evidence. Rather than simply document the variability and leave the current state of affairs as status quo, the present study may be a stepping stone to effect real changes in patient management. Because we remain uncertain, one management paradigm cannot be recommended over another with any authority. In this context of uncertainty, the best care of the patient may be to participate in a trial that

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**Fig. 1.** Catheter (A and B) and CT (C) angiogram examples from the questionnaire. A: Image obtained in a 42-year-old man with an asymptomatic 12-mm left posterior communicating artery aneurysm (Case 33) exemplifies a case in which agreement and certainty levels were nearly maximal (observation 0%, coiling 91%, clipping 9%; mean certainty 8.7 ± 1.3). B: Image obtained in a 39-year-old man with dizziness and a 12-mm left MCA aneurysm (Case 7) exemplifies a case in which treatment was unanimously chosen, but disagreement between coiling and clipping was nearly maximal despite high certainty levels (observation 0%, coiling 60%, clipping 40%; mean certainty 8.1 ± 1.8). C: Image from a 45-year-old man with an incidental 5-mm pericallosal artery aneurysm (Case 30) exemplifies the widest divergence in decision making and lowest certainty levels (observation 21%, coiling 30%, clipping 49%; mean certainty 6.7 ± 2.0).
If trials are proposed, they are often obstructed by the notion of personal or “theoretical” equipoise. Because clinicians are accustomed to come up with a single “best option” for each decision, they tend to believe that very few patients could be equally appropriately treated by both trial options. If these clinicians do not include their patients in the trial, recruitment and feasibility of the trial on a large-scale may become compromised. Down the road, in the event the trial is successfully completed, this phenomenon may affect the generalizability of the study results. The lack of personal, or “theoretical” equipoise, exemplified by the high degree of certainty of the survey responders, is in direct contrast to clinical or “community” equipoise, when various experts disagree regarding best management options. This latter notion may be a better foundation for trials to be accomplished. The extent of uncertainty necessary to render a trial “ethical” has been the subject of an ongoing controversy. Some have claimed that when 80% of experts clearly favor one option over the other, a trial would not be ethical. A different fundamental stance is that looking for trial justification in the presence of such uncertainty is misplaced, because a positive randomized trial should be the minimally acceptable norm for a clinician to perform an invasive preventive intervention on a patient. Either way, it remains true that trials can become unfeasible when everybody agrees, even without proof, that one management option is the “best thing to do.” Seen in this light, the results of this work are reassuring, because the wide variability of opinions (at least for 76% of the types of patients represented in this survey) suggests that sufficient community equipoise exists for recruitment into a trial that may provide knowledge of the results of our actions.

Strongly held but diverging opinions affect unruptured aneurysm patients themselves as they seek guidance from physicians regarding the best course of action regarding their personal problem. When physicians make confident recommendations for one course of action, patients could expect that the recommendation be based on an objective truth that other physicians would recognize. Otherwise, patients are receiving potentially life-changing advice from confident physicians whose recommendations are based on uncertain foundations, hardly a desirable situation. In these circumstances, an appropriate stance may be to remain uncertain; randomized allocation of the two best treatment options may be the optimal way to minimize unnecessary morbidity for patients facing this dilemma. The foregoing discussion assumes that the best management of aneurysms is not simply a matter of opinion. Some experts may assert that they are entitled to hold their opinion, and that it is as inviolable as their right to hold private property. In a world of opinions, managing unruptured intracranial aneurysms may be compared with a game in which no one keeps score, no one wins, and no one loses. We rather submit that in this field, just as in any type of medical care, there is a truth to the matter of how best to manage patients with unruptured aneurysms, and that before we demonstrate which management option is best, optimal care can be provided within a trial.

There were several limitations of this study. The questionnaire was sent to 48 email addresses. Only 28 answers (58%) were received. Although we cannot know how many clinicians actually received and read the email request to participate, we can only conjecture that the results reported here reflect the opinions of a self-selected group of clinicians who took the time and energy to respond. Responders were more often from a radiology background, and many of the surgeons polled had also been trained in endovascular therapy, which may explain the preponderance of endovascular choices. Furthermore, the portfolio used here was artificially constructed. Absolute numbers of choices are thus not meaningful, although we were careful to present cases that were representative of common clinical series. In our questionnaire, 27% of aneurysms were MCA aneurysms; the International Study of Unruptured Intracranial Aneurysms (ISUIA) had 29%. In the ISUIA, the mean aneurysm size for clipped aneurysms was 9.6 mm; in our survey, mean overall aneurysm size was 8.0 mm (9.7 mm for CURES cases). In the ISUIA, 11.9% of aneurysms were in the posterior circulation, whereas our survey had 9.8%. Also, using the 2008 Nationwide Inpatient Sample data, endovascular coiling was employed 2.03 times more frequently than surgical clipping for unruptured aneurysms. The respondents to our survey selected endovascular coiling more frequently than surgical clipping with a ratio of 2.12. Finally, answering an email questionnaire and caring for real patients represent different contexts for decision making; we can only speculate about how seriously the responders imagined they were dealing with important clinical decisions.

Conclusions

Management decisions are widely variable between experts, even those belonging to the same groups, regarding an important proportion of patients with unruptured aneurysms. This uncertainty should provide ample room for participation in trials designed to offer both optimal care and an immediate ethical solution to current clinical dilemmas regarding the treatment of patients with unruptured aneurysms.

Appendix

This article contains an appendix that is available only in the online version of the article.

Disclosure

Drs. Darsaut and Raymond are principal investigators of the CURES study, a randomized trial of surgery versus coiling for unruptured cerebral aneurysm, which is funded by the Canadian Institutes of Health Research (grant no. MOP-119554).

Author contributions to the study and manuscript preparation include the following. Conception and design: Raymond, Darsaut, Estrade. Acquisition of data: Raymond, Darsaut, Estrade, Jamali, Bojanowski. Analysis and interpretation of data: Raymond, Darsaut, Estrade, Jamali, Chagnon. Drafting the article: Raymond, Darsaut, Estrade. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Raymond. Statistical analysis: Raymond, Darsaut, Estrade, Chagnon. Administrative/technical/material support: Raymond, Darsaut, Jamali. Study supervision: Raymond, Darsaut.
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Appendix 1

Date

Have you been treating aneurysms for:

- 0 years
- 0-4 years
- 5-10 years
- More than 10 years

What would you do for these cases of unruptured aneurysm?

Case 1
74 F;
Incidental
7 mm right MCA bifurcation aneurysm

Case 2
38 F;
SAH 6 months ago for another treated aneurysm
6 mm PICA aneurysm

Case 3
46 M;
Headaches
10 mm left M1 aneurysm
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**Case 4**

54 F;  
Headaches, transient diplopia  
Target aneurysm: 12 mm right carotid terminus  
Rate your scale of certainty:  
![Scale of certainty](image)

**Case 5**

36 M;  
Headaches  
12 mm basilar tip aneurysm  
Rate your scale of certainty:  
![Scale of certainty](image)

**Case 6**

68 F;  
Screening (+family history)  
8 mm AComm aneurysm  
Rate your scale of certainty:  
![Scale of certainty](image)

**Case 7**

39 M;  
Episodic dizziness  
12 mm left MCA bifurcation aneurysm  
Rate your scale of certainty:  
![Scale of certainty](image)
**Case 8**

60 M;
Head and neck CA (in remission)
Target aneurysm: 20 mm ACom aneurysm

**Case 9**

49 F;
Headaches, TIA (right hemibody)
Target aneurysm: 6 mm left PCom aneurysm

**Case 10**

60 F;
Progressive visual loss left eye
6 mm ophthalmic artery aneurysm

**Case 11**

24 F;
Incidental
4 mm ACom aneurysm
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**Case 12**
68 F;
Incidental
10 mm right MCA aneurysm
Rate your scale of certainty:

**Case 13**
64 F;
Minor lacunar stroke
10 mm right MCA aneurysm
Rate your scale of certainty:

**Case 14**
40 F;
Incidental
7 mm right MCA bifurcation aneurysm
Rate your scale of certainty:

**Case 15**
58 M;
8 mm right MCA bifurcation aneurysm
Rate your scale of certainty:
**Case 16**

53 M;  
Tinnitus  
10 mm right carotid terminus aneurysm  
Rate your scale of certainty:  

![Image of right carotid terminus aneurysm]

**Case 17**

69 M;  
Episodic dizziness  
12 mm left MCA bifurcation aneurysm  
Rate your scale of certainty:  

![Image of left MCA bifurcation aneurysm]

**Case 18**

45 F;  
Visual loss  
Target aneurysm: 11 mm left carotid ophthalmic aneurysm  
Rate your scale of certainty:  

![Image of left carotid ophthalmic aneurysm]

**Case 19**

46 F;  
Headaches  
Target aneurysm: 9 mm left carotid ophthalmic aneurysm  
Rate your scale of certainty:  

![Image of left carotid ophthalmic aneurysm]
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**Case 20**

60 M;

Syncope

5 mm left Carotid terminus aneurysm

Rate your scale of certainty:

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<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
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**Case 21**

68 F;

Significant comorbidities

Headaches

8 mm right carotid terminus aneurysm

Rate your scale of certainty:

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<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
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**Case 22**

49 F;

SAH 2001

Target aneurysm: 5 mm *de novo* right AChA aneurysm

Rate your scale of certainty:

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<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
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**Case 23**

53 F;

Headaches

6 mm Acom artery aneurysm

Rate your scale of certainty:

| 0% | 20% | 40% | 60% | 80% | 100% |
**Case 24**

43 F;
Headaches
5 mm left A1-A2 junction aneurysm

**Case 25**

61 F;
Amaurosis fugax
4 mm distal right MCA aneurysm

**Case 26**

62 F;
Headaches, TIA (left hemibody)
Target aneurysm: 5 mm left MCA aneurysm

**Case 27**

76 F;
Screening (+ family history)
2 mm right MCA aneurysm
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**Case 28**
36 M;
Headaches
5 mm right MCA bifurcation aneurysm

**Case 29**
43 F;
SAH 2010
3 mm Acom aneurysm

**Case 30**
45 M;
Incidental
6 mm pericallosal artery aneurysm

**Case 31**
53 F;
Incidental
4 mm superior cerebellar artery aneurysm
**Case 32**

67 M;

Incidental

2 mm Acom aneurysm

**Case 33**

42 M;

Screening

11 mm right PCom aneurysm

**Case 34**

69 F;

8 mm basilar tip aneurysm

**Case 35**

73 M;

Oculomotor nerve palsy

10 mm left PCom aneurysm
Community uncertainty in the management of unruptured aneurysms

**Case 36**

52 F; Syncopal episode
6 mm right MCA bifurcation aneurysm

Rate your scale of certainty:

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<tr>
<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
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**Case 37**

66 F; 8 mm ACom aneurysm

Rate your scale of certainty:

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<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
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**Case 38**

47 M; 23 mm partially thrombosed and calcified left supraclinoid ICA aneurysm

Rate your scale of certainty:

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<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
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**Case 39**

52 F; 7 mm left paraclinoid ICA aneurysm

Rate your scale of certainty:

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<th>0%</th>
<th>20%</th>
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</thead>
</table>
**Case 40**

71 M; 
Cranial nerve dysfunction 
8 mm right PCom aneurysm

**Case 41**

51 F; 
Incidental 
7 mm right paraclinoid ICA aneurysm

Thank you for your time and effort. We appreciate it!  
Go back to first page and submit