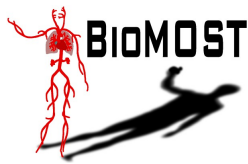




Cerebral Aneurysm Growth as the Etiology of Recurrence After Successful Coil Embolization

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Introduction

Cerebral Aneurysm Recurrence Prevalence:

- Raymond et al. has reported 33% [1]
- Murayama et al. has reported 21% [2]

Hypotheses:

1. Aneurysm growth, not coil compaction, is the primary recurrence mechanism
2. The coil mass will measurably translate when recurrence occurs

Significance:

1. Impact patient selection for coil embolization
2. Impact coil device design

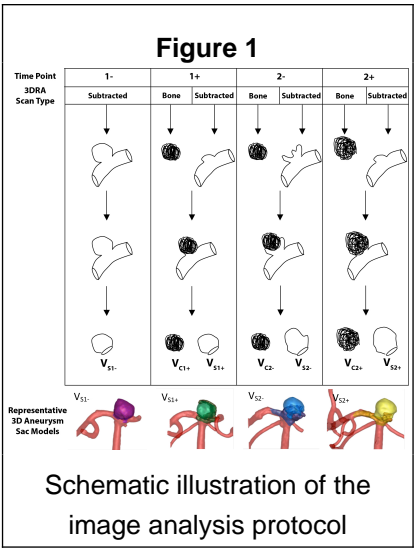
Methods

Population:

15 recurrence and 12 non-recurrence control aneurysms initially completely coiled at a single center.

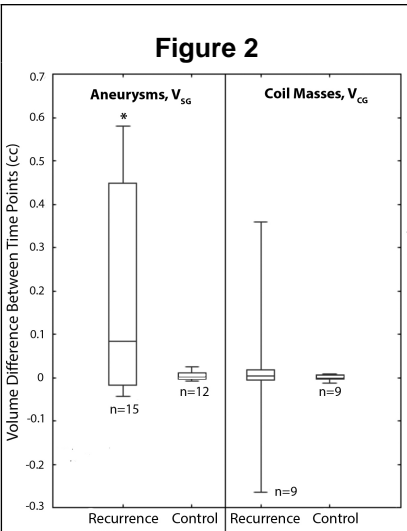
Approach:

Created an objective, quantitative image analysis protocol to determine the volumes of aneurysms and coil masses during initial and follow-up visits from 3D rotational angiograms (see Figure 1). [3]

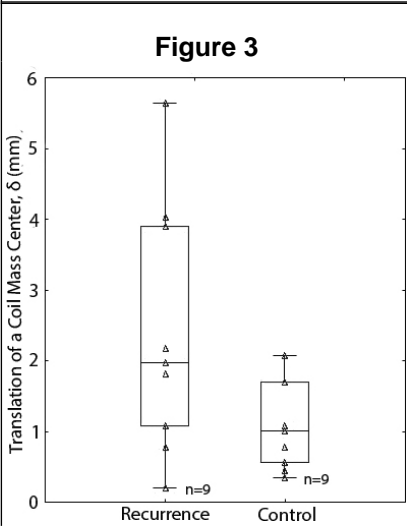


Results

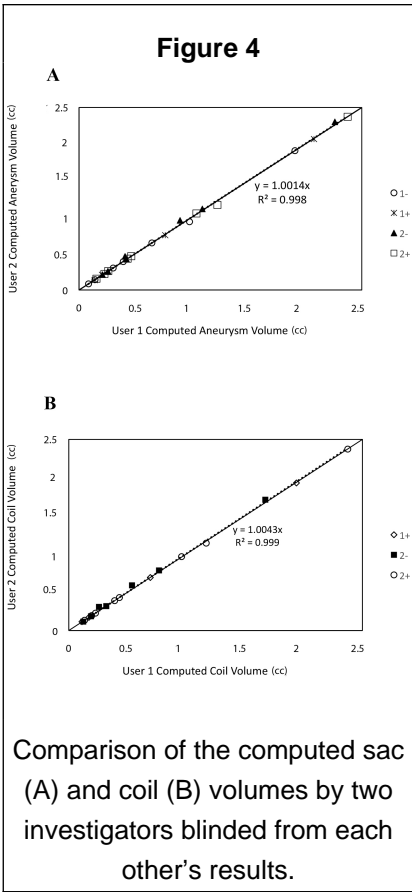
- Aneurysm growth was evident in the recurrence cohort ($p=0.003$) but not the control ($p=0.136$). There was no evidence of coil compaction in the population (recurrence: $p=0.339$; control: $p=0.429$; see Figure 2).
- The translation of the coil mass centers was found to be significantly larger in the recurrence cohort than the control ($p=0.047$, see Figure 3)
- Image analysis protocol was found to be insensitive to the investigator (see Figure 4)



Aneurysm sac growth (VSG) and coil mass growth (VCG) in the recurrence and control cohorts.



Coil mass center translation, in recurrence ($N=9$) and control cohort ($N=9$). The triangles indicate raw data values.



Conclusions

1. Image analysis protocol is not sensitive to the investigator
2. In this population aneurysm growth was the predominant recurrence mechanism; there is no evidence of coil compaction
3. The coil mass likely translates measurably when recurrence occurs and has potential to serve as a non-angiographic recurrence marker

Limitations:

Small study population and single-center data

References

- [1] Raymond et al. *Stroke*: 2003;34.
- [2] Murayama et al. *J. Neurosurg*: 2003;98.
- [3] Antiga, L and Steinman, D. VMTK v1.2 [software]. Accessed from www.vmtk.org

Acknowledgements

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Learning Objectives

- By the conclusion of this session, participants should be able to:
1. Recognize the importance of understanding the etiology of recurrence in coiled cerebral aneurysms.
 2. Understand the methods used in this study to independently quantify aneurysm and coil growth.
 3. Understand the study limitations.