



The Relationship Between Packing Density and Incomplete Aneurysm Occlusion Following Coil Embolization of Intracranial Aneurysms

Justin Robert Mascitelli MD; Eric Karl Oermann MD; J D. Mocco MD; Johanna Fifi MD; Aman B. Patel MD

[Institution]



Introduction

Coil embolization has been increasingly used over the last two decades for the treatment of intracranial aneurysms. Incomplete occlusion and aneurysm recurrence, however, remain disadvantages of this approach.[1-3] Higher packing density (PD) has been shown to have a positive influence on angiographic outcome.[4-8] There are certain situations, however, when the influence of PD has been called into question including the treatment of small[9] and unruptured[4] aneurysms as well as during stent assisted coiling.[10] It would be useful to know in which cases PD is the most influential.

Methods

This is a single center, retrospective review of 384 patients with 405 consecutively treated aneurysms. Exclusion criteria included previous treatment, atypical aneurysms, and non-coiling interventions. The Modified Raymond Roy Occlusion Classification was used to grade aneurysms.[11] Incomplete aneurysm occlusion was defined as Class IIIa or IIIb at any follow-up point. Neck remnants were not included in the incompletely occluded group based on our previous experience.[12]

Results

In the entire study population, PD was associated with incomplete aneurysm occlusion ($p=0.008$) with 31% being the ideal cut off point. This association persisted in unruptured aneurysms only (0.017) and those treated with stent-assisted coiling (0.037). The association no longer remained significant, however, for small aneurysms ($< 7\text{mm}$; $p=0.472$), narrow-necked aneurysms ($< 4\text{mm}$, $p=0.381$), and those aneurysms in which complete coil coverage across the aneurysm neck was achieved ($p=0.148$).

Conclusions

PD is associated with aneurysm occlusion at follow-up, irrespective of rupture status or stent-assistance. PD may be less important in small, narrow-necked aneurysms and those in which complete coil coverage across the aneurysm neck is achieved. These associations are important to keep in mind when deciding how densely to pack the aneurysm with coils.

References

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Learning Objectives

To understand the relationship between packing density and incomplete aneurysm occlusion both in the entire population of aneurysms treated with coiling but also in sub-populations such as small, narrow-necked, unruptured, stent-assisted aneurysms, as well as those with complete coil coverage across the aneurysm neck.

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