Comparative Effectiveness Analysis of Pipeline Embolization Device (PED) vs Coiling in Unruptured Aneurysms Less Than 10-mm in Size

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CNS 2018 ANNUAL MEETING
HOUSTON, TEXAS
OCTOBER 6-10, 2018

Introduction

Both endovascular coiling and the Pipeline Embolization Device (PED) have been shown to be safe and clinically effective for treatment of small (<10 mm) aneurysms. We conducted a comparative effectiveness analysis to compare their utility in terms of health benefits.

Methods

A decision-analytical study was performed with Markov modeling methods to simulate patients with small unruptured aneurysms undergoing endovascular coiling versus PED for treatment. Input probabilities were derived from prior literature, and one-way, two-way and probabilistic sensitivity analyses were performed to assess model and input parameter uncertainty.

Figure 1. A simplified decision tree diagram.

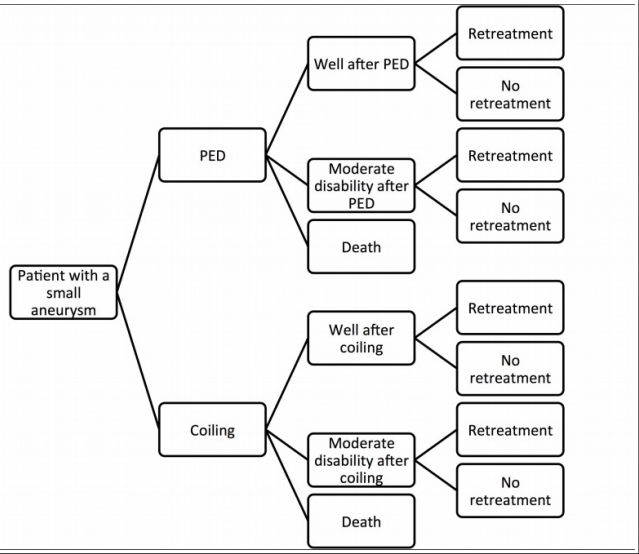
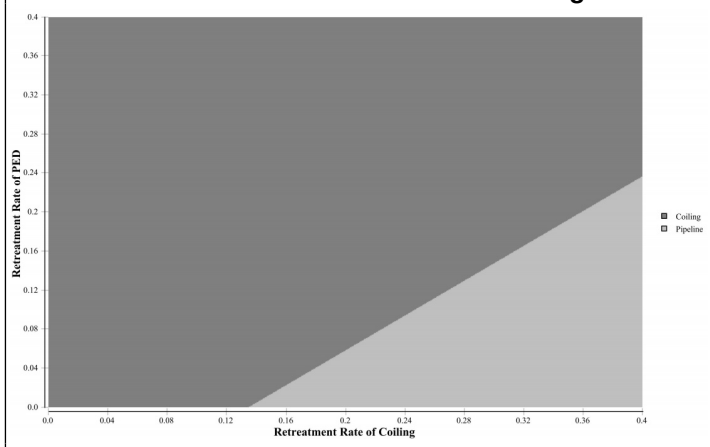


Figure 2. Two-way sensitivity analysis varying retreatment rates of PED and coiling.



The color indicates area where corresponding strategy is preferred.

Results

The base case calculation for a patient older than 50 -years shows PED to have a higher health benefit (17.48 quality-adjusted life years (QALY)) than coiling (17.44 QALY). PED is the better option in 6,141 of the 10,000 iterations in probabilistic sensitivity analysis.

When the re-treatment rate of PED is lower than 9.53%, and the coiling re-treatment is higher than 15.6%, PED is the better strategy.

In the two-way sensitivity analysis varying the re-treatment rates from both treatment modalities, when the re-treatment of PED is approximately 14% lower than the re-treatment of coiling, PED is the more favorable treatment strategy. Otherwise, coiling is more effective.

Conclusions

With the increasing use of PED for treatment of small unruptured aneurysms, our study indicates that PED may have higher health benefits, due to lower rates of re-treatment. Longer follow-up studies are needed to document the rates of recurrence and re-treatment after coiling and PED to assess cost effectiveness of these strategies.

Learning Objectives

To understand the "health benefits" of a strategy of endovascular coiling versus PED treatment for small, unruptured aneurysms.

References

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