

Pipeline Embolization Versus Coiling for the Treatment of Large Unruptured Intracranial Aneurysms: Cost-Effectiveness Over a 10-Year Projection

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Results

Introduction

Rupture of large intracranial aneurysms has high morbidity, mortality and health care costs. Elective endovascular treatments with pipeline embolization devices (PED) or endovascular coiling can safely treat large unruptured aneurysms. This analysis presents a 10-year cost-effectiveness projection of the elective treatment of large aneurysms with these endovascular interventions.

To project cost-effectiveness over a 10-year window, we constructed a Markov Model of a 60-year-old patient with a large intracranial aneurysm deciding to either treat the aneurysm elective coiling, PED, or to not treat the aneurysm. Rates of neurologic outcomes, procedural costs, rehabilitation costs and annual rupture rates were recovered from the literature. Patients that did not undergo treatment were exposed to higher annual rupture rates leading to hospitalization and rehabilitation costs. Costeffectiveness across a 10-year projection was defined using incremental cost-effectiveness ratios (ICERs) - the ratio of differences in cost by interventions divided by the differences in quality of adjusted life years (QALY) recovered by interventions. By convention, a strategy was considered cost-effective if it yielded an ICER less than \$50,000/QALY gained. Parameter uncertainty was modeled through a probabilistic sensitivity analysis across 10,000 iterations.

Methods

Our analysis demonstrated that across a 10-year period, the PED cohort yielded 6.8 QALY at \$44,261, the coiling cohort yielded 6.8 QALY at \$63,269, and no treatment cohort yielded 5.8 QALY at \$88,749. Coiling was associated with an ICER of \$184,811/QALY gained, indicating that PED was the more cost-effective modality (Figure 1). Probabilistic sampling demonstrated that PED was the cost-effective strategy in 56.9% of iterations, coiling was the cost -effective strategy in 38.3% of iterations, and no treatment was the costeffective strategy in only 4.8% of iterations (Figure 2).



Cost-Effectiveness of different treatment strategies to manage large intracranial aneurysm. PED remains the most cost-effective option yielding 6.8 QALY at \$44,261.



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Conclusions

Across a 10-year projection, elective pipeline embolization and coiling were cost-effective strategies that improved quality of life for patients with large intracranial aneurysms.

Learning Objectives

By the conclusion of this session, participants should be able to:

1. Describe the relative costeffectiveness of different endovascular interventions in the treatment of large aneurysms.

2. Discuss in small groups the implication that these findings may have for intervention selection when treating patients with large aneurysms.

References

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