Differences in Cost by Geographic Region in the United States for Clipping Versus Coiling of Unruptured Aneurysms: A Nationwide Inpatient Sample Database Study

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Ruptured intracranial aneurysms cause high morbidity and mortality, with 12% of patients dying before receiving medical supports, 33% dying within 48 hours, and 50% dying within 30 days. 50% of survivors suffer from permanent disability and dependency.

Surgical clipping and endoscopic coiling are two common methods of preventing unruptured aneurysms from rupturing.

Several studies have reported higher costs of coiling compared to clipping for treatment of unruptured intracranial aneurysms.

Conversely, a previous NIS database study found higher overall cost of clipping due to an associated increased length of stay.

However, no study has analyzed the impact of US region on the cost of each procedure and whether cost differentials vary by geographic location.
Methods

- Retrospective cohort analysis using the 2016 National Impatient Sample Database
- USA split into 9 geographic regions, and total cost of impatient stay extracted
- All unruptured intracranial aneurysm patients queried and split into clipping or coiling groups based on ICD coding
- Insurance coverage by region (Medicare, Medicaid, private, etc) was assessed to control for costs
- Statistics were conducted using R, with Tukey multiple comparisons of means to compare prices of each procedure between regions and Welch two sample t-tests to assess price differentials between procedures in each region.
Results

• Clipping: n = 728, Coiling: n = 1,319

• No significant regional difference in insurance distribution was found for either procedure.

• There was no significant difference in cost between clipping and coiling procedures found in any region.
Results (2)

• Clipping: Significantly more expensive in the Pacific region (p-values<0.05, $99,386.10 above national mean)

• Coiling: Significantly more expensive in the Pacific and Mountain regions (all p-values < 0.05, $60,970.10-$64,985.40 above national mean)
Discussion

• The implications of this study are large and may impact insurance payments. As a result, hospital administrative policy for dealing with procedural reimbursements.

• The data from this study may be used in conjunction with other papers on outcomes and costs of coiling versus clipping to allow for better patient and physician choice and awareness.
Summary and Future Directions

- The major findings of this study were that clipping and coiling are more expensive than average in the Pacific and/or Mountain regions of the United States, but the two procedures themselves did not differ significantly in cost.

- Future studies on cost should analyze more years of data and find year-by-year trends in cost differentials.

- Age/sex/comorbidity should be propensity-matched for future analysis.

- Analysis of complication and readmission rates following clipping versus coiling using additional database information may provide further information to supplement current clinical trial data.