

**P-023 NATIONAL TRENDS OF THE INPATIENT DIAGNOSIS, TREATMENT, AND OUTCOMES OF CEREBRAL ANEURYSMS IN LAST DECADE**

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**Introduction** Following publication of the ISUIA and ISAT studies, the paradigm for treatment of cerebral aneurysms shifted from open surgical clipping to endovascular embolization as primary therapy in a majority of cases. While this trend has been widely acknowledged, patient population, outcome data and large-scale treatment patterns have not been reported in recent years.

**Methods** The National Inpatient Sample from 2004–2014 was reviewed. Subarachnoid hemorrhage (SAH) and unruptured aneurysm (UA) discharges were identified along with treatment given, surgical clipping or endovascular repair. UA that were not primary diagnoses were labeled as incidental. The Elixhauser comorbidity readmission index (ELIX) was used to estimate patient baseline health status. SAH severity and outcomes were analyzed with the NIS-SAH severity score (NIS-SSS) and NIS-severity outcome measure (NIS-SOM), which correlate directly with Hunt-Hess score and mRS outcome, respectively. Time trend series plots were created. Following Shapiro-Wilks normality confirmation, linear and logistic regression were utilized to estimate significant changes in the yearly mean or median of treatments. Per capita values were analyzed to control for population growth. Comparisons of means/distributions of normally continuous variables was carried out using least squared means analysis; while, nonparametric distributions were compared with the Wilcoxon rank sum test. P-values of  $\leq 0.05$  were considered statistically significant. Statistical analysis performed with SAS 9.4 (Cary, NC).

**Results** A total of 379,437 SAH and 378,242 UA discharges were reviewed. For UA and SAH, endovascularly treated patients were significantly older ( $p < 0.0001$ ). SAH patients managed endovascularly were more sick than clipped patients (ELIX 10.4 vs 8.9;  $p < 0.0001$ ); whereas, UA-endovascular patients were healthier than UA-clipped patients (ELIX 2.4 vs 3.9;  $p < 0.0001$ ). SAH patients with NIH-SSS  $> 7$ , correlating with Hunt-Hess  $\geq 4$ , were more likely to be managed endovascularly ( $p < 0.0001$ ). Overall SAH-clipped patients had lower inpatient mortality (11.7 vs. 12.9;  $p = 0.012$ ), but a high NIH-SOM rate (54% vs 50%;  $p = 0.0002$ ). The rate of incidentally inpatient diagnosed UA has significantly risen every year (+1987 yearly; 2004, 10435 vs. 2014, 28795;  $p < 0.0001$ ).

For SAH treatment, yearly discharges for clipping decreased (-264.1,  $p = 0.0002$ ) and increased for endovascular (+366,  $p = 0.0003$ ) treatment (2004 vs. 2014; SAH-clipping 6579 vs 3400; SAH-endovascular 3878 vs 7535). For treated UA, yearly discharges for clipping remained stable and increased for endovascular therapy (+630,  $p < 0.0001$ ) (2004 vs. 2014; UA-clipping 3553 vs 3745; UA-endovascular 3948 vs 9705). These trends remained significant when analyzed by per capita values. Overtime, inpatient mortality decreased for both clipped ( $p = 0.0494$ ) and endovascularly ( $p < 0.0001$ ) treated SAH (2004 vs. 2014; SAH-clipped 13% vs 11.7%; SAH-endovascular 15.8% vs. 12.7%). Mortality rates for clipped UA decreased over time ( $p = 0.0027$ ) and did not change for endovascular treated UA (2004 vs. 2014 mortality rates; UA-clipped 1.57% vs 0.40%; UA-endovascular 0.59% vs. 0.52%). There was no change in NIH-SOM rates over time.

**Conclusion** Patients with ruptured and unruptured aneurysms are increasingly treated with endovascular therapy over clipping. Mortality rates of ruptured aneurysms is improving regardless of treatment; whereas, mortality in unruptured aneurysms is only improving for surgical clipping.

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**P-024 TARGET ULTRA REGISTRY FOR THE TREATMENT OF SMALL INTRACRANIAL ANEURYSMS, PRELIMINARY RESULTS**

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**Purpose** The ULTRA Registry is an ongoing multicenter, national, prospective study designed to assess aneurysm occlusion rates and safety profile of the Target<sup>®</sup> Ultra coil and the Target<sup>®</sup> Nano coil (Stryker Neurovascular, Fremont, CA, USA) in the treatment of small intracranial aneurysms.

**Materials and methods** The ULTRA registry is a prospective database of patients with small ( $< 5$  mm) intracranial aneurysms treated with Target<sup>®</sup> Ultra and Target<sup>®</sup> Nano coils. The primary endpoint is target aneurysm re-intervention or target aneurysm rupture during the follow up period, and secondary endpoints include residual aneurysm and device related or procedural adverse events.

**Results** Patients were enrolled from December 2013 to January 2019. A total of 100 patients with 100 aneurysms were included, including 49 ruptured aneurysms. The mean age was  $56 \pm 11.6$  years, and 75% were female. Mean aneurysm volume was  $17.7 \pm 12.4$  mm<sup>3</sup> with mean maximum and minimum aneurysm diameters of  $3.7 \pm 0.9$  mm and  $2.6 \pm 0.7$  mm, respectively. Mean packing density was  $33.9\% \pm 16.6\%$ . Stent and balloon assistance was used in 21 and 19 cases, respectively. No flow diverters were used. Initial complete occlusion, minimal residual, and residual aneurysm were reported in 45, 52, and 3 cases, respectively. There were no coil related adverse events and no intraoperative aneurysm ruptures. There were 6 procedural related adverse events: 3 ischemic strokes, 1 cerebral hemorrhage from wire perforation, 1 groin hematoma, and 1 groin infection. There was one procedural related death in the patient with cerebral hemorrhage complication. First follow up using MR angiography at a mean of  $5.8 \pm 2.3$  months demonstrated complete occlusion, minimal residual, and residual aneurysm in 64% (42/66), 27% (18/66), and 9% (6/66) of cases. Second follow up using digital subtraction angiography at a mean of  $15.8 \pm 5.4$  months demonstrated complete occlusion, minimal residual and residual aneurysm in 62% (26/42), 26% (11/42), and 12% (5/42) of cases. To date, there have been 6 aneurysm retreatments (9%; 6/66).

**Conclusion** Initial results of the ULTRA Registry demonstrate adequate efficacy and safety profiles.

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