Racial Disparities in Anterior Cervical Discectomy and Fusion Outcomes

Brian Quang Truong, Linsen Thoppil Samuel, Zachary Lyon, Jesse B Seamon, Jonathan J Carmouche

INTRODUCTION:

There is a paucity of studies outlining the relationship of patient race to short-term cervical spine surgery outcomes. Identifying disparities in outcomes is critical for targeting public health resources to areas of greatest need and improving provider awareness of potential discrepancies. We assessed race as a potential risk factor for unfavorable outcomes after anterior cervical discectomy and fusion (ACDF) in a retrospective database study.

METHODS: The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database was queried for ACDF cases between 2011 and 2021. We identified comorbidities with increased burden in non-White races and compared the mean modified 5-item frailty index (mFI-5) between races. Selected variables were categorized as demographic, comorbidity, perioperative factor, or patient outcome. Demographic variables of interest included gender, age, and body mass index. The mFI-5 was calculated for each patient; select comorbidities were also analyzed (Table 1). Perioperative factors are listed in Table 2. Multivariate analyses were completed by model selection by Akaike information criterion in backward stepwise regression while controlling for demographics and comorbidities to isolate race as a possible independent risk factor (Table 3). Demographic and comorbidity variable exclusion models were also built; cases were then excluded to achieve matrix completion (Fig. 1). We determined the beta coefficient or odds ratio, as indicated, for perioperative factors and patient outcomes for Black or African American (AA), Asian or Pacific Islander (AP), and Native American (NA) patients as compared to White or Caucasian (CA) patients. Likelihood ratio testing (LRT) was used to compare regression models with and without race.

RESULTS:

After exclusion criteria were applied, 82,443 cases were identified and stratified by race, yielding 70,004 CA, 10,012 AA, 1,879 AP, and 548 NA patients. AA, AP, and NA races had significantly higher mean mFI-5s as compared to CA patients (0.693, CA; 0.942, $p < 0.001$, AA; 0.745, $p = 0.002$, AP; 0.754, $p = 0.032$, NA; Fig. 2); comorbidities with significantly differing rates were also identified (Table 1). When analyzing these patients for the selected perioperative and patient outcome variables (Table 2), AA and AP races were associated with significantly increased operative times ($\beta = 12.334$, $p < 0.001$, AA; $\beta = 12.349$, $p < 0.001$, AP). AA race was also associated with increased time from operation to discharge ($\beta = 0.537$, $p < 0.001$) and increased length of total hospital stay ($\beta = 0.744$, $p < 0.001$). Overall, race was a significant predictor for all perioperative factors ($p < 0.001$). AA race was additionally associated with increased risk of 30-day reoperation (OR = 1.286, $p < 0.001$). AA and AP races were both associated with increased odds of a discharge destination other than home (OR = 2.189, $p < 0.001$, AA; OR = 1.470, $p < 0.001$, AP). Overall, race was a significant predictor for 30-day reoperation ($p < 0.001$) and a discharge destination other than home ($p < 0.001$).

DISCUSSION AND CONCLUSION: We show significant disparities in comorbidity burden and outcomes in Black, Asian, and Native American patients undergoing ACDF when compared to White patients, with Blacks being independently associated with longer post-discharge and hospital stays. Further studies on the origin of these disparities and potential remedies are warranted.