Socioeconomic Disparities in the Utilization of Mechanical Thrombectomy for Acute Ischemic Stroke

Waleed Brinjikji, MD,* Alejandro A. Rabinstein, MD,† and Harry J. Cloft, MD, PhD*‡

Background: Previous studies have demonstrated that socioeconomic disparities in access to treatment of cerebrovascular diseases exist. We studied the Nationwide Inpatient Sample (NIS) to determine if disparities exist in utilization of mechanical thrombectomy for acute ischemic stroke. *Methods:* Using the NIS for the years 2006-2010, we selected all discharges with a primary diagnosis of acute ischemic stroke. Patients who received mechanical thrombectomy for stroke were identified by using the *International Classification of Diseases, Ninth Revision,* procedure code 39.74. We examined the utilization rates of mechanical thrombectomy by race/ethnicity (white, black, Hispanic, and Asian/Pacific Islander), income quartile (first, second to third, and fourth), and insurance status (Medicare, Medicaid, self-pay, and private). We also studied thrombectomy utilization rates at hospitals that performed thrombectomy. *Results:* From 2006 to 2010, 2,087,017 patients were hospitalized with a primary diagnosis of acute ischemic stroke; 8946 patients (.4%) received mechanical thrombectomy. Compared with white patients, black patients had significantly lower rates of overall mechanical thrombectomy utilization (odds ratio [OR] = .59, 95% confidence interval [CI] = .55-.64, $P < .0001$) and at centers that offered mechanical thrombectomy (OR = .44, 95% CI = .41-.47, $P < .0001$). Compared with patients in the highest income quartile, patients in the lowest income quartile had significantly lower rates of mechanical thrombectomy utilization both overall (OR = .66, 95% CI = .62-.70, $P < .0001$) and at centers that offered mechanical thrombectomy (OR = .80, 95% CI = .75-.84, $P < .0001$). Compared with patients with private insurance, self-pay patients had significantly lower mechanical thrombectomy utilization both overall (OR = .71, 95% CI = .64-.78, $P < .0001$) and at centers that offered mechanical thrombectomy (OR = .81, 95% CI = .74-.90, $P < .0001$). *Conclusions:* Significant socioeconomic disparities exist in the utilization of mechanical thrombectomy in the United States. **Key Words:** Mechanical thrombectomy—epidemiology—acute ischemic stroke—socioeconomics.

Introduction

The first endovascular clot retrieval device for acute ischemic stroke was approved by the US Food and Drug Administration in 2004. Since that time, endovascular clot retrieval has been evaluated in several published trials and has become an increasingly used treatment for a select group of patients with acute ischemic stroke.[1] Previous studies have demonstrated that significant socioeconomic disparities exist in the utilization of treatments such as tissue plasminogen activator (tPA) for acute ischemic stroke.[2,3] Using the Nationwide Inpatient Sample (NIS),

From the *Department of Radiology, Mayo Clinic, Rochester, Minnesota; †Department of Neurology, Mayo Clinic, Rochester, Minnesota; and ‡Department of Neurosurgery, Mayo Clinic, Rochester, Minnesota.

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Address correspondence to Waleed Brinjikji, MD, Department of Radiology, Mayo Clinic, OL 1-115, 200 SW First St, Rochester, MN 55905. E-mail: brinjikji.waleed@mayo.edu.

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we sought to determine if any socioeconomic disparities exist in the utilization of mechanical thrombectomy for the treatment of acute ischemic stroke.

Methods

Patient Population

We purchased the NIS hospital discharge database for the period 2006-2010 from the Healthcare Cost and Utilization Project of the Agency for Healthcare Research and Quality, Rockville, MD. The NIS is a hospital discharge database representing 20% of all inpatient admissions to nonfederal hospitals in the United States. Patients who had a primary diagnosis of acute ischemic stroke were identified using *International Classification of Diseases, Ninth Revision,* codes 433, 434, 436, 437.0, and 437.1. Patients undergoing endovascular thrombectomy were identified using the *International Classification of Diseases, Ninth Revision*, procedure code 39.74, "endovascular removal of obstruction from the head and neck," which was first introduced into the NIS database in 2006. Patients were stratified by race/ethnicity (white, black, Hispanic, and Asian/Pacific Islander), median neighborhood income quartile (first, second-third, and fourth), and insurance status (private, Medicare, Medicaid, and self-pay).

Outcomes

The primary outcome in this study was utilization rate of mechanical thrombectomy. We performed 2 separate analyses of mechanical thrombectomy utilization rate: (1) utilization rate of mechanical thrombectomy among all patients with a primary diagnosis of acute ischemic stroke and (2) utilization rate of mechanical thrombectomy among acute ischemic stroke patients treated at centers that offered mechanical thrombectomy. Hospitals that offered mechanical thrombectomy were identified as those hospitals treating at least 1 patient with mechanical thrombectomy in a given year.

Statistical Analysis

Chi-squared testing was used to study utilization rates of mechanical thrombectomy. When studying utilization rates between races, white race was used as the reference. When studying utilization rates between income quartile, the fourth (highest) income quartile was used as a reference. When studying thrombectomy utilization rates by insurance status, private insurance was used as a reference. Discharge weights were applied in this study. A multivariate logistic regression analysis was performed to determine variables independently associated with thrombectomy utilization both among all patients with a primary diagnosis of acute ischemic stroke and among those patients treated at centers offering thrombectomy. Variables included in this multivariate analysis included insurance status, race, income quartile, age, and gender.

Results

Patient Population

Between 2006 and 2010, a total of 2,087,017 patients were hospitalized with a primary diagnosis of acute ischemic stroke; 8946 patients (.4%) received mechanical thrombectomy. A total of 4,34,570 (20.8%) patients with acute ischemic stroke were treated at centers that offered mechanical thrombectomy. The utilization rate of mechanical thrombectomy at these centers was 2.1% (8946/434,570). Race/ethnicity data were available for 1,662,379 patients; 1,208,157 (72.7%) of patients were white, 282,635 (17.0%) patients were black, 126,532 (7.6%) patients were Hispanic, and 45,055 (3.7%) patients were Asian/Pacific Islander. Income quartile data were available for all patients; 623,746 patients (29.9%) were in the lowest income quartile, 1,039,301 patients (49.8%) were in the second- to third-income quartile, and 423,970 patients (20.3%) were in the highest income quartile. Insurance information was available for 2,071,837 patients (99.3%); 1,399,021 patients (67.5%) were Medicare, 140,821 patients (10.1%) were Medicaid, 98,185 (4.7%) were self-pay, and 433,810 patients (20.9%) had private insurance.

Race and Utilization

Black patients had significantly lower mechanical thrombectomy utilization rates compared with white patients (odds ratio [OR] = .59, 95% confidence interval [CI] = .55-.64, $P < .0001$). No significant difference existed in mechanical thrombectomy utilization rates between Hispanic and white patients (OR = .97, 95% CI = .89-1.06, $P = .53$). Compared with white patients, black patients were significantly more likely to be treated at centers offering thrombectomy (OR = 1.45, 95% CI = 1.43-1.46, $P < .0001$); however, when studying mechanical thrombectomy utilization rates at these centers, black patients had significantly lower thrombectomy utilization rates than white patients (OR = .44, 95% CI = .41-.47, $P < .0001$). Compared with white patients, Hispanic patients had similar rates of treatment at centers offering mechanical thrombectomy (OR = 1.01, 95% CI = 1.00-1.03, $P = .07$). Utilization of mechanical thrombectomy at these centers was similar for whites and Hispanics (OR = .96, 95% CI = .88-1.05, $P = .38$). These data are summarized in Table 1.

Income Quartile and Utilization

Patients in the lowest income quartile had significantly lower mechanical thrombectomy utilization rates compared with patients in the highest income quartile (OR = .66, 95% CI = .62-.70, $P < .0001$). The same was