Acute Ischemic Stroke in Women: Does Care Differ?

Drs. Kim and Sheth elaborate on their study of trends seen when routing women with large vessel occlusion stroke to comprehensive versus primary stroke centers.

With Youngran Kim, PhD, and Sunil A. Sheth, MD

At the 2021 Society of NeuroInterventional Surgery annual meeting, your group presented on care trends for women with acute stroke, revealing that women with large vessel occlusion (LVO) were less likely than men to be taken to a comprehensive stroke center (CSC).[1] What first led you to pursue this topic?

Stroke affects more women than men, and their treatment may differ as well. Previous studies have shown that women may be less likely to be treated with clot-busting medications. We wanted to assess whether there were differences in access for women with stroke with the latest stroke treatments. Nowadays, we have endovascular therapy (EVT) techniques in which we can safely, rapidly, and effectively open up the blocked blood vessels that cause LVO stroke. These life-saving treatments have brought about a major change in our ability to restore brain function after this type of stroke. Therefore, we wanted to study whether women have equal access to this treatment, which is performed predominantly at CSCs.

What were the study design and endpoints?

We conducted a cross-sectional study of patients treated for LVO at 10 certified stroke centers across the greater Houston area. Of the 10 hospitals, six were primary stroke centers (PSCs) and four were CSCs. Our primary endpoint was routing destination (CSC vs PSC). We examined factors associated with being routed to CSCs and investigated whether or not women were being equally routed to CSCs.

How would you summarize the main trends and conclusions from the study?

We identified nearly 500 patients with LVO who were treated at these 10 different hospitals. Overall, the majority of these patients were routed to CSCs. However, women with LVO were 11% less likely to be routed to CSCs relative to men.

In terms of distance and travel time, what did this study reveal about the decision-making and protocols behind triaging patients to a CSC versus a PSC? What other factors are at play in this process?

We calculated distance and travel time to the nearest CSC and PSC based on the patients' home addresses. We found that patients who lived closer to CSCs were more likely to be routed to a CSC. On the other hand, many LVO patients who were routed to PSCs lived in areas with CSCs equidistant to the patients who were taken to CSCs. These findings suggest that those patients who were taken to PSCs could have been brought to CSCs without any substantial delays.

Your study included the CSCs and PSCs in the greater Houston area. How significant do you think location is to these observed trends? Do you think the same would be seen in a more urban or more rural area?

The greater Houston metropolitan area has a diverse population and includes many PSCs and CSCs. We believe our setting using a multihospital registry in a metropolitan city and covering a large geographic area will mirror

other urban areas but not rural areas, where patients have to travel much further to either a PSC or CSC. Although emergency medical services agencies are regulated at city and county levels and all are required to undergo training in prehospital stroke scales, the greater Houston area is attended to by multiple agencies. This may affect routing practice, and we couldn't account for that.

When evaluating the results between men and women, you found that the significant differences were median age (male, 65 years [interquartile range {IQR}, 59-74 years] vs female, 73 years [IQR, 60-83 years]) and median National Institutes of Health Stroke Scale (NIHSS; male, 12 [IQR, 5-18] vs female, 14 [IQR, 8-20]). How does this fit in with what we currently know about stroke trends in women?

The greater median NIHSS in women could be partially explained by age differences between men and women because age is also a contributing factor to sex differences in stroke severity. These findings are consistent with other studies and can affect management and outcomes of stroke. Elderly women are much more likely to live alone and be socially isolated, so there may not be anyone around to recognize the stroke, which will cause a delay in seeking care. Older age at onset and severe stroke in women compounded by a higher likelihood of age-related risk factors can contribute to the higher rate of death from stroke and higher risk for disability after stroke in women.

Female sex and longer distance to a CSC were significantly associated with a higher chance of presenting to a PSC. What are your hypotheses for why sex was the major baseline difference for patients presenting to a CSC versus PSC, even when presentation characteristics between men and women were comparable?

Some prior studies have suggested that women are more likely to present with stroke "mimics," or less common symptoms of stroke. Thus, the diagnosis may have been underrecognized in the prehospital setting. Ultimately, the reason why women were less likely to be routed to CSCs is not evident. Of particular interest would be the possibility of biases in treatment, and further study is needed to explore whether these played or continue to play a role.

More generally, what do we currently know about the lower rates of reperfusion therapies in women with acute ischemic stroke compared to men, and what is still unknown?

Other studies have found lower rates of intravenous tissue plasminogen activator (IV tPA) treatment and longer door-to-imaging and door-to-needle times, but less is known about the disparity in rates of EVT treatment. In large clinical trials and prospective registries of EVT, enrollment of women has been roughly equal to men.

Along with the differences in routing demonstrated in your study, are there any further differences in care and outcomes when women versus men present to a PSC or CSC?

We found that IV tPA rates were significantly higher at CSCs compared to PSCs and also confirmed that the interhospital transfer that would be required for EVT performance in LVO patients routed to PSCs could also reduce rates of treatment. These suggest that sex differences in thrombolysis rates and eligibility for EVT could be affected by prehospital routing disparities.

You noted that further study into the reasoning behind this disparity is needed. What steps can be taken now to address this problem?

Appropriating triage in prehospital routing is determined by the accuracy of predicting LVOs by emergency medical technicians. Whether LVOs in women are less likely to be identified using current screening tools due to older age, premorbidity, or nontraditional symptoms needs to be investigated. ■

1. Tariq MB. Women with large vessel occlusion acute ischemic stroke are less likely to be routed to comprehensive stroke centers. Presented at: Society of NeuroInterventional Surgery annual meeting; July 26-29, 2021; Colorado Springs, Colorado.

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