

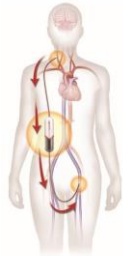
Outcomes of Transcarotid Artery Revascularization (TCAR) in a Community Setting Serving Rural Populations: A Single-Institutional Review

Rebekah Bjorklund, MD¹; Lutfi Barghuthi, MD¹; Mya Phelps, BS¹; Sarah Stokke, BS¹; Rebecca Swindall, MS¹; Maham Rahimi, MD²; Mark Robbins, MD³

¹University of Texas at Tyler; ²Houston Methodist; ³Vascular Tyler

INTRODUCTION

Transcarotid artery revascularization (TCAR) has emerged as a vital alternative to traditional carotid endarterectomy (CEA) for treating carotid artery stenosis. Numerous studies have validated TCAR's efficacy, with outcomes comparable to CEA. This study aims to evaluate the safety and effectiveness of TCAR in a large, single-institution rural setting, highlighting its feasibility and benefits in rural communities with limited healthcare resources.



METHODS

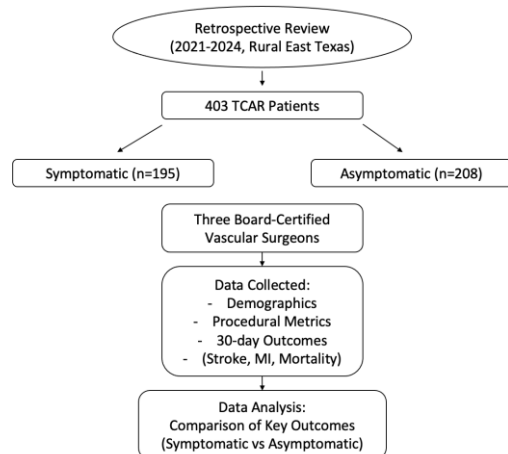


Table 1. Patient demographics by symptomatic due to previous stroke or transient ischemic attack versus asymptomatic patients.

	Symptomatic 195 (48.3)	Asymptomatic 208 (51.6)	p-value
Age, mean (sd)	72 (8)	72 (8)	
Male sex, n (%)	112 (57.7)	107 (51.4)	
High risk for carotid endarterectomy, n (%)	175 (89.7)	169 (81.3)	0.02
History of COVID	29 (14.9)	28 (13.5)	
Beta-blocker morning of surgery, median (IQR)	0 (0-1)	0 (0-1)	
ASA* physical status classification, n (%)			
Normal Health	0 (0)	0 (0)	
Mild systemic disease	6 (3.1)	11 (5.3)	
Severe disease	172 (88.2)	183 (88)	
Severe systemic disease w/ threat to life	17 (8.7)	14 (6.7)	
Re-operation same side	5 (2.6)	3 (1.5)	

*American Society of Anesthesiologists

Table 2. Procedure data by symptomatic due to previous stroke or transient ischemic attack versus asymptomatic patients.

	Symptomatic 195 (48.3)	Asymptomatic 208 (51.6)	p-value
Surgery time in minutes, median (IQR)	50 (43-60)	48 (41-56)	0.009
Same day return to OR or IR, n (%)	5 (2.6)	4 (1.9)	
Bradycardia, n (%)	27 (13.9)	30 (14.5)	
Conversion to open surgery	1 (0.5)	0 (0)	
Flow time in minutes, median (IQR)	6.5 (2-8)	3 (2-7)	0.04
Contrast used in cubic centimeters, median (IQR)	30 (21-50)	30 (21-50)	
Hypotension, n (%)	27 (13.9)	31 (15)	
# of stents used, median (IQR)	1 (1-1)	1 (1-1)	
# of times pre-stent balloon used, median (IQR)	1 (1-1)	1 (1-1)	
# of times post-stent balloon used, median (IQR)	0 (0-0)	0 (0-0)	

Table 3. Post procedure data by symptomatic due to previous stroke or transient ischemic attack versus asymptomatic patients.

	Symptomatic 195 (48.3)	Asymptomatic 208 (51.6)	p-value
<30 days after operation			
Myocardial infarction, n (%)	1 (0.5)	0 (0)	
Stroke, n (%)	13 (6.8)	8 (3.9)	
Death, n (%)	1 (0.5)	1 (0.5)	
ICU length of stay, median (min-max)	0 (0-1)	0 (0-1)	
>30 days after operation			
Myocardial infarction, n (%)	12 (6.2)	10 (4.8)	
Stroke, n (%)	22 (11.3)	7 (3.4)	0.002
Death, n (%)	11 (5.7)	9 (4.3)	
Neurological change, n (%)	15 (7.7)	9 (4.3)	

RESULTS

The cohort's mean age was 72 years (SD \pm 8), with a male prevalence of 57.7% in the symptomatic group and 51.4% in the asymptomatic group. Symptomatic patients had significantly longer median procedure times (58 minutes) compared to asymptomatic patients (50 minutes, $p = 0.009$), as well as longer flow-reversal times (6.5 minutes vs. 3 minutes, $p = 0.04$). The rates of major complications, including myocardial infarction (MI), stroke, and mortality, were low across both groups. Within 30 days, stroke rates were higher in the symptomatic group (6.8% vs. 3.9%), MI and mortality rates remained low (MI: 0.5% symptomatic, 0% asymptomatic; mortality: 0.5% both groups). After 30 days, stroke incidence was significantly higher in symptomatic patients (11.3% vs. 3.4%, $p = 0.002$), although mortality rates were similar between the groups (5.7% symptomatic, 4.3% asymptomatic).

DISCUSSION

This study highlights the viability and safety of TCAR as a minimally invasive treatment option for carotid artery stenosis, even in rural settings with constrained healthcare resources. The favorable outcomes observed in both symptomatic and asymptomatic patients suggest that TCAR can serve as a viable alternative to CEA, not only in high-volume centers but also in rural communities where access to advanced vascular care may be limited. Importantly, broader adoption of TCAR in these populations could help bridge disparities in stroke prevention by offering a less invasive option with comparable outcomes to CEA. Further studies are warranted to refine patient selection and procedural protocols, particularly in rural settings. Future research should focus on plaque morphology, as well as time-to-event analyses to identify high-risk patients. A better understanding of these factors could help determine which patients are at increased risk for post-operative stroke, allowing for more careful observation and tailored management strategies.

CONCLUSIONS

These findings support the broader adoption of TCAR as a safe and effective alternative to CEA, even in rural communities with limited healthcare resources. By offering a minimally invasive approach with comparable outcomes, TCAR has the potential to improve access to advanced vascular care. Further research is necessary to optimize patient selection and procedural techniques, ensuring the best possible outcomes for high-risk individuals.