9-1-2021

"Stronger but Not Faster": Flipped Classroom Teaching Significantly Improves Resident's Skills but Not Speed

Chinmayee Potti
Henry Ford Health, cpotti1@hfhs.org

Joshua J. Eby
jeby1@hfhs.org

Ali Rteil
Henry Ford Health, ARteil1@hfhs.org

Ann Woodward
Henry Ford Health, AWOODWA1@hfhs.org

Alexander D. Shepard
Henry Ford Health, ashepar2@hfhs.org

See next page for additional authors

Recommended Citation

Potti C, Eby J, Rteil A, Woodward A, Shepard A, and Kabbani L. "Stronger but Not Faster": Flipped Classroom Teaching Significantly Improves Resident's Skills but Not Speed. J Vasc Surg 2021; 74(3):E159-E160.

Authors
Chinmayee Potti, Joshua J. Eby, Ali Rteil, Ann Woodward, Alexander D. Shepard, and Loay S. Kabbani

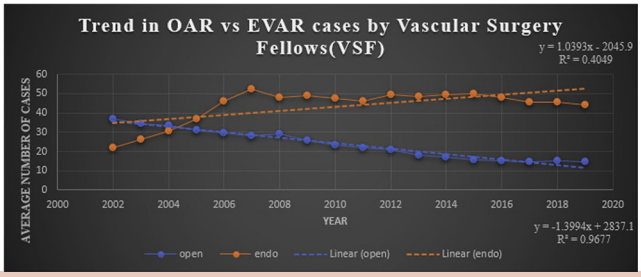

Fig 1. Mean numbers of cases logged by vascular surgery fellows (VSF) for total open AAA repair (OAR) and endovascular AAA repair (EVAR) procedures from 2002 to 2019. *AAA*, Abdominal aortic aneurysm.

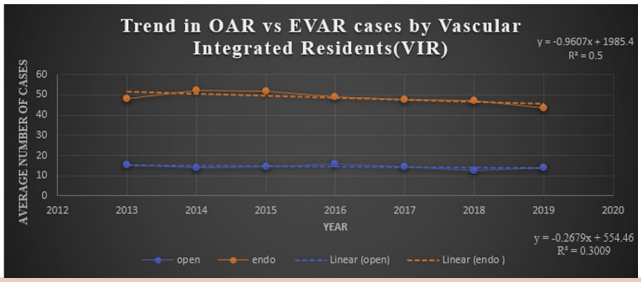

Fig 2. Mean numbers of cases logged by vascular surgery residents for total open AAA repair (OAR) and endovascular AAA repair (EVAR) procedures from 2012 to 2019. *AAA*, Abdominal aortic aneurysm.

performed by VIR mirrors this trend. Given this significant reduction, vascular surgery training programs may need to introduce advanced training programs or fellowships in OAR at high-volume centers to ensure that trainees have the expertise to perform such a high-risk procedure safely and independently.

Author Disclosures: J. Das Gupta: Nothing to disclose; **R. De Martino:** Nothing to disclose; **N. Elsayed:** Nothing to disclose; **M. A. Khan:** Nothing to disclose; **M. B. Malas:** Nothing to disclose; **I. Naazie:** Nothing to disclose.

IP171.

"Stronger but Not Faster": Flipped Classroom Teaching Significantly Improves Resident's Skills but Not Speed

Chinmayee Potti, Joshua Eby, Ali Rteil, Ann Woodward, Alexander Shepard, Loay Kabbani. Henry Ford Health System, Detroit, Mich

Objective: Flipped classroom teaching is a nontraditional education model where instructional content is delivered outside the classroom. This constructivist approach emphasizes self-direction, active inquiry; the instructor's role is to foster critical reflection and facilitate the application and understanding of concepts. Our objective was to study the difference in time taken and quality of patch graft angioplasty performed by residents with and without flipped teaching.

Methods: The study was set in a skills simulation teaching session overseen by attending surgeons. The intervention consisted of introducing a video outlining the technical aspects of patch graft angioplasty, watched before the session. The first group (2018 postgraduate year [PGY] 1 and 2 residents) was given instructions at the time of the class without a prior educational video or resources (Figs 1 and 2). The second group (2019, 2020 PGY 1 and 2 residents) was asked to watch a 20-minute video on the technical aspects of the procedure before the class. Participants then performed a standardized patch graft closure of a 1 cm arteriotomy using a polytetrafluoroethylene patch. The groups were timed. The quality of the closure was tested by assessing the number of leaks and the quantity of leak of the patch (Fig 3). Bivariate analysis sample *t*-tests were used for statistical analysis. *P* value <.05 was considered significant. Pre- and post-session surveys were conducted to assess residents' experience.

Results: 1Forty-two residents (PGY 1 and 2) were enrolled in the study, 15 in nonintervention group 1 and 27 in intervention group 2, compared with 7 staff vascular surgeons. The mean completion time was 26 minutes (group 1) vs 27 minutes (group 2), $P = .6$. The staff completion time was 12 minutes, $P = .001$. The number of major leaks (not needle holes) was 2.0 (group 1) vs 1.6 (group 2), $P = .007$, none for staff. The total quantity of leak was 42 mL (group 1) vs 15 mL (group 2), $P = .0001$ (Table I). There was perceived improvement in skill on analyzing pre- and post-session surveys (Table II).

Conclusions: A structured educational intervention, watching a video of a procedure before the skills session, did not change the time needed to complete the skill. There was improvement in the technical outcome of the procedure defined by a decrease in the total quantity of leak. Reversed classroom teaching significantly improves resident's skill, not speed. There was also a perceived improvement in skill by participants. This is a pilot study and further instructional outcomes are being studied.

Fig 1. Clip of video introducing the instruments.

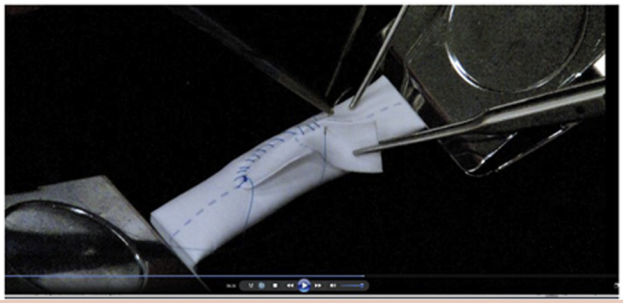

Fig 2. Clip of video detailing the operative technique.

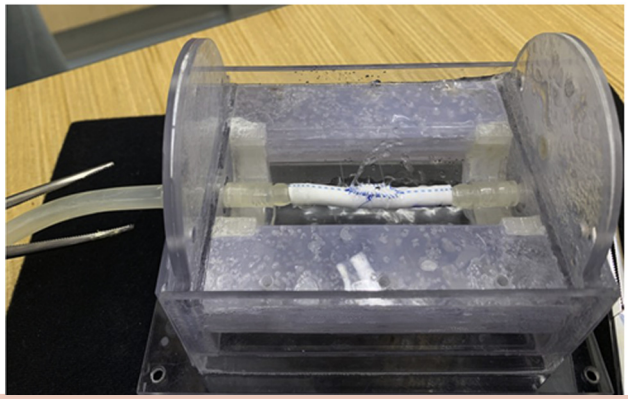

Fig 3. The anastomosis vessel segments were attached to a 3D-printed Plexiglas box, which was attached to a bag of saline pressurized at 150 mm Hg, and opened for 5 seconds. In this way, the anastomoses were tested for leaks that were quantified as minor (needle holes) and major (obvious defects), and the total leaked volume was also measured.

Table I. Anastomosis time and quality results

	Group 1	Group 2	*P* value	Staff surgeons
Intervention	No preparation	20-minute video		
Number of subjects (n)	15	27		7
Mean time for completion	1541 seconds (26 minutes ±6 minutes)	1627 seconds (27 minutes ±7 minutes)	.6	695 seconds (12 minutes) ($P = .001$)
Total quantity of leak (mL)	42 ± 10.9	15 ± 4.6	.001	
Number of major leaks	2.0 ± 1.2	1.67 ± 1.1	.38	None

Table II. Pre- and Post-session survey results

	Pre-test	Post-test	*P* value
Number of subjects (n)	14	14	
I am comfortable with using instruments particular to vascular surgery, including Castroviejo needle drivers, Potts scissors, and Gerald forceps.	2.85 ± 1.05	3.9 ± 0.59	.0039
I am comfortable attempting a vascular anastomosis in the operating room.	2.07 ± 1.16	3 ± 1.06	.036

Author Disclosures: J. Eby: Nothing to disclose; **L. Kabbani:** Nothing to disclose; **C. Potti:** Nothing to disclose; **A. Rteil:** Nothing to disclose; **A. Shepard:** Nothing to disclose; **A. Woodward:** Nothing to disclose.

IP173.

Racial and Ethnic Differences in Long-term Outcomes After Elective Endovascular Repair of Abdominal Aortic Aneurysm

Christina Marcaccio,[1] Livia de Guerre,[1] Priya Patel,[1] Jacqueline E. Wade,[1] Peter Soden,[2] Kakra Hughes,[3] Marc L. Schermerhorn[1]. [1]Beth Israel Deaconess Medical Center, Boston, Mass; [2]Brown University, Providence, RI; [3]Howard University and Hospital, Washington, DC

Objective: Racial and ethnic disparities in perioperative outcomes after abdominal aortic aneurysm (AAA) repair have been described, but differences in long-term outcomes are poorly understood. Our aim was to identify racial/ethnic differences in late aneurysm rupture, reintervention, and survival after elective endovascular AAA repair (EVAR) and to explore potential mechanisms underlying these differences.

Methods: We identified patients undergoing elective EVAR for AAA in the Vascular Quality Initiative from 2003 to 2015 with linkage to Medicare claims for long-term outcomes. Our primary outcome was late rupture. Secondary outcomes were reintervention, mortality, and loss to imaging follow-up (defined as no imaging studies within any 18-month period). We used Kaplan-Meier and Cox regression analyses to evaluate these outcomes by race/ethnicity and explore potential contributing factors, including procedure year, demographic characteristics (age, sex, hypertension, ever-smoker), and anatomic characteristics (AAA diameter, iliac aneurysm, completion endoleak).

Results: Of 9956 patients, 9296 (93%) were non-Hispanic white, 348 (3.5%) were black, 204 (2.1%) were Hispanic, and 108 (1.0%) were Asian. The median follow-up after EVAR was >2 years for all groups. At 4 years, rupture rates were 6.8% in blacks, 5.2% in Asians, 4.4% in Hispanics, and 4.0% in whites (Fig). Compared with whites, rupture rates were significantly higher in blacks (hazard ratio [HR]: 1.9; 95% confidence interval [CI]: [1.2-2.9]; $P = .009$) but were similar in Hispanics (HR: 1.1; 95% CI: [0.52-2.3]; $P = .82$). Low numbers prevented meaningful assessment of rupture rates in Asians (HR: 1.9; 95% CI: [0.84-4.2]; $P = .13$). Compared with whites, blacks also had higher rates of reintervention (4-year: 19% vs 14%; HR: 1.5; 95% CI: [1.2-2.0]; $P = .002$) and trended toward higher mortality (4-year: 41% vs 31%; HR: 1.2; 95% CI: [0.98-1.5]; $P = .08$) but did not have higher loss to imaging follow-up (4-year: 28% vs 28%; HR: 1.2; 95% CI: [0.93-1.6]; $P = .16$) (Table). In contrast, Hispanics had higher loss to imaging follow-up compared with whites (4-year: 34% vs 28%; HR: 1.6; 95% CI: [1.2-2.2]; $P = .001$) but had similar rates of reintervention (4-year: 16% vs 14%; HR: 1.2; 95% CI: [0.83-1.8]; $P = .30$) and mortality (4-year: 31% vs 31%; HR: 0.87; 95% CI: [0.64-1.2]; $P = .38$). In adjusted analyses, the associations between race/ethnicity and long-term outcomes were not impacted by procedure year, demographic characteristics, or anatomic characteristics.

Conclusions: Black patients had higher rates of late rupture and reintervention after elective EVAR. These outcome disparities did not appear to be due to loss to imaging follow-up or differences in demographic or anatomic risk factors. Meanwhile, Hispanic patients had higher loss to imaging follow-up. A larger-scale investigation of current practice patterns and their impact on racial/ethnic disparities in late outcomes after EVAR is needed to identify tangible targets for improvement.

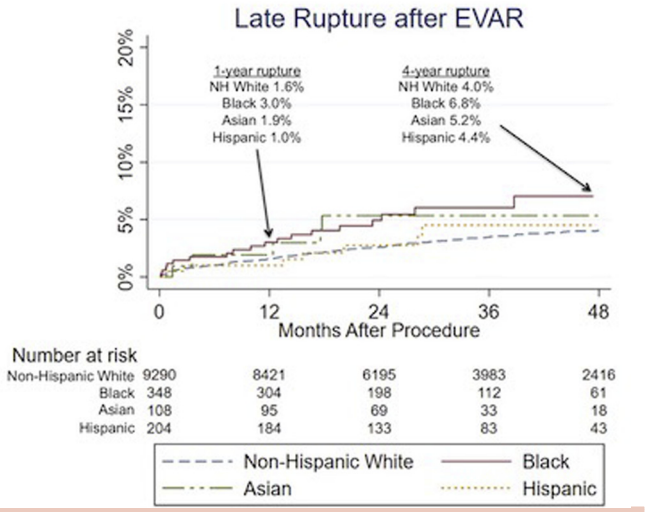

Fig. Cumulative rates of late abdominal aortic aneurysm (AAA) rupture after elective endovascular AAA repair (EVAR) by race/ethnicity. Standard errors are <10% across all time points for each group.

Table. Unadjusted Cox regression for long-term outcomes after elective endovascular abdominal aortic aneurysm (*AAA*) repair (EVAR) by race/ethnicity, with non-Hispanic white race as reference

	HR	95% CI	*P* value
Late AAA rupture			
Black	1.9	1.2-2.9	0.009
Asian	1.9	0.84-4.2	0.13
Hispanic	1.1	0.52-2.3	0.82
AAA reintervention			
Black	1.5	1.2-2.0	0.002

(Continued on next page)