the time to successful access, increased odds of first pass success, reduced odds of significant hematoma, and accidental venipuncture in patients randomized to ultrasound guided access compared with control. In sub-group analysis there was no significant reduction in time to engage the radial artery, presumably due to its superficial and more predictable location, however, more trials utilizing ultrasound guided radial access are warranted. Albeit a small mean difference of 17 seconds to successful access, this could prove important in emergent situations.

DECLARATION OF INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Abdul Aziz A. Asbeutah, MD[a]*
Akram M. Asbeutah, PhD[b]
Uzoma N. Ibebuogu, MD[c]
Rami N. Khouzam, MD[c]

[a] Department of Internal Medicine, University of Tennessee Health Sciences Center, Memphis, Tennessee
[b] Faculty of Allied Health Sciences, Health Sciences Center, Kuwait University, Kuwait City, Kuwait
[c] Division of Cardiology, University of Tennessee Health Sciences Center, Memphis, Tennessee

23 February 2021

1. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, de Ferranti S, Després JP, Fullerton HJ, Howard VJ, Huffman MD, Judd SE, Kissela BM, Lackland DT, Lichtman JH, Lisabeth LD, Liu S, Mackey RH, Matchar DB, McGuire DK, Mohler ER 3rd, Moy CS, Muntner P, Mussolino ME, Nasir K, Neumar RW, Nichol G, Palaniappan L, Pandey DK, Reeves MJ, Rodriguez CJ, Sorlie PD, Stein J, Towfighi A, Turan TN, Virani SS, Willey JZ, Woo D, Yeh RW, Turner MB, American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics−2015 update: a report from the American Heart Association. *Circulation* 2015;131:e29–322.
2. Valgimigli M, Gagnor A, Calabró P, Frigoli E, Leonardi S, Zaro T, Rubartelli P, Briguori C, Andò G, Repetto A, Limbruno U, Cortese B, Sganzerla P, Lupi A, Galli M, Colangelo S, Ierna S, Ausiello A, Presbitero P, Sardella G, Varbella F, Esposito G, Santarelli A, Tresoldi S, Nazzaro M, Zingarelli A, de Cesare N, Rigattieri S, Tosi P, Palmieri C, Brugaletta S, Rao SV, Heg D, Rothenbühler M, Vranckx P, Jüni P, MATRIX Investigators. Radial versus femoral access in patients with acute coronary syndromes undergoing invasive management: a randomised multicentre trial. *Lancet* 2015;385:2465–2476.
3. Dudeck O, Teichgraeber U, Podrabsky P, Lopez Haenninen E, Soerensen R, Ricke J. A randomized trial assessing the value of ultrasound-guided puncture of the femoral artery for interventional investigations. *Int J Cardiovasc Imaging* 2004;20:363–368.
4. Gedikoglu M, Oguzkurt L, Gur S, Andic C, Sariturk C, Ozkan U. Comparison of ultrasound guidance with the traditional palpation and fluoroscopy method for the common femoral artery puncture. *Catheter Cardiovasc Interv* 2013;82:1187–1192.
5. Katırcıbaşı MT, Güneş H, Çağrı Aykan A, Aksu E, Özgül S. Comparison of ultrasound guidance and conventional method for common femoral artery cannulation: a prospective study of 939 patients. *Acta Cardiol Sin* 2018;34:394–398.
6. Seto AH, Abu-Fadel MS, Sparling JM, Zacharias SJ, Daly TS, Harrison AT, Suh WM, Vera JA, Aston CE, Winters RJ, Patel PM, Hennebry TA, Kern MJ. Real-time ultrasound guidance facilitates femoral arterial access and reduces vascular complications: FAUST (Femoral Arterial Access With Ultrasound Trial). *JACC Cardiovasc Interv* 2010;3:751–758.
7. Slattery MM, Goh GS, Power S, Given MF, McGrath FP, Lee MJ. Comparison of ultrasound-guided and fluoroscopy-assisted antegrade common femoral artery puncture techniques. *Cardiovasc Intervent Radiol* 2015;38:579–582.
8. Stone P, Campbell J, Thompson S, Walker J. A prospective, randomized study comparing ultrasound versus fluoroscopic guided femoral arterial access in noncardiac vascular patients. *J Vasc Surg* 2020;72:259–267.
9. Nguyen P, Makris A, Hennessy A, Jayanti S, Wang A, Park K, Chen V, Nguyen T, Lo S, Xuan W, Leung M, Juergens C. Standard versus ultrasound-guided radial and femoral access in coronary angiography and intervention (SURF): a randomised controlled trial. *EuroIntervention* 2019;15:e522–e530.
10. Seto AH, Roberts JS, Abu-Fadel MS, Czak SJ, Latif F, Jain SP, Raza JA, Mangla A, Panagopoulos G, Patel PM, Kern MJ, Lasic Z. Real-time ultrasound guidance facilitates transradial access: RAUST (Radial Artery access with Ultrasound Trial). *JACC Cardiovasc Interv* 2015;8:283–291.
11. Zaremski L, Quesada R, Kovacs M, Schernthaner M, Uthoff H. Prospective comparison of palpation versus ultrasound-guided radial access for cardiac catheterization. *J Invasive Cardiol* 2013;25:538–542.
12. Marquis-Gravel G, Tremblay-Gravel M, Lévesque J, Généreux P, Schampaert E, Palisaitis D, Doucet M, Charron T, Terriault P, Tessier P. Ultrasound guidance versus anatomical landmark approach for femoral artery access in coronary angiography: A randomized controlled trial and a meta-analysis. *J Interv Cardiol* 2018;31:496–503.

https://doi.org/10.1016/j.amjcard.2021.03.002

Transcatheter Edge to Edge Repair With MitraClip Among Renal Transplant Recipients

Renal transplant recipients are at higher risk for development of valvular heart disease, including mitral regurgitation.[1] The management of severe mitral regurgitation among renal transplant recipients poses a challenging dilemma. Renal transplant recipients have high postoperative risk with surgical mitral valve replacement, owing to their multiple comorbidities, immunosuppressed state and prior multiple surgeries.[1] Transcatheter Edge to Edge Repair (TEER) with MitraClip (Abbott Structural, Menlo Park, CA) is currently approved for patients with severe symptomatic primary mitral regurgitation at high risk for surgery, as well as patients with moderate-to-severe or severe symptomatic secondary mitral regurgitation on optimal guideline-directed medical therapy.[2,3] Interest has been directed to exploring the outcomes of TEER among the high-risk group of patients with prior renal transplant. Hence, we aimed to evaluate the outcomes of TEER among this group of patients using a large claim database.

The National Readmissions Database (2014 to 2018) was used to identify hospitalizations for TEER using International Classification of Diseases, Ninth and Tenth editions (ICD-9 and ICD-10) procedure codes “35.97 and 02UG3JZ.” Renal transplant recipients were identified using ICD-9 and ICD-10 diagnostic codes “V42.0 and Z94.0.” The study was designed to compare in-hospital mortality among renal transplant recipients versus patients who have not had transplants. Multivariable regression analysis was conducted to adjust for clinical variables that were significant on univariable analysis. This study was exempt from institutional review board evaluation, since data from the NRD are publicly available and devoid of personal identifiers. All statistical analyses were conducted using the SPSS software (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp Released 2017).

Among 23,835 hospitalizations for TEER, 134 hospitalizations were among renal transplant recipients.

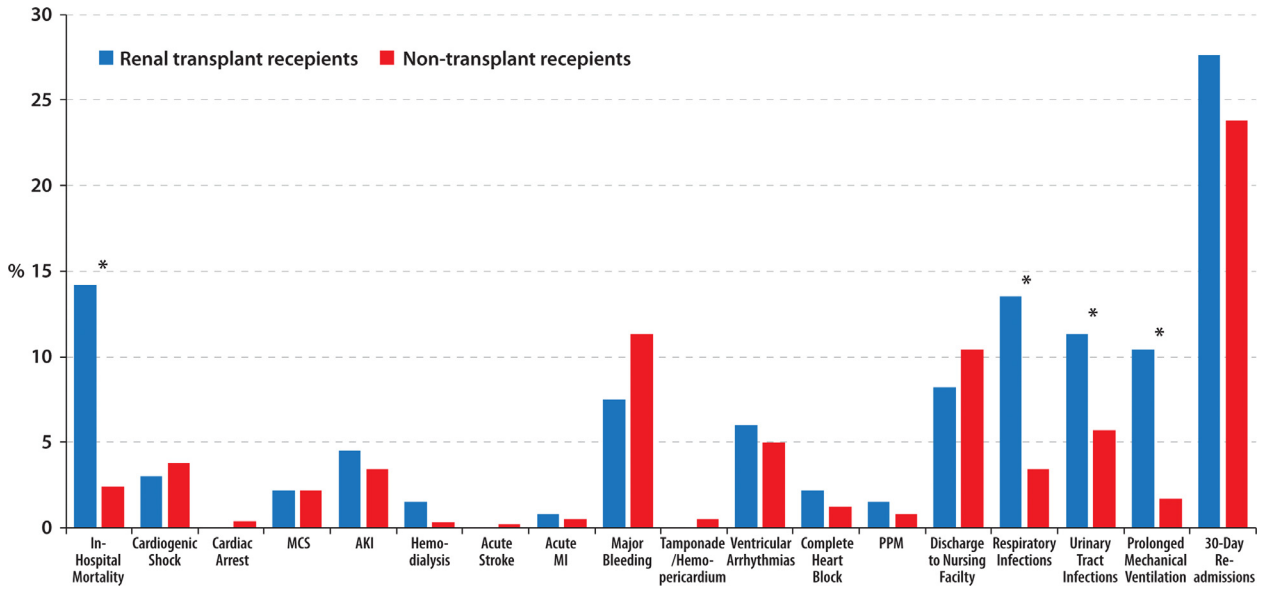

Figure 1. Outcomes of TEER among renal transplant recipients versus none.

number of renal transplant recipients undergoing TEER increased during the study years (12 in 2014 vs 53 in 2018, $p_{trend}<0.001$). Compared with nontransplant recipients, renal transplant recipients undergoing TEER were younger (67.9 ± 11.7 vs 77.6 ± 10.8 years, p = 0.80), with similar female representation (44% vs 46.6%, p = 0.68), and similar prevalence of diabetes, chronic liver disease, peripheral vascular disease, prior myocardial infarction, prior stroke, prior coronary artery bypass grafting, chronic dialysis, and obesity. Renal transplant recipients were more likely to have chronic systolic heart failure (57.5% vs 42.5%, p <0.001) and less likely to have chronic lung disease (14.2% vs 27.9%, p <0.001). TEER was performed among patients presenting with cardiogenic shock similarly across both groups (1.5% vs 0.8%, p = 0.67).

The crude in-hospital mortality was higher among renal transplant recipients versus nontransplant recipients (14.2% vs 2.4%, odds ratio (OR) 6.53; 95% confidence interval (CI) 4.28 to 9.96, p <0.001). Similar findings were observed after multivariable adjustment (adjusted-OR 6.55; 95% CI 4.15 to 10.34, p <0.001). On multivariable analysis, there were no differences between both groups in the rates of cardiac arrest, cardiogenic shock, mechanical circulatory support, acute kidney injury, requirement of hemodialysis, acute MI, acute stroke, major bleeding, cardiac tamponade/hemopericardium, ventricular arrhythmias, complete heart block, pacemaker implantation and discharges to nursing facilities. Renal transplant recipients were associated with higher rates of respiratory tract infections (adjusted-OR 4.19; 95% CI 2.75 to 6.39), urinary tract infections (adjusted-OR 2.27; 95% CI 1.69 to 3.06) and prolonged mechanical ventilation (>96 hours) (adjusted-OR 4.41; 95% CI 3.31 to 6.20). Adjusted analysis showed no difference among both groups in the rates of 30-day nonelective readmissions (27.6% vs 23.8% adjusted-OR 1.31; 95% CI 0.58 to 2.96, p <0.001; **Figure 1**).

Our analysis represents the first report describing the outcomes of TEER among renal transplant recipients. We observed an increase in the utilization of TEER among renal transplant recipients during the study years. TEER among renal transplant recipients was associated with significantly higher in-hospital mortality, infection related complications and prolonged mechanical ventilation. There was no difference in 30-day nonelective readmissions between renal transplant recipients versus none.

Surgical data have suggested high mortality and postoperative complications after surgical mitral valve replacement.[1] Our analysis suggested a similar signal for higher in-hospital mortality and post procedure complications among renal transplant recipients undergoing TEER. The exact underlying mechanisms for the higher mortality among renal transplant recipients in our study are unclear. However, the observed higher rate of infection-related complications and prolonged mechanical ventilation could have contributed to the higher in-hospital mortality among such vulnerable group of patients. Other studies have demonstrated higher risk for postoperative infections among renal transplant recipient owing to their chronic immunosuppressed state.[1] Our analysis also showed that among those discharged after TEER, there was no difference in 30-day nonelective readmissions between renal transplant recipients and nontransplant recipients. The interpretation of our study findings is limited by the observational nature of the analysis. Also, the small sample size might have limited the detection of true differences among the study groups. Overall, our findings emphasize the high-risk nature of renal transplant recipients when evaluated for mitral valvular interventions. Heart teams should be cognizant about the importance of careful patient selection when evaluating for TEER. In addition, attentive periprocedural care is needed with prompt management of anticipated postprocedural complications. Further studies are warranted to better characterize the long-term outcomes of TEER among renal transplant recipients.

Disclosures

Sachin Goel, MD, is on the Speakers Bureau for Abbott Structural Heart.

Ayman Elbadawi, MD[a]*
Mohammed Elzeneini, MD[b]
Mohamed Omer, MD[c]
Michael Megaly, MD[d]
Hesham Abowali, MD[a]
Ahmed H. Mohamed, MD[a]
Mohamed Saleh, MD[a]
Mohamed Hamed, MD[e]
Hend I. Shahin, PhD[a]
Neal S. Kleiman, MD[f]
Sachin S. Goel, MD[f]

[a] Department of Cardiovascular Medicine, University of Texas Medical Branch, Galveston, Texas
[b] Division of Internal Medicine, University of Florida, Gainesville, Florida
[c] Division of Cardiovascular Medicine, Mayo Clinic, Rochester, Minnesota
[d] Department of Cardiovascular Medicine, Banner University Medical Center, Phoenix, Arizona
[e] Division of Internal Medicine, Florida Atlantic University, Boca Raton, Florida
[f] Department of Cardiology, Houston Methodist DeBakey Heart and Vascular Center, Houston, Texas

22 February 2021

1. Sharma A, Gilbertson DT, Herzog CA. Survival of kidney transplant patients in the US after cardiac valve replacement. Circulation. 1212733.
2. Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'gara PT. 2017 AHA/ACC focused update of the 2014 AHA/ACC guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol. 70252–289.
3. O'Connor CM. *Guideline-Directed Medical Therapy Clinics: A Call to Action for the Heart Failure Team*. Ayman Elbadawi; 2019.

https://doi.org/10.1016/j.amjcard.2021.03.004