

Meta-analysis of Outcomes of Transradial versus Transfemoral Access in Patients with Prior Coronary Artery Bypass Graft Surgery Undergoing Coronary Angiography and/or Percutaneous Coronary Intervention

Noman Lateef, MD¹, Azka Latif, MD², Muhammad Junaid Ahsan, MD³, Waiel Abusnina, MD², Kristen Brown, MD¹, Mohsin Mirza, MD², Mamas Mamas, MBBCh⁴, Deepak L., Bhatt, MD, MPH⁵, Poonam Velagapudi, MD, MS¹

1. University of Nebraska Medical Center, Omaha, NE
2. Creighton University School of Medicine, Omaha, NE
3. Mercy One, Iowa Heart Center, Des Moines, Iowa
4. Keele University, UK
5. Brigham and Women's Hospital, Harvard Medical School, Boston, MA

Background

Transradial access (TRA) for coronary angiography (CA) and percutaneous coronary intervention (PCI) has been shown to have better outcomes compared with transfemoral access (TFA) across a broad spectrum of patients and presentations. However, patients with prior coronary artery bypass graft (CABG) remain under-represented in these studies. We performed a meta-analysis to compare the procedural and clinical outcomes of TRA versus TFA in patients with prior CABG undergoing CA and/or PCI.

Methods

We searched PubMed, MEDLINE, Scopus, Embase, and Google Scholar from inception to September, 2021 for studies (observational and randomized) that compared procedural and clinical outcomes of TRA and TFA in patients with prior CABG undergoing CA and/or PCI. Data from all included studies were combined to calculate weighted mean differences (WMD) and 95% confidence interval (CI) for continuous outcomes, whereas risk ratio (RR) and 95% CI were calculated for dichotomous outcomes.

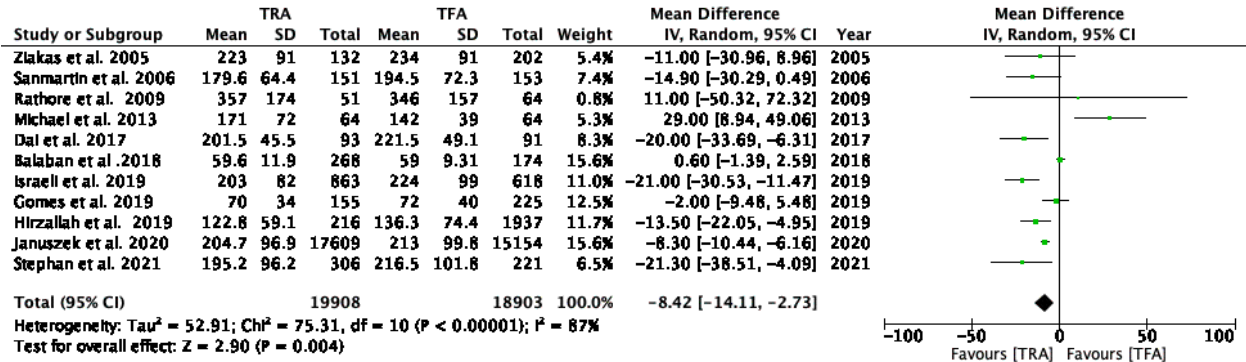
Results

Twenty studies (1 randomized, 19 observational) with 159,657 patients in TRA and 1,182,204 patients in TFA group were included. Compared with TFA, TRA was associated with lower contrast media use (WMD -8.24 ml, CI -14.1 to -2.73, $p=0.004$), access-site complications (RR 0.32, CI 0.24 to 0.42, $p<0.001$), in-hospital mortality (RR 0.57, CI 0.41 to 0.79, $p<0.001$) and 1-year mortality (RR 0.72, CI 0.62 to 0.82, $p<0.001$); with no difference in procedure time (WMD 0.94 minutes, CI -2.18 to 4.05, $p=0.56$), fluoroscopy time (WMD 0.25 minutes, CI -2.06 to 2.56, $p=0.083$); or radiation exposure (WMD -0.06 Gy, CI -0.14 to 0.03, $p=0.2$) in patients with prior CABG undergoing CA and/or PCI. Sensitivity analyses excluding studies or subgroup of studies that reported outcomes in patients undergoing CA alone showed similar findings. TRA was associated with lower contrast media use (WMD -11.6 ml, -16.5 to -6.7, $p<0.001$), and access site complications (RR 0.3, CI 0.25 to 0.45, $p<0.001$); with no difference in procedure (WMD -7.2, CI -22 to 7.7, $p=0.35$) and fluoroscopy times (WMD 0.7, CI -0.07 to 1.5, $p=0.07$) compared with TFA.

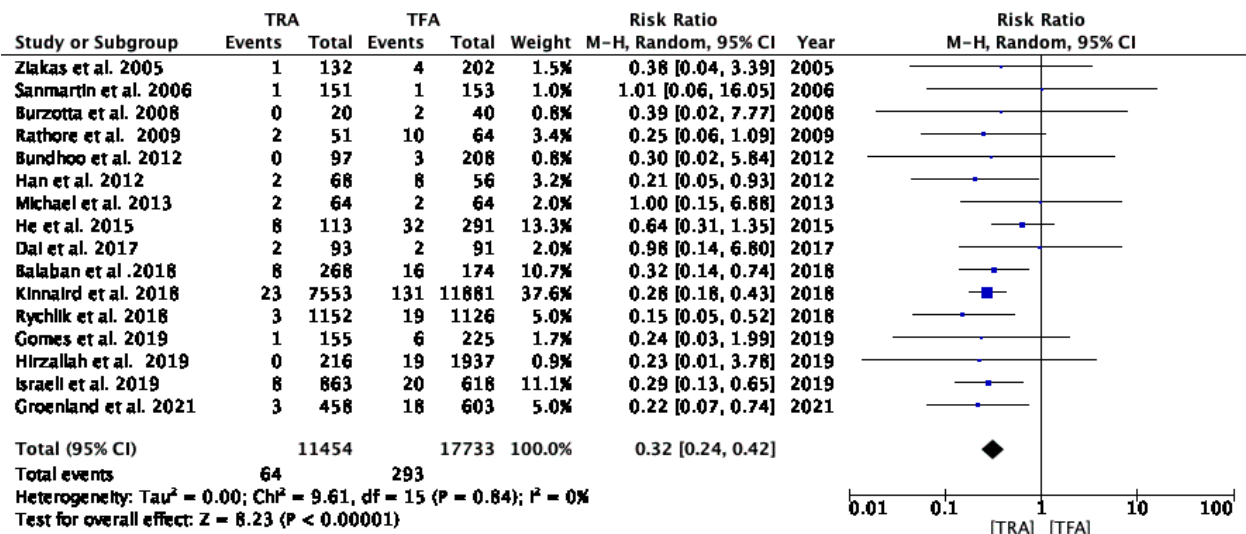
Conclusion

Compared with TFA, TRA was associated with lower access site complications, contrast use, and 1-year mortality without an increase in procedure or fluoroscopy time in patients with prior CABG undergoing CA and/or PCI.

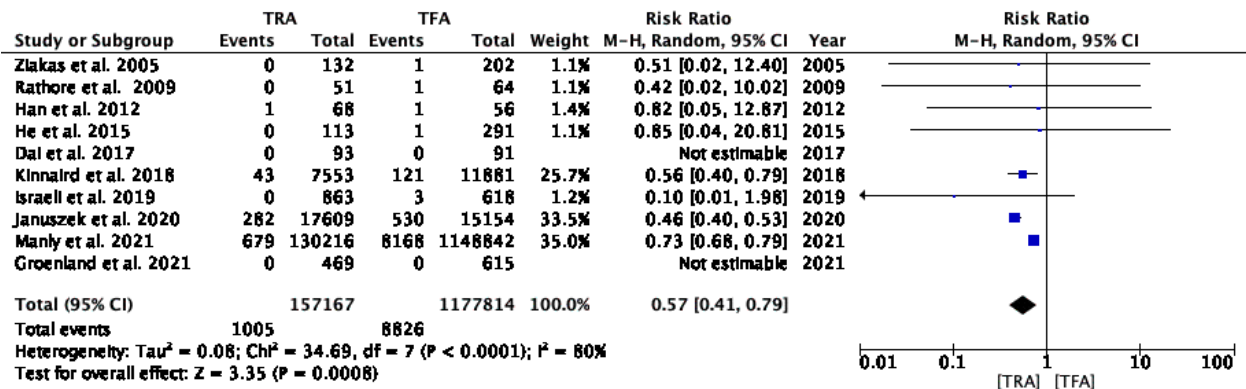
CONTRAST MEDIA USE



ACCESS-SITE COMPLICATIONS

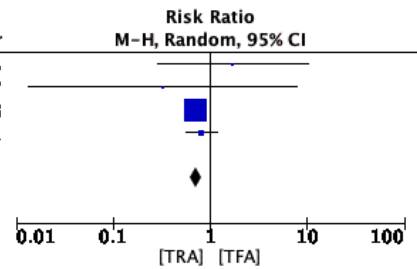


IN-HOSPITAL MORTALITY



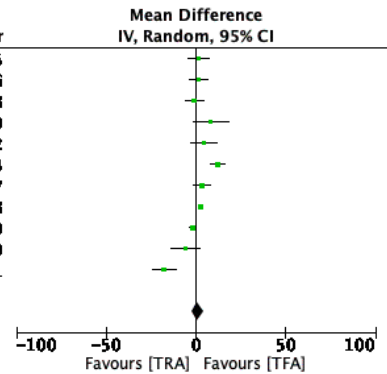
1-YEAR MORTALITY

Study or Subgroup	TRA		TFA		Weight	Risk Ratio		Year
	Events	Total	Events	Total		M-H, Random, 95% CI	Year	
He et al. 2015	2	113	3	291	0.6%	1.72	[0.29, 10.14]	2015
Dal et al. 2017	0	93	1	91	0.2%	0.33	[0.01, 7.91]	2017
Kinnaird et al. 2018	243	7553	547	11881	86.5%	0.70	[0.60, 0.81]	2018
Groenland et al. 2021	38	469	61	615	12.7%	0.82	[0.55, 1.20]	2021
Total (95% CI)	8228		12878		100.0%	0.72 [0.62, 0.82]		
Total events	283		612					
Heterogeneity: Tau ² = 0.00; Chi ² = 1.72, df = 3 (P = 0.63); I ² = 0%								
Test for overall effect: Z = 4.75 (P < 0.00001)								



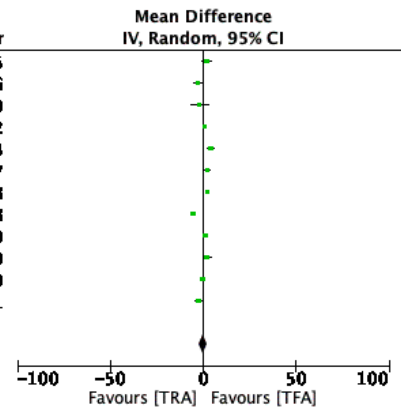
PROCEDURE TIME

Study or Subgroup	TRA			TFA			Weight	Mean Difference		Year
	Mean	SD	Total	Mean	SD	Total		IV, Random, 95% CI	Year	
Zlaskas et al. 2005	61.6	24.9	132	60	27.2	202	8.8%	1.60	[-4.07, 7.27]	2005
Sanmartin et al. 2006	41.4	22.3	151	39.8	22.9	153	9.4%	1.60	[-3.48, 6.68]	2006
Burzotta et al. 2008	21	10.4	20	22	7.3	40	9.4%	-1.00	[-6.09, 4.09]	2008
Rathore et al. 2009	52.1	29.5	51	43.9	23.3	64	5.5%	8.20	[-1.71, 18.11]	2009
Han et al. 2012	49	23.7	68	44.7	17.1	56	7.5%	4.30	[-2.90, 11.50]	2012
Michael et al. 2013	34.2	14.7	64	21.9	6.8	64	10.4%	12.30	[8.33, 16.27]	2013
Dal et al. 2017	70.1	15.8	93	66.8	14.9	91	10.0%	3.30	[-1.14, 7.74]	2017
Balaban et al. 2018	20.4	4.1	268	17.3	1.7	174	12.4%	3.10	[2.55, 3.65]	2018
Gomes et al. 2019	25.2	10.7	155	26.9	6.8	225	11.9%	-1.70	[-3.60, 0.20]	2019
Hirzallah et al. 2019	41.5	26.2	216	47.5	163.6	1937	6.8%	-6.00	[-14.08, 2.08]	2019
Stephan et al. 2021	73.9	35.9	306	91.7	40.2	221	8.0%	-17.80	[-24.45, -11.15]	2021
Total (95% CI)	1524			3227			100.0%	0.94 [-2.18, 4.05]		
Heterogeneity: Tau ² = 20.23; Chi ² = 89.73, df = 10 (P < 0.00001); I ² = 89%										
Test for overall effect: Z = 0.59 (P = 0.56)										



FLUOROSCOPY TIME

Study or Subgroup	TRA			TFA			Weight	Mean Difference		Year
	Mean	SD	Total	Mean	SD	Total		IV, Random, 95% CI	Year	
Zlaskas et al. 2005	20.4	12.2	132	18.4	10.2	202	8.1%	2.00	[-0.51, 4.51]	2005
Sanmartin et al. 2006	15.1	9.7	151	17.9	12.6	153	8.1%	-2.80	[-5.33, -0.27]	2006
Rathore et al. 2009	18.6	12.2	51	20.4	13	64	6.6%	-1.80	[-6.42, 2.82]	2009
Bundhoo et al. 2012	19.3	1.1	97	18.2	0.7	208	8.9%	1.10	[0.86, 1.34]	2012
Michael et al. 2013	12.7	6.6	64	8.5	4.7	64	8.4%	4.20	[2.21, 6.19]	2013
Dal et al. 2017	22.5	6.3	93	20.3	6.1	91	8.5%	2.20	[0.41, 3.99]	2017
Rychlik et al. 2018	10	5.6	1152	7.7	4.3	1126	8.9%	2.30	[1.89, 2.71]	2018
Balaban et al. 2018	5.5	0.7	268	10.7	1.6	174	8.9%	-5.20	[-5.45, -4.95]	2018
Gomes et al. 2019	10.7	5.5	155	9.5	4.7	225	8.7%	1.20	[0.14, 2.26]	2019
Hirzallah et al. 2019	15.9	14.3	216	13.9	25.6	1937	8.2%	2.00	[-0.22, 4.22]	2019
Israeli et al. 2019	24.9	11.8	863	25.2	14.6	618	8.6%	-0.30	[-1.69, 1.09]	2019
Stephan et al. 2021	22.2	13.5	306	24.5	13.3	221	8.2%	-2.30	[-4.62, 0.02]	2021
Total (95% CI)	3548			5083			100.0%	0.25 [-2.06, 2.56]		
Heterogeneity: Tau ² = 15.63; Chi ² = 1683.40, df = 11 (P < 0.00001); I ² = 99%										
Test for overall effect: Z = 0.21 (P = 0.83)										



RADIATION EXPOSURE

Study or Subgroup	TRA			TFA			Weight	Mean Difference		Year
	Mean	SD	Total	Mean	SD	Total		IV, Random, 95% CI	Year	
Bundhoo et al. 2012	60	4.5	97	43.9	2.8	208	19.3%	16.10	[15.13, 17.07]	2012
Michael et al. 2013	1.29	6.6	64	1.08	0.54	64	18.8%	0.21	[-1.41, 1.83]	2013
Dal et al. 2017	3.9	1.3	93	3.8	1.3	91	19.5%	0.10	[-0.28, 0.48]	2017
Rychlik et al. 2018	93.6	46.5	1152	76.6	34.5	1126	16.8%	17.00	[13.64, 20.36]	2018
Januszek et al. 2020	1.3	1.1	17609	1.3	1	15154	19.6%	0.00	[-0.02, 0.02]	2020
Stephan et al. 2021	95.8	67.9	306	101.2	73.5	221	6.0%	-5.40	[-17.72, 6.92]	2021
Total (95% CI)	19321			16864			100.0%	5.69 [2.08, 9.31]		
Heterogeneity: Tau ² = 17.37; Chi ² = 1150.59, df = 5 (P < 0.00001); I ² = 100%										
Test for overall effect: Z = 3.09 (P = 0.002)										

