Table 1
Characteristic and outcomes of MViV versus MVR

Characteristics/outcomes	Unmatched cohort			Propensity-matched cohort		
	MViV (n = 384)	MVR (n = 1,404)	p value	MViV (n = 361)	MVR (n = 807)	p value
Age, Median (25th to 75th IQR)	76 (68-82)	68 (61-75)	<0.01	75 (67-82)	73 (66-78)	<0.01
Female	56%	54.8%	0.67	56%	55%	0.76
Diabetes mellitus	34.6%	38.7%	0.14	34.9%	37.1%	0.48
Hypertension	57.3%	41.4%	<0.01	57.1%	50.9%	0.05
Peripheral vascular disease	9.2%	9.1%	0.75	9.4%	9.2%	0.89
Chronic anemia	31%	22.2%	<0.01	29.9%	25.8%	0.14
Chronic heart failure	85.9%	64.1%	<0.01	85%	80.4%	0.06
Coronary artery disease	53.9%	46.8%	0.01	52.4%	51.4%	0.76
Chronic kidney disease	40.9%	35.6%	<0.01	38.8%	34%	0.11
Atrial fibrillation	65.9%	72.1%	0.01	67%	68.8%	0.55
Conduction abnormality	5.2%	6.3%	0.44	5.5%	5.2%	0.81
Prior defibrillator	8.1%	4.4%	<0.01	6.1%	5.8%	0.85
Chronic liver disease	6.8%	6.8%	0.96	6.9%	7.1%	0.93
Clinical outcomes						
Major adverse events	25.8%	38.7%	<0.01	25.8%	44.1%	<0.01
Death	5.5%	9.5%	0.01	5.3%	11.9%	<0.01
Vascular complications	3.9%	5.9%	0.12	3.9%	6.4%	0.07
Acute kidney Injury	21.1%	32.3%	<0.01	21.3%	35.6%	<0.01
Stroke	1.0%	1.1%	0.36	1.1%	1.4%	0.72
Blood transfusion	15.9%	34.8%	<0.01	15.2%	37.4%	<0.01
Length of hospitalization median days (25th to 75th IQR)	5 (2-11)	11 (7-18)	<0.01	5 (2-11)	11 (7-17)	<0.01
Cost of hospitalization median $ (25th to 75th IQR)	60,670 (45,188-83,070)	67,232 (46,911-97,277)	<0.01	59,790 (44,255-82,430)	68,421 (47,742-99,861)	<0.01
30-day readmission rate	14.7%	14.9%	0.95	14.7%	14.4%	0.92

MViV = mitral valve in valve; MVR = redo-mitral valve replacement, IQR = the interquartile range; $ = US dollar.

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Less Myocardial Infarction and Stroke Hospitalizations During Middle East Respiratory Syndrome Coronavirus Epidemic in Korea

Viral infections are known to impact coronary disease, and acute myocardial infarction (AMI) may be triggered by the inflammatory cytokine response to infection.[1,2] Cytokines promote local inflammation in atherosclerotic plaques within the coronary artery, which can lead to plaque destabilization, rupture, and eventually AMI development. Psychological adversity, depression, stress at home or work, social isolation, and loneliness are also known factors contributing to acute vascular event.[3] Recent outbreaks of coronavirus (CoV), including severe acute respiratory syndrome, and Middle East respiratory syndrome (MERS) have been associated with a increase in patients presenting with cardiovascular complications in several countries.[4] Here, we explored the prevalence of AMI-, and acute stroke hospitalization during 2015 MERS-CoV epidemic in Korea.

This retrospective observational study analyzed data from the Korean general patient population from 1 January 2014 to 31 December 2016. Each case of AMI and stroke was validated using codes I210 to I219 and I60 to I64 in accordance with the Korean Standard Classification of Diseases. AMI and stroke-related hospitalization cases were identified in the National Emergency Department Information System (NEDIS) database. In total, 185 reports of patients infected with the MERS-CoV were recorded between 20 May and 4 July 2015 (over 46-day period) in

Korea. These data are publicly available and maintained by the Korea Centers for Disease Control and Prevention.

Of 185 confirmed cases of MERS-CoV, the male-female ratio was approximately 3:2 (59.5% male and 40.5% female). The highest prevalence of MERS-CoV infection was reported in the 50 to 59 year age group, and the majority of cases were reported during the 1st and 2nd week of June 2015. Thirty-eight deaths were recorded as being caused by MERS-CoV (case-fatality rate 20.5%).

Analysis of the distribution of monthly AMI cases shows that the minimum was recorded in June 2015 at the rate of 0.42% per 100,000 patients (Figure 1), which was lower than the same month in other years (0.45% in 2014 [relative risk reduction, RRR: 7.2%], and 0.50% in 2016 [RRR: 16.6%], as well as an average of 0.47% for 2014 and 2016 [RRR: 12.1%]). The distribution of monthly stroke cases exhibited a very similar trend as with AMI, with the minimum recorded in June 2015 at 1.32% per 100,000 patients, which was similarly lower than the same month in the other years (1.47% in 2014 [RRR: 10.2%], and 1.60% in 2016 [RRR: 18.2%], with an average of 1.53% for 2014 and 2016 [RRR: 14.4%]).

We identified significant reduction of 12.1% for AMI-, and 14.4% for stroke hospitalization during the 2015 MERS-CoV epidemic in Korea. At that time, a significant proportion of Koreans were observing social distancing guidelines, resulting in lower levels of social interaction and physical activity. This may have reduced overall levels of physical exertion within the population, and a subsequent reduction in acute cardiovascular events such as AMI during the 2015 MERS-CoV epidemic. Another possible factor is that patients in households practicing social distancing may have been less able to be admitted to emergency departments, instead leading to a increase in out-of-hospital cardiac arrests. Data to support this possibility has not been recorded in the NEDIS database. Importantly, similar decline of hospitalizations for acute coronary emergencies has been spotted in US over COVID-19 pandemic,[5] which may represent a universal mechanism for any current coronavirus infections in general, and MERS-CoV in particular five years ago.

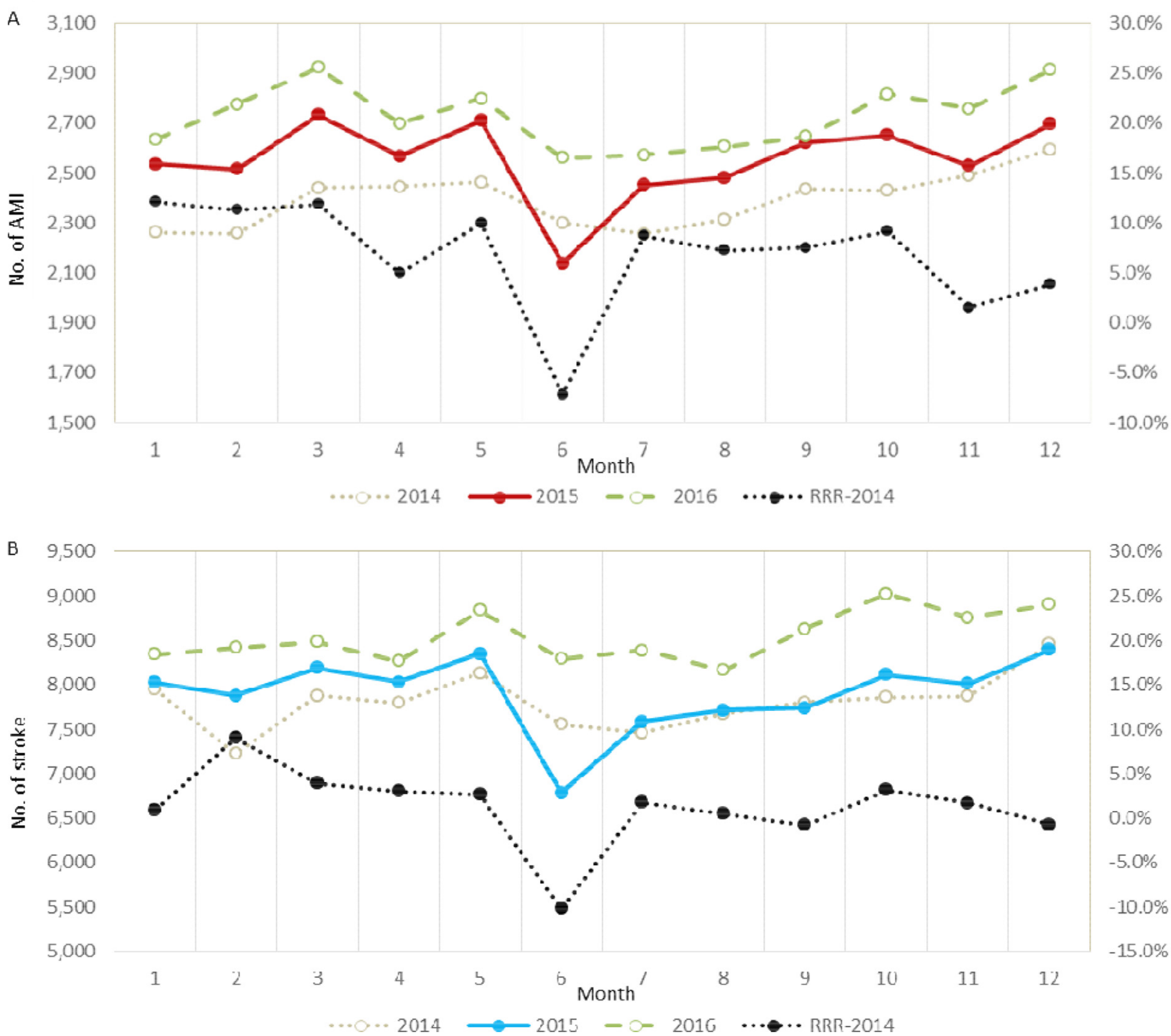

Figure 1. Distribution of monthly cases of hospitalizations, caused by (A) AMI; (B) and stroke in 2014, 2015, and 2016. The peak of the Korean MERS-CoV epidemic outbreak occurred between the 4th week of May and the 1st week of July in 2015. AMI = acute myocardial infarction; MERS-CoV = Middle East respiratory syndrome coronavirus; RRR = relative risk reduction.

Author Contributions

Moo Hyun Kim has full access to all study data and takes responsibility for the integrity of the data and the accuracy of the data analysis. Concept and design: Moo Hyun Kim. Acquisition, analysis, or interpretation of data: All authors. Drafting of the manuscript: Cai De Jin. Critical revision for important intellectual content: Victor Serebruany. Statistical analysis: Kwang Min Lee. Obtained funding: Moo Hyun Kim. Supervision: Moo Hyun Kim, Sung-Cheol Yun.

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Multiple Arterial Grafting: A Critical Analysis

We have major concerns with regard to the meta-analysis titled “Meta-analysis Comparing Multiple Arterial Grafts versus Single Arterial Graft for Coronary-Artery Bypass Grafting” and recently published in the American Journal of Cardiology.[1]

First, and most importantly, a major error in study selection is evident. The authors aim at including only randomized trial that evaluated the outcomes of multiple versus single arterial grafting. However, they include a post hoc analysis of the Evaluation of XIENCE versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization (EXCEL) trial. The EXCEL trial was a randomized trial comparing coronary surgery with percutaneous interventions in the treatment of left main coronary disease[2] − randomization in the surgery group was not stratified by the number of arterial grafts so the comparison between patients receiving multiple versus single arterial grafts is in fact observational. The study by Thujis does not meet the authors’ inclusion criteria and should not have been included.

We have also major concern with the use of a fixed model for data pooling. Current recommendations requires than in meta-analyses of cardiac treatment studies the choice between a random and a fixed effect model is not based on statistical heterogeneity, but rather on methodological heterogeneity.[3] As the authors pool studies performed in Asia, North America and Europe, with sample size varying from 60 to 3102 patients, follow-up varying from 1 to 10 years and publication date from 2000 to 2019, a high level of methodological heterogeneity must be assumed and a random model should have been used.

Finally, the Arterial Revascularization Trial (ART), by far the largest of the pooled studies including 3,102 of the 6,392 total patients, has been heavily criticized because of the high crossover rate and use of the radial artery in 23% of patients in the single arterial graft group.[4] The overall results of the published meta-analysis are clearly driven by a methodologically fragile study. Indeed, when multiarterial versus single arterial grafting was examined within the arterial revascularization trial trial, the results favored the multiarterial group.[5] Based on the previously mentioned recommendations, in this situation a decision not to pool the data should have been made or at least a sensitivity analysis using leave-one-out analysis should have been performed.

In conclusion, significant methodological flaws limit our ability to derive meaningful information from this report regarding the benefits (or lack thereof) of multiple versus single arterial grafting. Moreover, careful examination of the data presented might well lead the opposite conclusion.

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