Korean Circ J. 2020 Nov;50(11):1037-1039
https://doi.org/10.4070/kcj.2020.0383
pISSN 1738-5520·eISSN 1738-5555

kcj
Korean Circulation Journal

Editorial

Is Hospital Percutaneous Coronary Intervention Volume-In-hospital Outcome Relation an Issue in Acute Myocardial Infarction?

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▸ See the article "Impact of Hospital Volume of Percutaneous Coronary Intervention (PCI) on In-Hospital Outcomes in Patients with Acute Myocardial Infarction: Based on the 2014 Cohort of the Korean Percutaneous Coronary Intervention (K-PCI) Registry" in volume 50 on page 1026.

Received: Aug 29, 2020
Accepted: Sep 15, 2020

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Conflict of Interest
The author has no financial conflicts of interest.

The contents of the report are the author's own views and do not necessarily reflect the views of the *Korean Circulation Journal*.

In current clinical practice for acute myocardial infarction (AMI), primary percutaneous coronary intervention (PCI) for ST elevation myocardial infarction (STEMI) and early invasive PCI for non-ST elevation myocardial infarction are regarded as the standard care in Korea.[1] However, despite of the number of PCI capable hospitals is increasing, all hospitals are not belong to enough PCI volume according to previous international guidelines of usual recommended volume of 400 cases/year.[2] The PCI volume-outcome relationship has been a continuous debate for long time due to the titles and results are discordant. These differences might have been caused by cohort heterogeneities (overall AMI or STEMI alone), concurrent diseases (so many heterogeneous baseline characteristics), methods of categorization (different criteria), and the definition of PCI volume (how many cases/year) used.

Kim et al.[3] investigated the impact of hospital PCI volume on in-hospital clinical outcomes with 17,121 AMI patients enrolled in 2014 Korean PCI (K-PCI) registry. Authors classified the study population according to 400 cases/year cut-off as high versus low volume. Study endpoints were in-hospital major adverse cardiovascular and cerebrovascular events (MACCE), defined as the composite of death, non-fatal MI, stent thrombosis, stroke and need for urgent PCI. The incidence of MACCE and non-fatal MI were higher despite of no difference of mortality in low-volume centers. However, PCI volume did not independently predict MACCE. Authors concluded that the hospital PCI volume was not an independent predictor of in-hospital adverse outcomes in AMI patients who underwent PCI from the 2014 K-PCI registry.

In this study, about 75% of all AMI patients were treated at high-volume PCI hospitals (49 hospitals) and 25% were at low-volume PCI hospitals (43 hospitals). Low-volume PCI hospitals mostly are located in small and medium-sized cities and rural areas, however, they continue to make major contributions for invasive management of AMI in Korea. The recommended minimum annual hospital PCI volume of 400 cases/year is based on the 2011 American College of Cardiology Foundation/American Heart Association/Society of Cardiovascular Angiography and Intervention (ACCF/AHA/SCAI) guideline and the British Cardiovascular Intervention Society but many rural hospitals not only in the USA but also in

Korea cannot meet this requirement. Further, this recommended setting is already 9 years ago and cannot reflect current daily clinical practice and outcomes. Unlike the previous studies comparing PCI volume-outcome relationship, this Korean study used transradial approach more than 50%, and drug-eluting stents (DES) were implanted more than 90%. PCI devices including hemodynamic support devices, tools for image (intravascular ultrasound, optical coherence tomography and physiology (fractional flow reserve) in multivessel AMI and optimal medical therapy were advanced considerably compared with a decade ago.[4] Although previous clinical studies have demonstrated an inverse relationship between hospital PCI volume and in-hospital mortality in AMI patients,[5] current study did not show the mortality difference between high and low PCI volume centers.

Recently, Matsuzawa et al.[6] reported PCI volume and in-hospital outcomes from contemporary Japanese PCI environment in 2020. This was a retrospective study of 64,414 AMI patients transported to hospital by ambulances. There was a significant negative relationship between population density and in-hospital mortality (odd ratio for a quartile down in population density, 1.086; 95% confidence interval, 1.042–1.132; p<0.001). Patients in less densely populated areas were more often transported to hospitals with a lower primary PCI volume. Primary PCI volume was significantly associated with in-hospital mortality. When divided into the low- and high-volume hospitals, using the cut-off value of 115 PCI cases/year, the increase in in-hospital mortality associated with low population density was observed. Interestingly, this study showed 115 cases/year as the cut-off value of mortality, showing necessity of change in PCI volume definition. This study reflect the current situation of rural area showing poorer health care, more limited accessibility to qualified PCI centers, and lower quality of emergency care even in contemporary PCI setting with DES. In this regard, the cut-off of our Korean PCI volume-outcome relation in AMI setting should be readjusted according to current data and clinical situation in Korea instead of 400 cases/year.

The 2013 ACCF/AHA/SCAI updated minimum requirements for PCI volume >200 cases/year and ≥50 cases/year for operator.[7] The PCI guidelines of the European Society of Cardiology/European Association recommended a minimum of 75 cases/year for operator.[8] A recent Japanese PCI registry report showed the probability of mortality plateaued at approximately 100 cases/year.[9] The Korean Society of Interventional Cardiology (KSIC) recommends ≥150 cases every two years (≥75 cases/year) to meet interventional cardiologist certification requirements and ≥100 cases/year for the institute to be certified by KSIC standard. When we consider that the median PCI cases/year of a Japanese operator was 28 cases and the United States 33 cases,[9,10] many Korean operators cannot exceed this KSIC recommended 75 cases/year. So this recommendation may require revision to reflect current Korean situation and updated published data.

This study has several limitations; 1) relatively old data (2014 cohort), 2) only part of PCI centers were included (92 hospitals), 3) retrospective data with unavoidable error in data filling or missing, 4) no information about operator qualification, and 5) absence of long-term data. However, this is the first Korean study evaluated the hospital PCI volume and in-hospital clinical outcomes relationship in AMI patients who underwent PCI. Further study with current AMI cohort with larger study populations will be required to get final conclusion.

https://doi.org/10.4070/kcj.2020.0383

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