REFLECTIONS INSPIRED BY THE DEBATE ON CONVENTIONAL AND OFF-PUMP CORONARY ARTERY BYPASS GRAFT

To the Editor:

In an Editorial published in the *Journal*, Dr Sabik¹ highlighted 2 articles that compared the efficacy of conventional coronary artery bypass grafting (cCABG) and off-pump coronary artery bypass (OPCAB) grafting. When compared with OPCAB, the main advantages of cCABG include higher complete revascularization rate, higher long-term patency rate, and lower long-term incidence of major adverse cerebral cardiovascular events.

Although this topic may seem cliché, it is still worthy of scrutiny. In particular, for a typical developing country like China, the evidence-based results derived from this topic are critical for standardizing coronary artery procedures. Unfortunately, although OPCAB accounts for far more of the total coronary artery bypass grafting (CABG) surgeries in some developing countries than in Western countries, most of the evidence focusing on the comparison between OPCAB and cCABG comes from Western countries.

According to the data provided in the Chinese Cardiac Surgery Registry (CCSR) (Figure 1 and Shengshou Hu, MD, PhD, Zhe Zheng, MD, PhD, Xin Yuan, MD, PhD, on behalf of Chinese Cardiac Surgery Registry, unpublished data, February, 17, 2015), the proportion of

OPCABs performed by CCSR members accounted for up to 71.5% of all CABG procedures in 2004. With the deepening of evidence-based and guideline-based concepts among CCSR members, the proportion of OPCAB procedures gradually declined to a lower point from 2004 to 2007, but the proportion of OPCAB still accounts for up to 58.5%, which is far greater than the proportion in Western countries (~10%-20%). Another noteworthy phenomenon is that after the new members have joined the CCSR since 2007, the proportion of OPCAB once again has increased gradually (Figure 1). The proportion of OPCAB procedures in China continues to increase, especially within the past several years after the results of large-scale, randomized, and controlled studies have been announced (Shengshou Hu, MD, PhD, Zhe Zheng, MD, PhD, Xin Yuan, MD, PhD, on behalf of Chinese Cardiac Surgery Registry, unpublished data, February 17, 2015) and the reports of a single-center large-scale clinical study carried out in Fu Wai Hospital have been successively published in noteworthy journals. As of 2012, OPCAB accounts for 65.1% of all CABG procedures.

In addition to the relation to the cardiac surgery training system and qualification system in China, the numerous medical quality-control deficiencies in the Chinese medical sector also are responsible for this phenomenon. Meanwhile, it should be pointed out that clinical practice is a comprehensive scientific system; its quality is affected by numerous factors beyond healthcare, including regional

FIGURE 1. Annual change in the proportion of OPCAB and cCABG in the CCSR database. cCABG, Conventional coronary artery bypass grafting; CCSR, Chinese Cardiac Surgery Registry; OPCAB, off-pump coronary artery bypass.

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THE BENEFITS OF OFF-PUMP CORONARY ARTERY BYPASS GRAFTING REQUIRE CAREFUL PATIENT SELECTION AND SPECIAL EXPERTISE

To the Editor:

Off-pump coronary artery bypass grafting (OPCAB) has been used clinically for nearly 20 years and has been the focus of debate as to whether it can achieve the same midterm and long-term results of Conventional on-pump coronary artery bypass grafting (CCABG) and also further decrease perioperative mortality and morbidity. In this innovative era, OPCAB was technically a new surgical option for coronary bypass surgery; however, it brought with it some new challenges: (1) OPCAB is technically more demanding for both cardiac surgeons and anesthesiologists. (2) Studies comparing the 2 techniques (OPCAB vs CCABG) have demonstrated that OPCAB may result in fewer bypass grafts (distal anastomoses), higher rates of incomplete myocardial revascularization, and lower graft patency rate. It is therefore essential to evaluate objectively the benefit of OPCAB (reducing such morbidities as stroke) and the risk of OPCAB (such as patency rate of grafts and incomplete revascularization) to ensure the highest quality of surgery.

It was shown in the Society of Thoracic Surgeons database that the proportion of OPCAB among all patients undergoing coronary artery bypass grafting surgery in the United States has been decreasing, from 23% in 2002 to 17% in 2012 (it never went higher than 25% in the last decade). In fact, only a minority of cardiac surgeons in the United States performed OPCAB on 90% of their patients. In contrast, the majority of cardiac surgeons in the United States used OPCAB for fewer than 10% of their patients in their daily practice.¹

Generally speaking, whether a novel technique can be widely accepted depends on 3 factors: effectiveness, learning curve, and ease of practice. The effectiveness of OPCAB has been questioned by the Veterans Affairs Randomized On/Off Bypass (ROOBY) study, in which both the number of bypass grafts and the patency rate were lower in the OPCAB group.² Most cardiac surgeons recruited in that study, however, had limited experience in OPCAB at that time. As OPCAB is used in more and more heart centers all over the world, several large, multicenter, prospective, randomized, controlled trials have been completed. The CABG Off or On Pump Revascularization Study (CORONARY) study recruited about 4500 patients, and all the cardiac surgeons in that study had experience with more than 100 OPCAB cases per year.³ In the German Off Pump Coronary Artery Bypass in Elderly (GOPCABE) study, most of the surgeons had experience with more than

policy, regional economy and culture, doctors' philosophies, healthcare commercial activities, and patients' promotion and education levels.

By taking a look back at the developmental history of CABG, we can see more than half a century of vicissitudes. Some pursued and admired concepts have been washed away with time without a trace, whereas some classic concepts and technical means have survived and flourished. From 1962 when Sabiston pioneered CABG under the off-pump condition to the extensive application of extracorporeal circulation in coronary artery surgery to the revival of OPCAB by the end of last century, we have been through a long journey to understand this surgical approach.² In a sense, OPCAB has promoted the development of the entire coronary surgery, namely, this approach expands the indications of CABG and facilitates the maturation of minimally invasive CABG. Therefore, any unilateral exaggeration of its efficacy or complete rejection of its significance is inconsistent with the evidence-based spirit. Exploration of the pros and cons associated with OPCAB is likely to be one of the investigators' focuses of attention for many years to come. How to treat this surgical procedure will continue to be an important issue for the whole sector to address. However, one thing is certain: Only the rational use of off-pump technology can help coronary surgery to properly develop in China.

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