The evolution of percutaneous coronary intervention in Asia: in celebration of the 40th anniversary of percutaneous transluminal coronary angioplasty

Runlin Gao, Chief Editor, Asia Intervention

Forty years ago, in September 1977, Dr Andreas Grünzig heralded the era of interventional cardiology by successfully performing the first percutaneous transluminal coronary angioplasty (PTCA) in Zurich, Switzerland. Through live demonstration courses, he went on to train cardiologists from around the world, leading to the rapid introduction of PTCA into clinical practice in the rest of Europe, the United States and beyond.

In October 1981, Dr Nobuyoshi from Kokura Memorial Hospital, Japan, performed the first PTCA in Japan and in Asia. Unfortunately, the procedure failed and the patient underwent emergency cardiac bypass surgery. Dr Nobuyoshi’s next two cases met the same fate. To refine his skills further, he visited several famous hospitals in the United States and learned from prominent masters, including Drs Myler, Simpson, Dorros, and Hotzler, carefully noting every precise detail of the procedure. In 1982, Dr Nobuyoshi performed his fourth PTCA case at Kokura Memorial Hospital with a successful outcome. Thereafter, his caseload reached 93 during 1983, and 40 weekly in 1984, when he held the first live demonstration course in Japan with about 300 attendees. This live demonstration has been held yearly since, being instrumental in the rapid expansion of PTCA use in Japan during the 1980s, and its uptake in several Asian countries.

PTCA was first performed almost simultaneously to the first Japanese case in Taiwan, China, in 1981, in Korea and Malaysia in 1983, in Singapore and India in 1984, and in Hong Kong and mainland China in 1985. However, expansion of PTCA use was relatively slower in many Asian countries. In mainland China, for instance, during the first decade after its introduction in 1985, PTCA could only be performed at a few centres and by a few cardiologists. By the end of 1996, a total of only 6,200 percutaneous coronary intervention (PCI) cases had been performed at 51 hospitals. However, along with economic growth and extensive training, the last 10-15 years have witnessed an explosive growth in annual numbers of PCI, reaching a total of 666,495 cases performed at over 2,000 hospitals nationwide in 2016. During the same period, PCI use also expanded rapidly in most developing countries in Asia. According to a rough case count, approximately one million PCI were performed in 2016 in Asia, which is close to the figure for Europe or North America. Asia therefore has become a non-negligible force within the global PCI community.

Although PCI uptake was slower overall in Asia than in North America or Europe, interventional cardiologists in Asia have made remarkable contributions to PCI. In Japan, the skill and patience of interventionalists along with their development of specialised techniques and devices have translated into the highest success rates in the treatment of chronic total occlusion (CTO) lesions. Various antegrade approaches combined with retrograde CTO techniques developed by Japanese scholars have increased the success rate of CTO treatment to 80%-90%; their adoption around the world has improved overall treatment outcomes for CTO lesions. Japan remains the worldwide leader in CTO treatment and, in recent years, Chinese interventional cardiologists have achieved great progress in the battle to conquer CTO lesions.

For their pioneering work, thanks are due to our Korean colleagues, who accumulated clinical experience on left main coronary artery stenting and shared it with the rest of the world via live
demonstrations and international meetings. Korean investigators also led the early real-world registry and randomised trial comparing stenting vs. CABG to treat left main coronary artery disease\(^6,^7\), which provided important evidence to inform revascularisation strategy choice for left main coronary artery disease. Clinical practice and research on left main coronary artery stenting have also progressed in China in recent years\(^6,^7\).

Soon after Dr Kiemeneij first performed PCI via the transradial approach\(^8\), the technique was introduced into Japan\(^9\), China\(^10\), and many other countries and regions in Asia. PCI via the transradial approach has many advantages compared to the femoral approach: patients can ambulate earlier, feel more comfortable, and experience significantly decreased rates of vascular and bleeding complications. Use of the transradial approach has rapidly spread in Asia where it is used in the highest proportions in the world. Currently, more than 90% of PCI in China are performed via the transradial approach.

The research and development on bioresorbable scaffolds (BRS) was flourishing worldwide until the Absorb BVS (Abbott Vascular, Santa Clara, CA, USA) was withdrawn from the global market; however, research and development on a second-generation BRS continues in China and India. First-in-man studies presented at TCT 2016 documented the safety and efficacy of the Firesorb bioresorbable sirolimus target eluting scaffold (MicroPort, Shanghai, China) and the MeRes bioresorbable scaffold (Meril Life Sciences, Vapi, India) with a strut thickness of 100–120 μm. The multicentre randomised trial of Firesorb has been launched in China. Asia is therefore in a leading position worldwide in terms of research and development of second-generation BRS.

The four decades since Dr Grüntzig ushered in the era of interventional cardiology have witnessed tremendous progress in revascularisation therapy of coronary artery disease. Although cardiologists in Asia initially lagged in assimilation of this new revascularisation therapy of coronary artery disease 4,5,6,7,8. Use of the transradial approach has rapidly spread in Asia where it is used in the highest proportions in the world. Currently, more than 90% of PCI in China are performed via the transradial approach.

The research and development on bioresorbable scaffolds (BRS) was flourishing worldwide until the Absorb BVS (Abbott Vascular, Santa Clara, CA, USA) was withdrawn from the global market; however, research and development on a second-generation BRS continues in China and India. First-in-man studies presented at TCT 2016 documented the safety and efficacy of the Firesorb bioresorbable sirolimus target eluting scaffold (MicroPort, Shanghai, China) and the MeRes bioresorbable scaffold (Meril Life Sciences, Vapi, India) with a strut thickness of 100–120 μm. The multicentre randomised trial of Firesorb has been launched in China. Asia is therefore in a leading position worldwide in terms of research and development of second-generation BRS.

Acknowledgements

The author sincerely thanks Prof. Huay Cheem Tan, MD, the President of the Asian Pacific Society of Interventional Cardiology (APUSIC), and Ms. Joe Chan, of the Secretariat of APSIC, for assisting in collecting relevant data.

References


