

Editorial Comment

From Experience to Science

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Medicine is a kind of science, which is aiming at treating the patients by peoples' knowledge and experiences as much as possible with the available technology within the regulation by the society while fulfilling the human ethics. It started from the experiences, after an attempt to treat the disease resulted in success. The accumulation of experiences was gradually converted to medical knowledge by the power of science. The history of percutaneous coronary intervention (PCI) has traced the similar path.

It is a famous story that Gruentzig and his colleagues, the inventors of PCI, produced the first PCI balloons by themselves in a garage. Since that time, the development of PCI has been lead by numerous new ideas conceived by many talented people. The ideas include not only in the area of device creation and improvement but also of the development in technique. Chronic total occlusion (CTO) lesions are so-called last frontier in PCI. The success rate for these lesions were initially around 60%, although it is approaching more than 90% now. Many factors have contributed to the improved success.

By now, many kinds of “new devices” were development for CTO lesions. These include the laser guidewire [1], activated guidewire angioplasty [2], the use of a hydrophilic guidewire with a nitinol core (Crosswire) [3], Safe-Cross system [4], and Crosser system [5]. However, the successes rates achieved by these devices are far from our satisfaction. On the other hand of the development of these new devices, further improvements in conventional PCI guidewires have been continuously made. These improvements were achieved not only by the numerous efforts of engineers in the manufacturing companies. Also, we can never forget that they responded to the advices from many operators who have devoted themselves to improve the success rate in PCI for CTO lesions. Many skillful operators have developed various kinds of techniques using conventional PCI guidewires to improve the success rate in CTO lesions, such as the utilization of double or triple guidewire technique [6],

side branch entry technique [7], sea-saw guidewire technique [8], retrograde or bidirectional approach [9], mother-and-child guiding catheter technique [10], a anchoring balloon technique [11], utilizing an over-the-wire penetration catheter (Tornus[®], Asahi Intecc) [12], and “Open Sesame” technique [13].

Pathological examination shows that most CTO lesions have microchannels of 160–230 μm in diameter within them, which are difficult to visualize during fluoroscopy [14]. Thus, it is rational to conceive the use of thin diameter guidewires as increasing the penetrating ability through these lesions. In fact, there have been the literatures claiming that the use of tapered-tip guidewires of 0.010 or 0.009 inch in diameter improve the success rate [6] [8]. However, since the penetrating power of the guidewires will increase while their cross-sectional area decreases at the tip, it can easily penetrate the arterial wall and result in the vessel perforation. As everybody knows, PCI for CTO lesions need operators' skill and experiences much more than regular PCI. The handling of these wires absolutely need much more experiences and fine skills by the operators.

In this Journal, Matsukage et al. [15] reported the initial 0.010-inch guidewire successfully passed the CTO lesions in 68.8% of cases by multiple operators in multiple institutions. Although it is not clear from the literature which kinds of 0.010-inch guidewire were mainly used as an initial one among seven wires listed in Table I, it is interesting that 0.010-inch guidewires with less than or equal to 3.0 g of tip stiffness (0.75–0.30 g) could successfully pass through these lesions in more than two-thirds of the cases. It also should be emphasized that most of them had a hydrophilic coating. The risk of creating vessel perforation should be less when using these relatively soft-tip guidewires. After the publication of this literature, if

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any operators try to open the CTO lesions, they have to start with a 0.010-inch guidewire with relatively soft and hydrophilic coating. Then, they can achieve the success in crossing the wire in more than two-thirds of the cases safely. This is clearly one kind of generalization of the experiences of a genius in PCI. In another word, it is "From Experience to Science."

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