Transradial Coronary Intervention as the Primary Approach for Acute Myocardial Infarction

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In the first case of percutaneous coronary intervention (PCI), reported by Dr Gruntzig in 1978, the transfemoral approach was used. Since then, many interventional cardiologists have performed PCI using that approach. However, in the history of cardiac catheterization, the first case was performed by a urologist Dr Forssmann, from his own brachial vein to the right side of his heart in 1929, for which he received a Nobel Prize because he opened the gate to cardiac catheterization. Dr Sones started coronary diagnostic catheterization via the brachial artery in 1960, so catheterization from the upper limb is quite an old idea. Following Dr Sones, Dr Judkins started transfemoral coronary diagnostic catheterization using a catheter that he had designed for easy engagement in the coronary artery, and the transfemoral approach using the "Judkins technique" became the standard technique.

PCI started as an alternative to coronary artery bypass surgery for treating coronary artery disease and despite the superiority of bypass surgery shown in many comparative studies, the number of cases of PCI has increased over the past 3 decades. Coronary artery bypass surgery requires general anesthesia, sternotomy, and cardiac arrest assisted by cardiopulmonary pump, whereas PCI requires local anesthesia, a small skin incision and no necessity for cardiac arrest. Patients prefer PCI if the outcome is the same.

It has become clear that transfemoral intervention (TFI) has limitations such as bleeding complications in the retroperitoneal space, cholesterol embolism, lumbar pain, urologic problems and so on. Patients most frequently complain of lumbar pain and urologic problems, so it was natural to consider a less invasive method of PCI.

The first transradial intervention (TRI) was reported by Dr Kiemneij in 1993.1 Downsizing the stent system from 8 Fr to 6 Fr made TRI popular by the end of the 1990s, and it clearly had less complications than TFI.2 In fact, there are almost no bleeding complications,3 and lumbar pain and urologic problems are almost zero. Patients must rest supine on the bed for 3–6 h in TFI compared with no rest required for TRI. TRI has so many benefits compared with TRI, but it also has limitations such as difficulty with puncture because of the small size of the radial artery,4 and difficulty with guiding the catheter because there is less backup force, particularly when using the Judkins catheter.5 The backup force determinants include the size and shape of the guiding catheter.6 It is ruled by physics not by the approach site. Thus, less backup force of the guiding catheter is overcome by using a properly shaped guiding catheter for TRI, such as the Ikari.5,7 When the Ikari guiding catheter is used, the backup force of TFI and TRI is the same. The success rate of TRI using the Ikari L guiding catheter for either the left or the right coronary artery is extremely high.8 TRI for non-coronary arteries is becoming popular. For renal artery stenting, the upper limb approach is superior to TFI because the guiding catheter is easily engaged as a result of the downward origin of the renal artery. Carotid stenting is also easier with TRI than TFI in cases of anomaly of left common carotid artery branching from brachiocephalic artery (bovine arch).

TRI application in PCI is becoming more widespread; for example, it is now possible to treat unprotected left main coronary artery stenoses with TRI.9 Finally it is time to consider TRI as the primary approach for emergency PCI for ST elevation myocardial infarction (STEMI). Bleeding complications are a frequent problem in PCI for STEMI because of the use of IIbIIIa inhibitor or tPA. If puncture of the radial artery can be quickly achieved, TRI may be an excellent option for PCI for STEMI because bleeding complications are rare with TRI, even when using a IIbIIIa inhibitor.10 Pulmonary embolism is a rare complication because of the short resting time. Early commencement of rehabilitation makes for a shorter hospital stay, so theoretically, TRI should be the first choice for PCI in patients with STEMI.

In the TEMPURA study, which was a prospective multicenter randomized design with 149 patients, Saito et al reported that TRI was feasible and safe for primary PCI in patients with STEMI.11 Other registry studies have also reported superior results: Cruden et al in 287 cases12 and Louvard et al in 277 cases.13 This issue of the Journal publishes the report from a single-center observational analysis that included 506 cases, which is the largest number so far.14 The authors report excellent data for TRI for STEMI, because they are experienced with both radial puncture and using special guiding catheters such as the Ikari. TRI in the setting of emergency PCI for STEMI could be the future direction; however, some have reported a longer door to balloon time.15 TRI should be considered as the primary approach for emergency PCI for STEMI if the
operators are experienced in using this approach, although further investigation is still needed in this field.

References