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Zafar Sajjad
Aga Khan University

MULT-SLICE CT SCANNING

With the advent of Magnetic Resonance Imaging (MRI) in the mid to late 1980s, it was widely assumed that computerized tomography (CT) of the brain and spine will ultimately be entirely replaced by this new modality. MRI had significant advantages over CT scans. It was truly multi-planar, it had high tissue-contrast, it was not affected by dense bone, and there was no radiation involved. The prophecy of an early demise for CT scans was almost fulfilled. CT was fast becoming relegated to the status of an economy class passenger in neuro-imaging, and was considered to be good only for trauma and acute hemorrhage. With the introduction of spiral scanning and its further refinement with multi-detector capabilities, CT scanning has made a huge come back.

So what is multi-slice CT? Or to give it its proper name, Multi-detector CT (MDCT). The easiest way to understand this technique is to imagine several CT scanners combined into a single unit. For example, a 64-slice CT is 64 single slice scanners rolled into one. The main advantage of having 64 (or 32 or 16) sections being scanned simultaneously is the speed at which the area of interest can be covered. The effect is the same as a high-speed camera. The moving contrast bolus is 'frozen' in time and a snapshot of the vessel is taken when its visualization is at its best.

Globally, the greatest impact of MDCT has been in the area of vascular imaging, especially CT coronary angiography, which usually gets the most attention. It would be fair to say that CT cardiac angiography is now set to replace invasive diagnostic angiography in most applications. Indeed, this is as true for invasive cerebral angiography as it is for coronary work.

The real clinical potential of these very fast imaging protocols is in the field of stroke intervention. Strokes cause significant morbidity and mortality. Until recently, the only intervention available was rehabilitation and secondary prevention. With the development of thrombolytic therapy and increased endovascular techniques, the scenario has changed. The development of stroke services in the industrialized world is following a pattern seen previously in the context of myocardial infarction and salvage. The importance of rapid response and a short 'door-to-drug' time has been established for acute cardiac intervention. This is even more so for the brain, which is less tolerant of ischemic insults than the myocardium. A major problem in stroke diagnosis by CT is the absence of an objective signal corresponding to, for example, the ST-segment elevation on ECG in myocardial infarction. The diagnosis requires assessment combining the clinical picture as well as imaging studies.

Current FDA guidelines for the intravenous use of Tissue Plasminogen Activator (TPA) recommend its use within the first three hours of stroke onset. The role of imaging is to exclude non-ischemic causes of the neurological deficit and especially to rule out hemorrhage. This has hitherto been done by conventional CT scanning, with optional extras being available in the form of estimating the amount of salvageable tissue and visualizing the arterial tree. Although the latter two add real value to acute stroke management, they have not been routinely performed. MRI for acute or hyperacute stroke is problematic even in places like the United States, as it takes too long to organize and is devoid of any real benefit outside of the very large university hospital setting. MDCT is changing all that. With multi-slice CT, all requirements of hyperacute stroke imaging are met in virtually the same time as it takes to perform a conventional CT scan. The availability of CT perfusion studies and CT angiography make this possible. Time factor is no longer a bar, and a more confident diagnosis enables judicious assessment of a potentially hazardous intervention such as thrombolysis.

Multi-slice CT technology has now become available in Pakistan, and the federal government is funding three MDCT units at choice locations. Unfortunately, two of these scanners will be installed in dedicated cardiology hospitals, where they will not be available for stroke sufferers. These scanners are expensive and their optimal utilization demands their availability to a wider patient population. As already stated, time is of the essence for stroke sufferers, most of whom will be emergency patients. On the other hand, most patients requiring coronary CT angiography are stable and can be scanned electively as outpatients. The best placement for MDCT scanners is in acute multi-speciality public-sector hospitals serving large populations, where both sets of patients can benefit from the technology.

In the private sector, these scanners are being installed in standalone radiology centers where stroke intervention will not be possible. Even when they have been placed in private hospitals, the focus seems almost exclusively on coronary work, with no effort being made to educate the public about the neuroimaging potential of these machines.

The onus is on the neuroscience community to raise awareness about stroke intervention in general and the wider application of MDCT in particular. This has to happen both among the public, as well as with health administrators and the government. Failure to do so will condemn potentially treatable patients to disability and death.

Zafar Sajjad
Associate Professor of Radiology
Aga Khan University Medical College