

Diagnostic imaging, present & future

Dr. P.K. Deka, MD, FICR

Prof & HOD, Radiodiagnosis, College of Medical Sciences, Bharatpur, Chitwan, Nepal

Just a few decades ago when I joined Radiology as a junior faculty member, little we could realised that many great discoveries are going to happened soon. There had been tremendous technologic explosions during the decades from 1970s through 1980s. During this past 30 years, the radiology & imaging has seen accelerated growth in technology with introduction of interventional radiology, nuclear medicine and an access to cross – sectional imaging. As a matter of fact technologies that are used today in the field of radiology & imaging did not exist a decade age. About one-third of radiologic imaging procedures and two-third of the relative value units involved in radiological imaging, especially CT, MRI, US, interventional radiology or nuclear medicine were only in its experimental and nascent stages.

The medical imaging is now increasing in sensitivity and specificity towards optimum precision. It is acquiring and displaying data in 3D/4D dimensions and on the verge of providing virtual presentation. Functional imaging has become a reality. In the near future genetic and molecular marker imaging is going to be a part of imaging system.

The futuristic developments shall make the progress in conventional radiology with picture achieving and communication system (PACS), CT, MRI intervention radiology and nuclear medicine. Remarkable progress in electronic and computer engineering shall benefit diagnostic imaging with further advances which will continue for years to come.

Introduced 30 years back CT has undergone numerous advances. A three dimensional reformatting and rotation of images has been introduced and this technique is becoming increasingly useful to the plastic surgeons, vascular surgeons and neurosurgery. Introduced in 1998, the multi slices CT (MSCT) has rapidly evolved 2/4/8/16/32/64 slices. Adaptive spiral CT has debuted on the block and with this technique perfusion study of several body region can be performed. CT has nearly peaked itself in its capacity and the one beat, three beat cardiac CT have reached their potential as commented by one Sr. technologist.

About 25 years ago, a diagnostic technique in which radio waves generated in a strong magnetic field were used to provide information about the hydrogen atoms in different tissues within the body was introduced, it is MRI. Since then there is a growth rate of about 10 percent per year, and the trend will continue due to new application

of magnet and gantry design. At present, three tesla diagnostic MRI is preferred by most institutions which deliver clear images of the body organs. The most important clinical areas those are currently significant for MRI is neurosciences, oncology, ENT and orthopaedics. During the next 10 years or so the newer areas of attention shall be the breast imaging, cardiology and interventional invasive procedures. MRI will complement CT in future in assessing brain function and shall be a standard of care for all white matter brain diseases.

Ultrasonography (US) has fetched the status of the most popular cross-sectional diagnostic modality all over the world, especially, in the developing countries, it is the only cross-sectional modality available. As commented by a Sr. sinologist the popularity of the present US is due to advances in resolution of images. With introduction of contrast in Doppler techniques, US shall continue to be the predominant imaging modality in the present time.

The other area of future imaging is the fusion imaging where two modalities provide a combined enhanced images. The common examples are in nuclear imaging with SPECT-CT and PET-CT. PET/ SPECT provides functional information about tissue properties, function and viability. The common application for PET-CT is in cancer staging of tumour, treatment planning and therapy.

Radiology and imaging training to the PGs and interns are perhaps far from adequate. Sub-specialization is imperative. Depth of knowledge is of course essential. A chest physician can read high-resolution CT scan better, a child specialist understand paediatric imaging better, so also a neurologist and neurosurgeon etc. With adjusted protocols radiologist will have to be a part of the system. Radiology and imaging is one of the most powerful diagnostic approaches in clinical medicine to-day. So also the role of a radiologist!