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Rational Use of Radiology Services

Saba Sohail

Within the last two decades, information technology has undergone an explosive and dynamic development. The field of medicine and health care has happily reaped the fruits of this development for their purpose. The branch of medicine that has shown a parallel advancement is the field of medical imaging or radiology.¹ The use of computers has revolutionized the radiology equipment. Plain radiography, fluoroscopy and mammography have evolved into digital and computerized formats with greater latitude and control over the final radiographic image without the need of re-exposing the examinee to another surge of ionizing radiation. Spiral CT evolved into multi-detector CT (MDCT)-imaging the body in virtually any plane and computer-based reformatting has allowed for visualization of all those anatomical regions that have been notoriously difficult to image such as the mid-facial skeleton and the pelvic girdle particularly the acetabulum.

MRI has an established role in imaging the soft tissues irrespective of the anatomical region - the only limitations being imposed by the presence of air, calcification or magnetisable implants; or where an admixture of hematoma hides a ruptured aneurysm. Use of dynamic multi-phase techniques and imaging protocols allow CT and MRI procedures to detect the vascular uptake and washout pattern to extract curves, that reliably predict the benign or malignant behaviour, possible response to therapy and even pathologic findings for triple negative lesions in liver and breast respectively.²

In particular, the advent of MDCT has surpassed the use of even MRI for non-invasive angiography. The diagnostic credibility of the technique is threatening the use of catheter-angiography to being restricted to a therapeutic role. All these advances have tremendously helped the clinicians not only to reach diagnostic conclusion in clinically equivocal scenarios but also to start screening for conditions such as coronary heart disease and intracranial aneurysms.³ Mammography is already an established mass screening tool for breast cancer that has markedly brought down the incidence of breast cancer in the West.⁴

This improved diagnosis has created enough excitement in the front-line clinicians. But there is a risk-benefit

trade-off, that must be considered. This advanced and digitally touched-up morphography has come at the price of high radiation dose and increased cost. It is easy to forget about the cost of the procedure. Acquiring an image incurring an expenditure that is paid either by the patient or a re-imbursing authority or the State in case of public health care services. In addition, the patient undergoing a radiographic, mammographic, nuclear medicine or CT procedure gets exposed to a significant amount of ionizing radiation that may be equal to, or in case of CT, even greater than the lifetime radiation exposure from natural sources.⁵ Moreover, certain techniques are more sensitive than specific. An example is the increasingly frequent visualization of the otherwise asymptomatic gall stone,⁶ gall bladder polyp or renal cyst, with the increasingly frequent and wide spread use of ultrasound. Innocuous calcifications are picked by CT giving undue concern. Endometrial signal changes in a thickened endometrium alarm the clinicians but do not reliably differentiate benign from malignant condition. MRI and radionuclide scans are particularly liable to pick unrelated and irrelevant pathology because of their high sensitivity but not comparably high specificity.

Above all, the diagnostic yield is greatly compromised if an imaging modality used for a certain indication is inappropriate. An imaging test must be ordered where appropriate and likely to affect management, not just because it is available or available free of cost. Radiology is often being used in place of clinical judgement and ultrasound is particularly used like a stethoscope for abdomen and pelvis.

Examples abound in clinical radiology practice. Not every patient with seasonal allergy syndrome or acute sinusitis requires CT scan of paranasal sinuses. Myelopathy and acute non-traumatic backache are best evaluated by MRI not CT scan. Hepatobiliary system and the female genital tract is best evaluated by ultrasound; complimented in certain cases of adenomyosis and trophoblastic tumours by MRI. Radiographic, MRI or scintimammography would remain technically compromised in a lactating breast which should primarily be evaluated with ultrasound and/or histopathology.

Plain X-ray often remain the best base-line investigation particularly when a bony disorder or acute abdomen is the diagnosis in consideration. A Doppler ultrasound evaluates intrauterine growth restriction but it cannot and should not be used for fetal biometry, which is a gray-scale ultrasound function. A phlegmon of pancreatic

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origin spreading between the bowel loops or mesenteric folds is best visualized on CT scan, but remains hidden on an ultrasound study. Likewise, a nonspecific extremity Doppler request without specifying the vessel of interest may not provide the desired information and will take up more of the radiologist's time in random search for pathology. This is not just a concern with the resource-constrained public sector hospitals of Pakistan. The question is raised even at places where cost-risks trade off are a concern.

Effective use of any imaging modality requires a continuous education and evaluation towards its appropriate application. What basically is needed is a continuous education and trust-building on the part of stake holders. A modality to be used in emergency should not be used for non-emergent uses or for the wrong reason. It is upto the clinicians and radiologists to solve this problem. Regular clinico-radiological meetings at institutional level go a long way in achieving the aim of the clinicians' and radiologists' education towards understanding the needs and limitations of each other. The search for the magical eye to see the pathology will continue to evolve; however, a continuous education for the new modalities and an appraisal of the time-tested radiologic techniques can achieve this aim in a better way.

Best practice requires an integration of the imaging with clinical judiciousness to provide the best possible patient

care. The Royal and the American Colleges of Radiology have separately issued guidelines suiting to their needs and practices, with emphasis on the need and benefits of an imaging test for a particular indication. It is high time that local bodies such as the Radiological Society of Pakistan and the physicians and surgical societies in various sub-disciplines should put their experience together and work on developing local guidelines and criteria for the propriety and judicious use of radiology services.

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