

### Radiation in Surgeon's Arena

More than a century ago when X-ray was discovered by Dr. Wilhelm Conrad Röntgen in 1895, it was very warmly welcomed by medical community. In 1896 X-ray was started to use for localization of foreign bodies, bullet injuries and diagnosis of fractures. It was surgeons' fraternity who embraced this new invention and since then they have been enjoying a good relation

X-ray based imaging modalities have become an integral part of operation rooms. X-ray illuminators mounted on surgical theaters walls facilitate the surgeons from palpation to seeing the area of interest before starting the procedure. Image intensifier, which was introduced by C. H. F. Müller in 1956, has revolutionized the surgery as it allows the surgeon to perform procedure with image guidance and improves the procedure outcomes. Most of the theatres are equipped with either fixed or mobile C-arm image intensifiers which provide a variety of movements required in various surgical procedures such as cardiology, orthopedics and urology. It has also become a fundamental requirement for interventional gastroenterologists for performing ERCP, deploying stent and also for laparoscopic procedures.

In early 90's nuclear medicine opened a new vista of radioguided surgery and in a short period of time it has succeeded in getting a warm reception in theater primarily by oncological surgeons. Sentinel lymph node mapping with a hand held gamma probe guided dissection of nodes since its introduction in 1990 has now become an integral part of standard of care in breast cancer and melanoma. The sentinel reason of success of sentinel node biopsy is its ability to add the sense of hearing to existing senses of palpation and sight of surgeons which beyond any exaggeration improves the skills and dexterity of surgeons. This success has paved the path of radioguided sentinel node biopsy for other solid tumors as well. In recent years, nuclear medicine based radioguided surgery has moved a step ahead for localization of difficult to locate tumors. In this technique a tumor seeking radiotracer is injected intravenously or deployed under image guidance into tumor itself and this makes the job easy for a surgeon who is holding a gamma probe and a knife in hands. These procedures are commonly employed for localization of parathyroid adenoma using intravenous injection of Tc<sup>99m</sup> MIBI (MethoxyIsoButyllsonitrile) or injection of Tc<sup>99m</sup> nannocolloid under ultrasound guidance for occult breast lesions. Furthermore, recently <sup>18</sup>Fluorodeoxyglucose (FDG, positron emission tomography agent) has also been used for radioguided surgeries with a dedicated positron or annihilation photon detectors.

However, one must not forget the radiation exposure associated with these radiation based procedures. Surgeons and theater staff must be cognizant of stochastic and non-stochastic effects of radiation, methods of radiation protection and radiation monitoring as well. They must follow the institutional policy of radiation safety like wearing personal dosimeters as film badges, TLD (thermo luminescence dosimeter) or OSL (optically stimulated luminescence) while performing these procedures. This ensures a precise data keeping of their annual radiation exposure which must be under statutory limits.

In conclusion, radiation since its discovery has been exploited smartly by surgeons' fraternity. Recent technological developments in radiology and nuclear medicine not only have a positive impact on surgeons' skill and dexterity but have also improved patient's management, outcome and possibly positive impact upon health economics. However, adherence to radiation safety practice is mandatory for continuation of a safe, successful and happy relation between radiation and its users.

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