e- Registration & e-voting at AMPI: Beginning of a new era

Association of Medical Physicists of India (AMPI), formed in 1976, has members scattered all over India and even abroad. Many of its members keep changing their jobs in keeping with their professional requirements making the membership register unreliable for its content. Keeping this in mind AMPI Executive Committee (EC) (2011-13) mooted the idea of an active e-registration of members at AMPI web-site www.ampi.org.in. The registration is pass-word protected and members can update their information. It has significant connotation as periodic update of vast and floating members is a continual gigantic task and reaching them who have changed their addresses or contact details is problematic. With key to e-registration and active update of information into hands of the members it is the responsibility of the members of AMPI to keep the latest information in membership directory. This is to suggest here that e-directory may indicate the date of last update for each member so that other may guess about its probable validity. Again, a column entitled “remarks” may be added in all members’ page which may contain additional information entered by AMPI like validity year for annual member, status of being active/deceased etc.

AMPI took another big leap recently by conducting e-voting for the election of EC and Trust for 2013-15 successfully for the first time in its history. This put at rest all the problems related with wrong contact addresses of members, loss or delay of announcement, nomination paper and ballot paper during transit and probable human error in sorting and counting the votes. Last EC devoted much time debating, concluding and ensuring secrecy, security and transparency of the e-election method. The system designed by M/S Networth Systems is based upon Word Press Content Management (wordpress.org) and has a few inbuilt checks like only one ballot per voter, voting by only valid members, automatic e-mail reminder to Election Officer to send information to members etc. The icing on the cake was the space for one-time e-campaign for the contestants. All these resulted in the record number of 530 voters participating in election which is about 80% of all e-registered members of AMPI. We have to consolidate this huge gain by improving the e-voting process further. There were some instances where voters couldn’t vote for less than 15 candidates in EC and also vote for EC and Trust have to be casted together.

We must thank and congratulate Dr Manoj Semwal, Election Officer; Dr D.D. Deshpande, President 2011-13; Dr Challapalli Srinivas, Secretary and all EC members of AMPI to make the membership directory and election electronic.

Pratik Kumar

Pratik Kumar
MULTI SESSION GAMMA-KNIFE STEREOTACTIC RADIOSURGERY: TECHNOLOGY DEVELOPMENT, ADVANCEMENT AND USE

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Introduction
Gamma knife stereotactic Radiosurgery (GKSRS) is a highly conformal radiation dose delivery system to well defined targets within the brain without much damaging normal healthy neighboring tissue. This precise radiation dose delivery method requires rigid frame fixation followed by the MR/CT and/or angiography imaging with commanding treatment planning system for perfect calculations. Experiencing the radiobiological benefits of hypo-fractionation, the evidences shows, multiple session radiosurgery or fractionated gamma knife stereotactic radiosurgery (fGKSRS) for single or multiple lesions may be beneficial for the treatment of brain tumor. A newly developed extend system (ES) is used to treat brain tumors with modified gamma knife stereotactic radiosurgery technique. The ES comprises of a carbon fiber frame system (extend frame), a vacuum pump (vacuum surveillance system - connected to the vacuum compressor), mouth piece with dental impression connected to the front piece of frame and a customized vacuum head rest to maintains reproducibility of fractionation. As there is no pin through skin, ES gives absolute comfort to the patient.

Materials and Method
The extend frame assembly of Leksell Gamma Knife Perfexion (GKPFX) enables fractionated treatments in addition to volume staging. It also facilitates to treat larger lesions or the tumors near vital regions. GKPFX can now also allow treating tumors of paranasal sinuses, orbit and upper cervical spine in a single fraction or with fractionation. Optimization and justification of fGKSRS regime could be considered as an option for radiosurgery with GKPFX. ES can safely deliver doses to the volumes unable to treat previously. Fractionation could be preferred for large tumors to spare normal vicinity tissue because while treating large volume in a single high radiation dose, significant amount of normal healthy tissue may receives high radiation dose. Up to 7 - 8 Gy of radiation dose per fraction over a course of maximum five session (maintaining the SRS recommendations) to achieve the predetermined output of delivered radiation dose could be applied with ES. The fGKSRS may attain good results for the tumor near critical organs like brain stem, optic nerve or motor/ speech function sites.

Treatment process involves preparation of dental impression, fitting the patient head on vacuum cushion with dental impression front piece, vacuum adjustable for comfort and/or saliva suction, multiple radii measurement and record on each position round the head. The patient then taken to CT imaging with dental impression and extend frame fixation base with vacuum support. Skull radii at various points and position are measured before imaging using repositioning check tool (RCT) to satisfying positional accuracy and reproducibility while compared these radii measurements before each fraction of radiation treatment. CT of the head taken with CT adapter. Acquired stereotactic CT images are co-registered with volumetric MR image for treatment planning. Radii measurements are taken with high precision electronic probes which locates the patient head within the extend frame. Vacuum surveillance interlocks pause the treatment if the patient moves within the extend frame.

Results
Radiation dose of 14 – 25 Gy in 5 pituitary region tumors and 2 meningiomas near optic nerve and brain stem with 31 fractions were delivered through ES successfully. Average tumor size treated was 8.87 cc (max 16.04 cc) with 92.6 % coverage. 3.5 - 5.0 Gy/fraction in 4 - 5 fGKSRS fractions are delivered in consecutive days. Maximum and minimum radii error was measured as 1.2 mm and 0.1 mm. An average error of 0.66 mm was recorded with 0.9 mm maximum specific patient positioning error. Average maximum point dose to optic nerve and brain stem was found 11.84 Gy (integral dose 2.78 mJ) and 13.16 Gy (integral dose 62.51 mJ) respectively.

Conclusion
All patients have tolerated the treatment well with specific dental bite block. The setup is accurate and reliable with efficient conformity. The ES has extended the clinical advantage as the extended range of indications for gamma knife SRS/SRT with fractionation or multi fraction techniques. Further more patients to be treated with the technique to conclude its accuracy, reproducibility and efficiency with steep dose fall outside the target. More patient treatment and experiencing positive results /follow ups will make the full use of its advantage.

Swapnil Chougule S/O Prof. Arun Chougule, Jaipur has launched a campaign against smoking among college-goers with the name I SMOK (I Support the MOvement to Kill cancer) in association with his 23 fellow students of IIT Mumbai and in co-ordination with UNISEF, UNESCO and Indian Cancer Society. Congrats!!!

Medical Physics Family News
that we lack significantly in terms of literacy, quality education, access to effect globally, are expected to benefit Indian scenario in the particular. own country will be a blessing for such patients.

that these revolutionary advancements, apart from having a positive go abroad can be counted on fingers. Bringing newer modalities to our Therapy modalities and the scenario of our nation led to the conclusion preferred mode of treatment in many cancers. Those who can afford to process to a relation between the recent developments in Radiation in the country, most are simple Cobalt teletherapy units which is not the treatment of many patients. Among about 400 external treatment units and the rest of the world. However, narrowing down the thought treatment modality for that matter, does not distinguish between India Poverty is another reason which sometimes hinders the proper treatment for such cancers is bound to be more effective if and small towns. This is responsible for a rise in oral and lung cancers.

The topic at first perplexed me as Radiation Therapy or any other medical facilities and working atmosphere.

The idea of this article is not to present any data and figures which are easily available today online. If one goes on a clicking spree, the recent advancements in Radiotherapy planning and execution of treatment will pop up in no time. Nor do I intend to copy and paste the facts about the depth and precision to which a notorious tumor can be detected, targeted and treated.

As an Indian who grew up watching the gross ignorance about cancer in a vast population of our country, I am sure the recent developments in the fast growing menace of cancer will be a boon for my country. I have divided the possible benefits to Indian scenario in major three categories;

a. A boon for patients
b. A blessing in academics
c. A push for the dignity of technical professionals

a. A Boon For Patients

Unfortunately, the literacy level in our country remains considerably low even after six long decades as an independent nation. The lack of education to a major part of our population has been largely responsible for ignorance about the basic health, common ailments, and preventive measures and even about the cooperation required from the patient's side during treatment.

Cancer has been giving sleepless nights to the medical fraternity throughout the world. Even after continuous research and excellent infrastructure, even the advanced countries have not yet fully understood the nature and causes of many malignancies. So, the recent advancements in Radiotherapy field will assure an era of early diagnosis coupled with precise and targeted treatment in comparatively less time span. It is our common observation at the hospitals that most patients, especially the ones from the rural background, reach the hospital or radiotherapy centre at a late stage. Sometimes, a crucial time is wasted from the patient's side during treatment.

The treatment for such cancers is bound to be more effective if positional errors during treatment are eliminated and the involuntary movements of the body are compensated. The IMRT, IGRT modalities assure better results in such patients. (Smoking is rampant in foreign countries also but their health consciousness and disease management is also much better than our people). Since a large part of patient influx at our hospitals and radiotherapy centers belongs to rural areas, sparing time for daily visits for external beam radiotherapy is also found cumbersome for many. (Many patients discontinue, silt many resort to unscientific treatment methods in their areas). A major reason is that most patients belong to labour class. The latest equipments like SBRT and other higher energy modalities which can deliver treatment in less number of fractions can help the patients with a convenient treatment span and a better cooperation can be expected from them.

Parveen Malik and Dr Pradeep Narayan who scored First in “For” and “Against” category respectively wins Rs. 5000/- each. There were, in total, 19 entries (11 For and 8 Against the proposal). We express our gratitude to all the participants and following 5 judges (in alphabetical order) who took pains to contribute to this academic activity: Dr Arun Chougule, Jaipur Dr D.D. Deshpande, Mumbai Dr Paul Ravindran, Vellore Dr P.G.G. Kurup, Chennai Mr R.K. Munjal, Delhi

Results of Discussion Forum Contest

Pratik Kumar, Editor, Medical Physics Chronicle & Additional Professor, Medical Physics Unit Dr B.R. Ambedkar IRCH, AIIMS, New Delhi

Medical Physics Chronicle invited entries either FOR or AGAINST the proposal “The fast-paced technological advancement in radiation treatment equipment is good for Indian scenario”.

For the proposal

1st Parveen Malik
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parveen2219@gmail.com

2nd Arun Krishnan M.P.
Medical Physicist
Kolhapur Cancer Center Kolhapur (Maharashtra) arunkrishnanmp@gmail.com

3rd Ganesh Patel
GCRI, Ahmadabad ganeshgravity@gmail.com

Against the proposal

1st Dr. Pradeep Narayan
Defence Laboratory, Jodhpur pradeep_narayan@rediffmail.com

2nd Dr. Abhijit Mandal
Deptt. of Radiotherapy and Radiation Medicine, Institute of Medical sciences, BHU, Varanasi - 221005 amandal751@yahoo.co.in

3rd Ramaiah Vinay Kumar & Suman Bhasker
Asstt. Prof. of Radiotherapy, Kidwai Memorial Institute of Oncology, Bangalore -560029 & Addl Prof., RT, AIIMS, N.D.-19 vinaykumar33223@gmail.com

Discussion Forum Contest: For the Proposal

THE FAST PACED TECHNOLOGICAL ADVANCEMENT IN RADIATION TREATMENT EQUIPMENT IS GOOD FOR INDIAN SCENARIO

Parveen Malik, Department of Radiotherapy, Government Medical College and Hospital, Sector-32, Chandigarh

The topic at first perplexed me as Radiation Therapy or any other treatment modality for that matter, does not distinguish between India and the rest of the world. However, narrowing down the thought process to a relation between the recent developments in Radiation Therapy modalities and the scenario of our nation led to the conclusion that these revolutionary advancements, apart from having a positive effect globally, are expected to benefit Indian scenario in the particular. Placing our country in contrast with the developed countries suggests that we lack significantly in terms of literacy, quality education, access to medical facilities and working atmosphere.

Poverty is another reason which sometimes hinders the proper treatment of many patients. Among about 400 external treatment units in the country, most are simple Cobalt teletherapy units which is not the preferred mode of treatment in many cancers. Those who can afford to go abroad can be counted on fingers. Bringing newer modalities to our own country will be a blessing for such patients.
**b. A Blessing in Academics**

India being a highly populated state ranks high in unemployment statistics also. Ironically, many youth who have dreams and ambitions to compete with the outer world, fail to avail good career start despite capabilities. Just for example, the entrance examinations held for medical and engineering courses have a handful of seats as compared to the students taking the examinations. Thus, a large number of students fail to get through despite being capable. Consequently, several youth settle for alternative careers unwillingly, many small town youths are forced to join family businesses, and there may be students who quit studies for good. In such a scenario, the advancements in paramedical fields will create fresh opportunities for our ambitious youth. Moreover, the revolutionary equipment will add a new lustre and prestige to the radiotherapy technology profession. The recent advancements will not only usher in better career opportunities but also increased job options in government as well as private sector.

**c. A Push For The Dignity of Technical Professionals**

It is a sad thing to say that the paramedical profession in our country has not got the due it deserves. There are many paramedical professionals, whose skills and precious time is getting wasted in pursuing their long demands, fighting cases for things like nationwide uniform nomenclature, better pay scales and what not. This has disastrous effects on the profession which can be a big put off to future candidates. A lot more needs to be done in this country to convince all that the radiotherapy technologists are the back bone of this glorious profession. The renaissance in the advanced radiotherapy treatment equipments will add dignity and value to the profession. Recent advancements in radiotherapy equipments will enrich the paramedical profession a lot which will help the paramedics, physicists and oncologists to think afresh about the potential of teamwork needed in radiotherapy. New advancements will also boost them towards more academic accomplishments. Since the recent state of the art treatment modalities require a complete teamwork of all the above professionals, we can expect a better and cordial atmosphere at our radiotherapy centres. The fruits of a healthy working atmosphere are eventually translated into a better quality of treatment for the patients. Every recovered patient is the precious asset of the entire department.

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**Discussion Forum Contest: AGAINST the Proposal**

**THE FAST PACED TECHNOLOGICAL ADVANCEMENT IN RADIATION TREATMENT EQUIPMENT IS GOOD FOR INDIAN SCENARIO**

Dr. Pradeep Narayan, Defence Laboratory, Jodhpur

**Background**

“A silent crisis in cancer treatment persists in developing countries and is intensifying every year. At least 50 to 60 per cent of cancer victims can benefit from radiotherapy that destroys cancerous tumors, but most developing countries do not have enough radiotherapy machines or sufficient numbers of specialized doctors and other health professionals.” — Mohamed El Baradei, Former Director General IAEA

Cancer is the second most common disease in India responsible for maximum mortality with about 0.3 million deaths per year. Regardless of prognosis, the initial diagnosis of cancer is still perceived by many patients as a life-threatening event which leads to anxiety and depression. There has been a steady increase in the cancer incidence rate in India affecting both men and women over the last two decades. About 60 to 80 percent of cancer patients report at a late stage where radiotherapy is the main mode of treatment often for palliation. As suggested by The International Union against Cancer that at least one cobalt unit is required for treatment of cancer patients for one million populations in the developing countries. However, considering all the sources, currently there are around 400 teletherapy units in India as against a requirement of around 1200. The state-wise distribution of radio-therapy units reflects wide gap in the availability of facilities. It is really a big question from where and when the resources can be obtained to meet the short fall of more than these 800 teletherapy machines. The existing treatment facilities for cancer control in-terms of radiotherapy and financial allocation are woefully inadequate to take care of even the present load [1].

There has been substantial increase in the technological complexity of radiotherapy over the last 20 years, driven by advances in computing power, imaging and more efficient methods for delivering radiation. IMRT leads to a reduction in acute and late toxicities compared to conventional radiotherapy. Stereotactic Body Radiation Therapy for early stage lung cancer is ablative therapy that has control rates similar to surgery. Image Guided Radiotherapy (IGRT) is widely adopted and considered standard modality of radiation treatment. Biological approaches are likely to make the biggest impact. Proton therapy may provide theoretical benefit over conventional radiotherapy in lung and prostate cancer treatment where sharp dose fallout is needed. The modern technology of radiation therapy continues to progress at an unprecedented rate. There are large financial and educational barriers in the initial setups and implementation of new radiation treatment modalities [2]. The clinical scientific evidence regarding tumor control and overall cancer survival for most tumor sites are generally inconclusive at this time while using advanced radiation treatment techniques. The need for these advancements is based on the underlying assumption that the new, complex technologies will improve loco-regional control of cancer and therefore cure more patients [3]. Huang et al. [4] concluded that new technology can produce new ways for errors to occur, necessitating ongoing evaluation of QA for radiation therapy. Resources available for health care are particularly constrained in developing counties, and interventions need to attain demanding levels of cost-effectiveness before they can be prioritized [5]. The rapid changes in the radiation technologies and their adoption need to be evaluated for clinical efficacy, toxicity, patient preference, and cost effectiveness.

The implementation of advanced radiotherapy technologies often leads to less personal contact between the physician and patients. The radiation oncologist deals more with treatment planning systems and dose volume histograms (DVHs) and less with the actual patient. This distance also makes it more difficult for the medical physicist and technical staff to understand the relationship between the radiation fields and the patient’s anatomy. The major challenges in using technically advanced equipments and techniques are; appropriate human resources, qualified and trained staff for the accurate radiation dose delivery; infrastructure for handling the technologies in efficient and effective way; decisions on types and stages of cancers to be treated; development of commissioning and QA/QC protocols; and institutional resources and clinical backup to deal with increased downtime for the more complex technologies.

**Remarks**

In 2010, the World Bank reported that 32.7% of the Indian people fall below the international poverty line of US$ 1.25 per day, while 68.7% lives on less than US$ 2 per day. As per Times of India report, private spending on health in India is 4.2% of GDP and 70% of it is paid by the people from their own pockets and this expenditure has been rising, especially for the poor with increasing privatization of healthcare. In
2011, WHO had commented that rising cost of diagnosis, medicines and hospitalization may push millions of Indians below the poverty line. Poor people are more likely to be diagnosed with cancer when the disease is at advanced stage and treatment options are limited. Limited access to medical care carries the additional risk of denied access to community resources. A diagnosis of cancer compounds the struggle for survival and introduces new financial, physical, and psychological demands that may lead to “Economic Shock”.

Looking into the current technological advancement in radiation treatment vis-à-vis the economic status of the Indian people, the requirement is to provide the minimum quality radiation treatment in an affordable and approachable way. Each district hospital of the country should be facilitated at least with one telecobalt unit and the treatment should be available at minimum cost. Currently, for simple case of radiotherapy, the patients have to rush to metropolitan city or state capital and generally got trapped in private hospitals at heavy financial cost. The policy makers of Govt. of India should take necessary steps in this direction and encourage the NGOs and Private parties through subsidy to install and operate the teletherapy machines at District Hospitals. The cost of imported equipment of cobalt units; linear accelerators and brachytherapy machines are major problems in making cancer treatment equitable to all in India. Perhaps, local manufacturing of equipment with cheaper and innovative designs will go a long way in reducing the cost. In order to implement and establish comprehensive cancer care, more and more financial resources are required. The improvement in tumor control and reduction in normal tissue toxicity while using advanced technologies such as IMRT, IGRT, SRS etc. are not yet established. These technologies should be adopted only for needy and clinically required cases not as a routine treatment modality.

As a nation, we must ensure that cancer prevention, detection, treatment, and rehabilitation services are accessible and available to all who need them, regardless of their ability to pay. There must be sufficient trained and knowledgeable staff with clinical and medical physics expertise to deliver a safe and effective radiation dose. The allocated money of cancer care should be diverted towards district hospitals for establishing basic radiation treatment facility. Our motto is to allocate money of cancer care should be diverted towards district hospitals for establishing basic radiation treatment facility. Our motto is to make cancer treatment equitable to all in India. Perhaps, local manufacturing of equipment with cheaper and innovative designs will go a long way in reducing the cost. In order to implement and establish comprehensive cancer care, more and more financial resources are required. The improvement in tumor control and reduction in normal tissue toxicity while using advanced technologies such as IMRT, IGRT, SRS etc. are not yet established. These technologies should be adopted only for needy and clinically required cases not as a routine treatment modality.

References


K Thayalan is a senior medical physicist in India, and presently serving as head, Medical physics division and Medical cyclotron facility, Dr. Kamakshi memorial hospital, Chennai. Earlier, he has been in the Tamil Nadu Government medical service and served as the professor of radiology physics at the prestigious Madras medical college. He has 30 years of experience both in clinics and teaching. He was born in Vattathur, a village in Cuddalore district of Tamilnadu, to parents of K. Kuppusamy and Arukkaniammal. He completed his physics master degree with first rank at the Annamalai University (1978) and did his post graduate diploma in Radiological physics and training (1985) at the Bhabha Atomic Research Centre (BARC), under the University of Bombay. He is a certified Radiological safety officer (RSO) for medical, industrial and research institutions. He got his M.Phil degree in radiation physics from the Loyola college, under the University of Madras (1983). He underwent an advanced clinical medical physics training (1987) at the Harper hospital and Wayne state University, Detroit, USA with the support of International Union against cancer (UIUC).He is the fellow of the UIUC, International academy of medical sciences (IMSA) and ultrasonic society of India(FUSI). He obtained his doctoral degree (Ph.D) on High dose rate brachtherapy (2003) from the Tamilnadu Dr.M.G.R.Medical University, Chennai. He is the member of professional development committee, Association of federations of organizations of medical physicists (AFOMP), representing India in the 16 East Asian countries medical physics community. He served as the vice president, Association of medical physicist of India (AMPI), treasurer, secretary and chairman of its Tamilnadu and Puducherry chapter. He is one of the founder member of Indian Brachtherapy Society (IBS) and currently the secretary of IBS. He is the member in 13 scientific associations. He has 22 publications to his credit, presented 70 scientific papers, delivered 82 invited lectures, in national and international conferences and an author of 5 books in medical physics/Radiological physics. He is an examiner for M.Sc., M.D. and Ph.D., courses, member of board of study, advisory board, ethic committee and expert panel in many Indian universities and currently guiding students for Ph.D. He is the Task group member of the Atomic energy regulatory board (AERB), Mumbai for the preparation of safety codes and guides.
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