SYMPOSIUM: NEW OPPORTUNITIES WITH ROBOTIC, ENDOSCOPIC AND RADIOLOGICAL INTERVENTIONS

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ROBOT ASSISTED MESH BRACHYTHERAPY AFTER SUBLOBAR RESECTION FOR EARLY STAGE LUNG CANCER
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Lobectomy has long been the standard of care for the management of patients with early stage lung cancer. More recently, this has been challenged as advanced radiotherapy techniques are showing excellent long term local control approaching that of lobectomy. However, the latter makes assumptions about nodal disease and occasionally histology, that can dramatically affect the impact on adjuvant therapy. Recently, there has been resurgence in the United States of the use of sublobar resections for patients that are not able to tolerate a lobectomy. However, sublobar resection does result in a a staple line that has a non – trivial risk of local recurrence. Methods, such as mesh brachytherapy have been explored and have shown in single institution series the ability to dramatically decrease the local recurrences. Prospective trials are underway to further quantify this benefit. One of the downsides of using mesh brachytherapy is that there is radiation exposure to the team handling the mesh. Novel methods, utilizing robotic technology, have allowed us to improve the safety and precision of this procedure. In this lecture we will describe both the rationale and methods for robot assisted mesh brachytherapy after sublobar resection.

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RIGID RECTOSCOPY TO IMPROVE RADIATION TARGETING AND INDIVIDUALISE MANAGEMENT OF RECTAL CANCER
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Purpose: In rectal cancer most of the time radiotherapy (RT) is given front line and the identification of the GTV is important to target properly the beams. Assessment of the GTV (and CTV) can be made with imaging(CT scan, MRI, ERUS, Pet-CT etc…) . Clinical examination with Digital examination (DE) and endoscopy is essential for GTV evaluation. Endoscopy can be performed in different way (flexible colo or sigmoidoscopy). Rigid rectoscopy (RR) is a relevant alternative
Method: RR is performed on an ambulatory basis, in the knee chest position. A small bowel preparation is necessary. A disposable plastic rectoscope is used with cold light, insuflation and succion. The diameter of the RR is 2.5 cm. Biopsy can be taken with forceps. Fiducial marker can be implanted to localize the tumor. Pictures of the tumor can be taken with a camera. This examination is lasting 2 to 5 minutes and can be easily repeated at each visit.
Results:
1- With RR it is possible to see the tumor and localize it precisely in the rectum which is important for proper delineation on the planning CT scan. The tumor response is evaluated according to RECIST criteria. RR can be performed each week during RT and after treatment to evaluate the CLINICAL RESPONSE (CR) which as strong predictive and prognostic value (1). A complete CR after neoadjuvant treatment is defined as no visible tumor and a rectal wall supple or with a slight non suspicious induration.
If a CCR is achieved the surgeon may reapraize his initial decision and move to a more conservative type of surgery (1).
2- To perform contact X-Ray (CXRT) it is mandatory to use RR which is necessary to position the X-Ray tube in contact to the tumor under vision control. The diameter of this applicator is usually 3 cm ; with the Papillon 50^{TM} it is possible to use applicators of 2.5 or 2.2 cm easy to introduce.
The merit of CXRT is to safely increase (50 to 110 Gy in 3 to 4 fractions) the dose to the rectal tumor. The randomized trial Lyon R96-02 has shown that CXRT+EBRT was increasing significantly the CCR (29%) and the rate of colostomy free 10 year survival (60%) (2). CXRT alone or combined with external beam RT can definitively control 80 to 90% of T1 or T2 N0 tumors not exceeding 4 cm in diameter (3).
Conclusion: Clinical examination of the tumor with RR is an essential step of the management of rectal cancer with radiotherapy. It is simple and fast to perform but need some clinical practice. Radiation oncologists treating rectal cancers (and all surgeons) should become familiar with RR and use it on a routine basis.
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RADIOLOGICAL INTERVENTION
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Purpose/Objective: The new possibilities of image guidance by interventional radiology enable very advanced treatments by interstitial brachytherapy. Tumors or metastases at almost any anatomical site may be targeted. In this talk, the spectrum of indications will be demonstrated. Clinical and oncological properties and results will be discussed accordingly.
Material and Method: Positioning of the catheters is carried out by CT or MRI guidance. The Seldinger technique is applied to place sheaths in the target volume, which ultimately host the brachytherapy catheter. Proper localization and a sufficient number of catheters are important to achieve an adjusted dose distribution. In specific cases this is supported by preplanning using virtual catheters in the treatment planning system set by a radiooncologist. HDR-brachytherapy with a 192-Ir source is dependent on a close inter-disciplinary cooperation of radiooncologist and radiointerventionalist.
Since August 2006 1573 patients with liver tumors have been treated, as well as 163 patients with lung tumors and metastases, 44 retroperitoneal malignancies, 15 renal tumors and 110 patients with tumors in other locations.
Results: Prospective data is available on HCC as well as colorectal carcinoma. Outside the liver, prospective data is available on lung and retroperitoneal treatments. A prospective phase II trial with 83 brachytherapy application for lung malignomas resulted in a local control rate of 92% after 12 months (1 – 21). Minor pneumothorax occurred in 6 patients (21 %), only in 1 patient a chest tube was necessary (2 %). There were no changes in the postinterventional vital capacity.
For the patients with retroperitoneal tumors the results regarding local control are similar, the complication rate and GI toxicity are negligible.
Conclusion: Interventional CT/MRI assisted brachytherapy is typically an interdisciplinary approach. In almost every anatomical site where the interventional radiologist may place a catheter brachytherapy is able to deliveran adequate dose usually as a single fraction. Our results demonstrate CT guided brachytherapy is safe and highly effective. It is important to further define appropriate indications with regard to a) alternative therapeutic approaches such as extracerebral stereotactical irradiation with hypofractionation schemes and b) general oncological considerations. The lecture will provide facts for this discussion.

SYMPOSIUM: ROLE OF IAEA AND UICC IN BRACHYTHERAPY TRAINING

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BRACHYTHERAPY: THE IAEA VISION AND POLICY.
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In the field of Human Health and radiotherapy in particular, the International Atomic Energy Agency (IAEA) has an objective to enhance Member States' (MS) capabilities to establish sound policies for radiotherapy and cancer treatment, to improve access to radiotherapy worldwide and to ensure the effective and safe application of radiotherapy technologies.
Brachytherapy (BT) is an essential component of cancer treatment and activities in this field have always been among IAEA's priorities. The IAEA has a number of possibilities to address the needs of MS related to BT. Technical Cooperation (TC) Programme comprises national and regional projects, with either bilateral cooperation between individual MS or between a group of MS in the region and IAEA. These projects are unique vehicles through which a MS may obtain knowledge, skills or technology from the Agency or other MS. Typical examples of TC projects are the initiation of a high-dose rate (HDR) BT unit, upgrade of BT department or introduction of a new BT technique.
The IAEA conducts radiotherapy and radiobiology multicentre international trials under Coordinated Research Project (CRP) Programme. They are designed to answer scientific questions relevant to the radiation oncology community and applicable in busy radiotherapy departments within limited resource setting. Additional benefit for participating institutions includes research capacity building and gaining expertise in conducting radiotherapy trials. Two of 12 currently running CRPs are randomised studies on oesophageal and cervical cancer investigating clinical outcome and toxicity of a resource-sparing schedule of radiotherapy with BT component. The results of CRPs are usually published as IAEA documents with free access and/or in scientific peer-reviewed journals.
The IAEA places a lot of emphasis on training and education both in BT and in external beam radiotherapy. This is achieved through producing learning and educational materials, making them available in IAEA official languages, organizing and conducting training courses and workshops, assistance in planning and implementation of long-term training and education programmes at the national or regional level. Recent publications include a full series of syllabi for the training and education of radiotherapy professionals. The IAEA develops clinical guidelines for management of selected types of cancer or clinical situations that are very common in low and middle income MS. Described approach and techniques are intended to be simple, feasible and resource sparing to the extent that is possible when dealing with a complex treatment modality. Such clinical guidelines on cervical and prostate cancers are in press and will be available later this year. Another important publication "Implementation of HDR BT in limited resource setting" is planned to be published in 2012/2013. The document covers a broad range of relevant subjects, as necessary infrastructure, requirements for personnel and training, quality assurance, radiation safety and current applications of HDR BT.
The Division of Human Health supports and promotes e-learning and m-learning. The recently launched Human Health Campus-webpage and its mobile version are educational and informational portals for professionals in radiation medicine. Development of learning resources was performed in close collaboration with professional educationalists. Among available educational tools are recorded lectures, interactive case studies and videos containing guide questions and answers.
It is worth emphasizing that Agency's policy in reference to brachytherapy promotes resource-sparing approaches with support of HDR brachytherapy, Co^{60} brachytherapy, short fractionation schedules, and the use of fixed-geometry applicators (e.g. tandem-ring).
Having more than half a century history of promoting and supporting of radiotherapy and BT in treatment of cancer, the IAEA is proud of its success stories. One of the recent examples is establishing a HDR BT unit in El-Salvador.

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UICC: RADIATION THERAPY IN THE WORLD
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Radiotherapy is a critical ingredient of comprehensive cancer treatment. It has been estimated that anywhere from 40 to 50 percent of all cancer patients would benefit from receiving radiotherapy in course of their illness. Radiotherapy can be used as a sole curative therapy, in combination with surgery and/ or chemotherapy as part of the initial curative treatment approach, in the management of recurrent disease, and as a powerful tool for palliation.
Currently, the supply of radiotherapy services falls short of demand in many parts of the world including many of high income countries. However, the shortage is so pronounced in low and middle income countries that it precludes radiotherapy from being considered as part of cancer management. In fact, there are many countries in Africa with no access or access limited to one or two centres. It is estimated that in Africa, only 18% of the published need of the minimal need of one treatment unit per million population in Africa. In Indonesia, available radiotherapy resources represent less than 10% of national need. This in spite of a large number of cervical cancer cases best managed with curative radiotherapy. Large gaps also exist in high income countries that face not only shortages of equipment, staff, but also limited access to new technologies. Radiotherapy is one of the most cost effective and safe cancer treatments available today. To execute treatment process safely and effectively, an initial investment into facility, equipment, staff training and on-going investment in quality programs is required.
The IAEA has developed a number if guidelines for safe deployment of radiation therapy programs. The IAEA has also developed a Programme for Action for Cancer Therapy (PACT) whose mission is to contribute to the improvement in cancer survival in developing countries by integrating radiotherapy investment into health system. PACT integrates radiotherapy within a comprehensive cancer strategy within the framework of a National Cancer Control Plan. However, in spite of a number of partner organizations, the resources available to IAEA and PACT Programme are limited. If we are going to witness improvement in access to radiotherapy in the world, we must change the current strategy of reliance on WHO and IAEA to solve the problem. The UICC is working together with WHO, IAEA, and its member organizations to put cancer on the global agenda to secure improved funding. However, cancer requires complex interventions and there will be numerous priorities for the use of funds. The national and international radiation therapy organizations should consider their role in global advocacy for cancer control, especially in advocacy for radiation therapy. More complete data are required describing radiotherapy resources including required manpower and technology for optimal deployment of radiotherapy. Many countries do not recognize medical physicists and radiation therapists as essential medical personnel. Information regarding infrastructure required for equipment operation (power supply, service, availability of parts, etc) is frequently incomplete. Resource rich countries should offer training and assistance to those less resources not only in providing personnel and medical training but also advocacy and implementation science support. This help should not be limited to north-south help or west-east but also east - east and south-south help. In addition, the radiotherapy industry should join forces with other partners to develop affordable sources of radiotherapy equipment coupled with sustainable service provision. Global radiation oncology community must join forces to assist the governments in making rational choices in identifying best strategies to improves cancer control; strategies that include radiotherapy.

SYMPOSIUM: SKIN BRACHYTHERAPY

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WHAT ARE THE BEST INDICATIONS FOR BRACHYTHERAPY IN NON-MELANOMA SKIN CANCERS?
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Non melanoma skin cancers are highly curable tumors mostly located in sun exposed areas, with an increased incidence in elderly. The goal of the treatment is to obtain cure with the best achievable cosmetic and functional results. Different modalities have been applied: dermatologic treatments, surgery alone or in combination with external beam radiotherapy, or interstitial low dose rate (LDR) brachytherapy. More recently, high dose rate (HDR) brachytherapy