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باللغة العربية : دور العلاج الإشعاعى ثلاثى الأبعاد فى علاج أورام الصدر

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قَالُوا سبحانك لَا علْم لَنا إِلا ما علمتنا إِنك أَنت الْعليم الْحكيم

صدق الله العظيم

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ROLE OF 3 DIMENSIONAL RADIATION THERAPY IN MANAGEMENT OF MEDIASTINAL TUMORS

Essay

Submitted in the Partial Fulfillment of M.S.c Degree in
Clinical Oncology

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Abstract

This study is a review of literature on the role of 3 dimensional radiation therapy in the management of mediastinal tumors. Moreover, special comparison has been made with classical 2 dimensional radiation therapy of the same anatomical area as regards dose escalation and toxicity. Although, the incidence of mediastinal tumors has increased in the last 10 years, it is still categorized as rare tumors in the all WHO and other international neoplasms classifications. In NEMROCK it is about 0.49% of the total registered cases in the last 10 years between 1999 – 2009. The anatomical location of the mediastinum and the necessity of using radiation therapy in treatment of mediastinal tumors, made many normal tissues to be significantly considered as risk organs such as the spinal cord, lungs, and the heart. Radiation therapy is used on the base of definitive, preoperative, adjuvant or palliative issues, depending on the histopatological classification of the mediastinal tumors, the different stages of patient at presentation and the medical condition of the patients. The advancement in the computed programmes with modern imaging devices, facilitate the use of 3DRT (3D-CRT & IMRT) in treatment of mediastinal tumors to overcome obstacles in conventional radiation therapy and improvement of the results. Three DRT gives the possibility of radiation dose escalation with improvement of the therapeutic ratio and less toxicity to the pulmonary tissues and the heart. In addition to that, IMRT technique makes great breakthrough in form of possibility of re-irradiation or radiation to the large volumes mass in the mediastinum.

Key Words: 3 Dimensional, Radiation Therapy, Mediastinal Tumors

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List of Abbreviations

AV	Atrioventricular
BM	Bone marrow
CAD	Cardiovascular Disease
CR	Complete remission
CT	Computed tomography
CTC	Common Toxicity Criteria
CTV	Clinical target volume
3D	3 Dimensional
DLBCL	Diffuse Large B-cell Lymphoma
DMLC	Dynamic multileafcollimator
DRR	Digitally reconstructed radiographs
DVH	Dose Volume Histogram
EFS	Event free survival
EORTC	European Organization for Research and Treatment of Cancer
EPID	Electronic Portal Image Device
EUD	Effective uniform dose
EUD	Equivalent uniform dose
FFP	Freedom from progression
GTV	Gross tumor volume
HL	Hodgkin Lymphoma
ICRU	International Commission on Radiation Units and Measurements
IMRT	Intensity- Modulated Radiation Therapy
LDH	Lactic dehydrogenase
LET	Linear energy transfer
LS	Lhermitte's sign
MLCs	Mulitleaf Collimators
MLD	Mean lung dose
NEMROCK	Kaser EL-einy Center of Radiation Oncology & Nuclear Medicine

MRI	Magnetic resonance imaging
NCI	National Cancer Institute
NHL	Non Hodgkin Lymphoma
ORs	Organs at risks
OS	Overall Survival
PET	Positron emission tomography
PTV	Planning target volume
RIHD	Radiation-induced heart disease
RT	Radiation therapy
RTOG	Radiation therapy oncology group
RTPS	Radiotherapy Treatment Planning
SEPs	spinal- and scalprecorded somatosensory evoked potentials
SMLC	Multiple segmented multileaf collimator
TCP	Tumor control probability
TD	Tolerance Dose
2DRT	2Dimensional Radiation Therapy
3DCRT	3Dimensional conformal radiotherapy

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INTRODUCTION & AIM OF WORK

The incidence of mediastinal tumors is rare, but it is characterized by wide diversity of tumors such as thymoma, lymphoma & germ cells tumors according to the histological origin and which part of the Mediastinal involved(anterior, middle or posterior) & predominance of each type related to the age of the patient(Children or Adults) ***(Todd et al. 2008).***

Adults generally develop thymic tumors and lymphomas, but germ cell tumors and carcinomas can also be found. Neurogenic tumors are usually seen in the pediatric population ***(Robert et al. 2008)***.

Most of these tumors require radiotherapy as a local measure of definitive treatment, part of a multimodality regimen or Palliation of symptoms in patients with stage IV disease ***(Jeffrey et al. 2007).***

Anatomically, when exposes mediastinal tumor to radiation therapy, there are many risk organs closely related to the field such as the lungs, heart & the spinal cord ***(Gayle et al. 2006).***

The advancement in computed soft ware programmes & images techniques e.g. (CT –based planning) lead to use precise radiation therapy (3DCRT & IMRT)* more easily to achieve the golden aim of radiation therapy, maximum dose to the target volume & minimum dose to the adjacent normal tissues ,which might be difficult to be achieved by conventional techniques ***(Benedick et al. 2007).***

* *(3DCRT: 3 Dimensional Conformal Radiation Therapy --- IMRT: Intensity Modulated Radiation Therapy)

Aim of Work

To study & review the outcome of using 3dimentional radiation therapy in prospect of local control of the disease in mediastinal tumors & development of radiation toxicity in the adjacent normal tissues.

CHAPTER I

Overview of Mediastinal Tumors

- **Anatomical Features.**
- **Incidence of Mediastinal Tumors:**
  - Global Data
  - Egyptian Data
- **Classification of Mediastinal Tumors**
- **Overview of Treatment Approaches**