

STUDY ON RADIATION SAFETY OF HIGH DOSE RATE MULTIPLE COBALT-60 SOURCES TELEETHERAPY MACHINE

Sang-Hue Yen^{1,3,4}, Yuh-Lin Lee^{1,4}, Liung S. Chao^{1,4}, Max M. Chao^{1,4}

David HC Pan^{2,4}, Kuang Y. Chen^{1,3,4}

1. Cancer Center and Cancer Research Group, Veterans General Hospital-Taipei

2. Department of Neurosurgery, Veterans General Hospital-Taipei

3. Department of Radiation Oncology, National Defense Medical Center

4. National Yang Ming University

Stereotactic focusing irradiation (radiosurgery) by applying multiple beam from linear accelerator or multiple cobalt sources has been used in the treatment of brain tumors. Gamma Unit (Gamma Knife) containing 201 cobalt sources has been developed and used in Sweden for decades and it also has gradually become popular in the treatment of deep-located brain tumors or abnormalities in the recent 10 years. Owing to the high activity of its 201 cobalt sources, the internal structure, installation, beam direction, possible radiation leakage and operations of this new treatment modality and techniques of Gamma Unit are quite different from those of traditional cobalt teletherapy machines. So far, there is no such therapeutic experience in Taiwan. This study is to set up the quality assurance program and to evaluate our own data about radiation protection, shielding, possible radiation leakage and measurement to increase the radiation safety for patients as well as staffs. Laksell Gamma Unit (Model B) with 4 different sized interchangeable collimator helmets, individual collimator plugs and different detector including ion chambers, LiF thermoluminescent dosimeter chips, verification films, spherical polystyrene phantom and survey meters were used for exposure and absorbed dose measurement. The radiation leakage measurements around, above and beneath the treatment room were background readings which were below the limits established by NCRP Report 49. This study will provide not only the data and rules to follow for the radiation safety in our center, but also the reference data for other hospitals when they install similar facilities in the coming days.

[Therapeut Radiol Oncol 1995; 2: 235-242]

Key words: Focusing irradiation, Radiosurgery, Gamma Knife.

INTRODUCTION

Stereotactic radiosurgery is the use of

external radiation together with a stereotactic target localization device to treat the inaccessible deep seated lesions within the

Received: 1995, 6, 20. Accepted: 1995, 7, 30.

Address reprint request to: Sang-Hue Yen, M.D., Cancer Center, Veterans Geners Hospital, Taipei, No. 201, Sec. 2, Shih-Pai Road, Taipei, Taiwan.