



EXCELLENCE IN  
CANCER CARE

# NCCI

## Neurospinal & Cancer Care Institute

M. HASHIM MEMORIAL TRUST



م. حاشم میموریل ٹرسٹ

PAKISTAN GAMMA KNIFE & X-KNIFE RADIATION ★ PET CT & PET-GUIDED RADIOTHERAPY ★ NEUROSPINAL & MEDICAL SERVICES

# Newsletter

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## RADIOSURGERY

**Gamma Knife® surgery**, sometimes referred to as stereotactic radiosurgery (SRS), is a non-invasive method for treating brain disorders. It is the delivery of a single, high dose of irradiation to a small and critically located intra-cranial volume through the intact skull. It is preferred for its extreme accuracy, efficiency and outstanding therapeutic response.

Today, Gamma Knife surgery is performed in hundreds of leading hospitals and clinics around the world. Around 70,000 patients undergo Gamma Knife surgery every year, and this unique procedure has an impressive scientific track record with thousands of peer-reviewed articles. No other non-invasive treatment method in this field has greater clinical acceptance.



### Leksell Gamma Knife® Icon™

Leksell Gamma Knife Icon is the most precise radiosurgery device on the market, limiting radiation dose to healthy tissue. Icon is the only technology with microradiosurgery capabilities allowing for the treatment of virtually any target in the brain with ultra high precision.

Leksell Gamma Knife® Icon™ is FDA cleared and CE marked.

**SRS / VMAT for multiple brain metastases on Synergy-S**

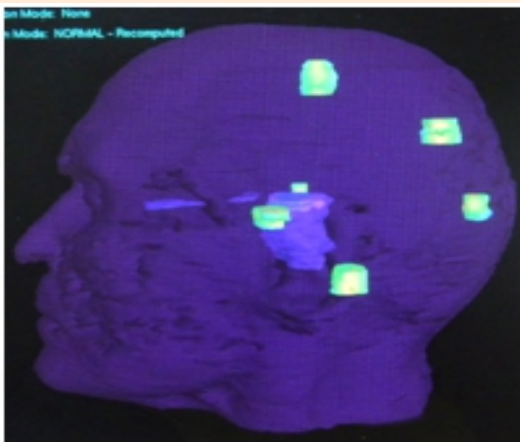
Dr. Azhar Rashid (Consultant Radiation Oncologist)

We are presenting an interesting case of metastatic Non small cell Lung cancer treated on Synergy-S ( Linear Accelerator Based Stereotactic Radiosurgery System).

Case Report: 81 years old gentleman with good performance status, diagnosed with non small cell Lung cancer having pulmonary and liver metastases in 2012. He received treatment with multiple targeted agents and later he received conventional chemotherapy. Recently he developed two small metastases in left cerebral region of brain. Patient developed neurologic symptoms and was unable to continue his systemic therapy. His medical oncologist very wisely referred this case to NCCI for stereotactic radiosurgery (SRS) as they wanted to offer more systemic therapies if he improves from his brain symptoms, so as the performance status.

On arrival of patient to NCCI, thin sliced MRI brain with contrast was done and found to have 6 small metastases in both the cerebral hemispheres and one lesion was present in right cerebellar region.

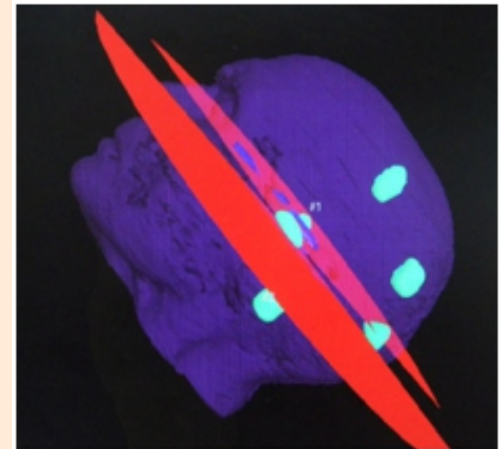
CT simulation was performed with thermoplastic sheet and SRS / VMAT planning was carried out on ERGO ++. Excellent Dose distribution was achieved on two arcs and calculated treatment time was 11 minutes. SRS dose prescription was 20 Gy single fraction at 70 % isodose line.



**Pic-(1)- Location and Volumes of Six brain metastases were contoured**

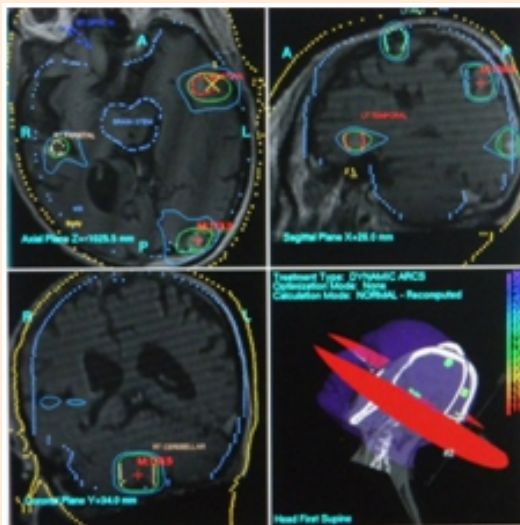
- Left temporal met: 1.8 cc
- Left parietal met: 2.1 cc
- Left posterior parietal met: 2.2 cc
- Left Occipital met: 1.2 cc
- Right parietal met: 0.3 cc
- Right cerebellar met: 2.9 cc

**Pic. No.1**



**Pic-(2)- SRS/ VMAT Plan was prepared with the help of two arcs, all the contoured mets were well covered with prescription isodose line of 70 %. Total treatment time was 11 minutes.**

**Pic. No.2**

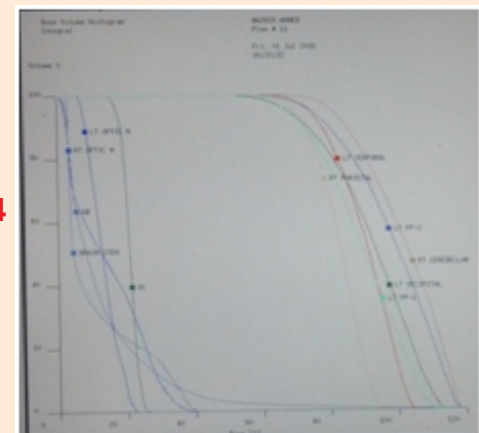


**Pic. No.3**

**Pic-(3)- Computerized Planning on Treatment planning system ERGO ++. Green line around the target is prescription isodose line of 70 %. Blue line is 50 % isodose line.**

**Pic. No.4**

**Pic-(4)- DVH showing wide gap between all the target doses and critical organ doses representing effective treatment planning.**



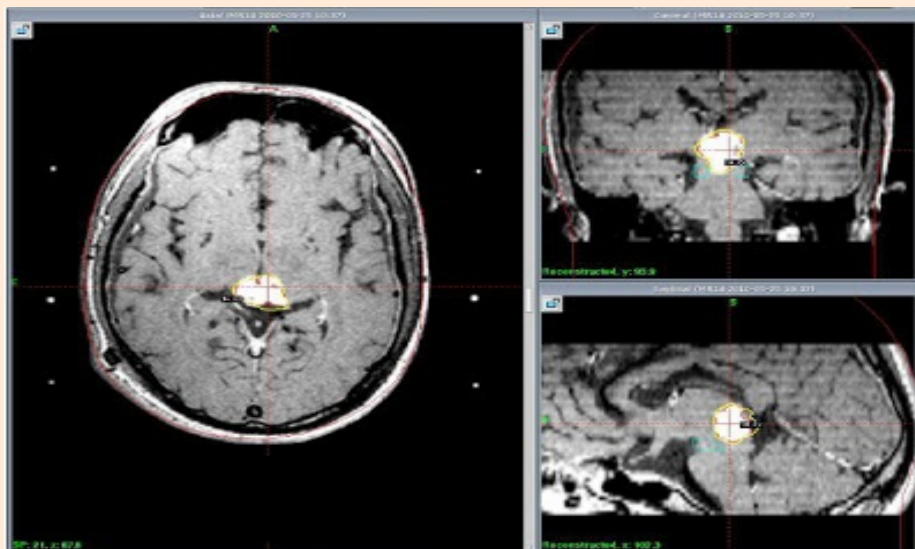


**In conclusion following benefits were achieved from this treatment.**

- 1- Shortest treatment time( 4-11 min) to execute the standard dose of radiation therapy .
- 2- Non Invasive procedure(no fuducials or screws), No anesthesia, No bleeding, No pain.
- 3- Very high doses to each metastases (Pic-4- DVH)- Good local control.
- 4- Lowest dose to the critical organs at risk.(Pic-4- DVH)-Minimal side effects.
- 5- Sparring of hippocampus.
- 6- No long term memory impairment.
- 7- No cognitive impairment.
- 8- Rapid improvement in performance status to continue the systemic therapy.
- 9- Continue daily routine work, no rest, no hospitalization, no holidays required. Day care procedure. Discharged on the same day , 60 min after the procedure.
- 10- Treatment of choice in brain metastases for the oncologist, neurosurgeons and other clinicians.

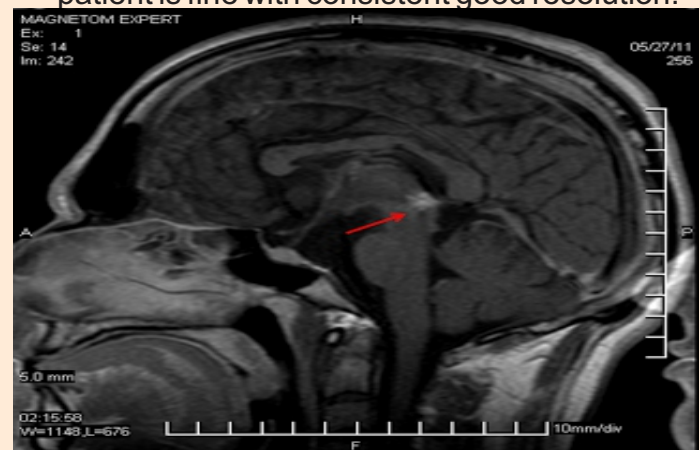
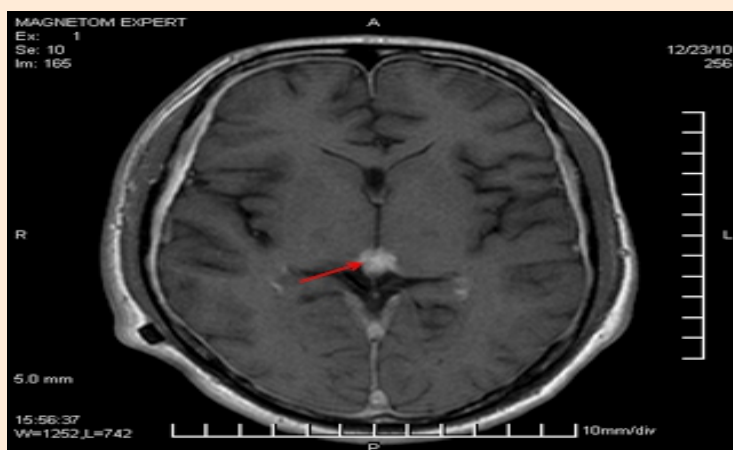
**A case of Pineal region Tumor treated with Gamma Knife Radiosurgery**

Dr. M. Abid Saleem (Consultant Neurosurgeon)

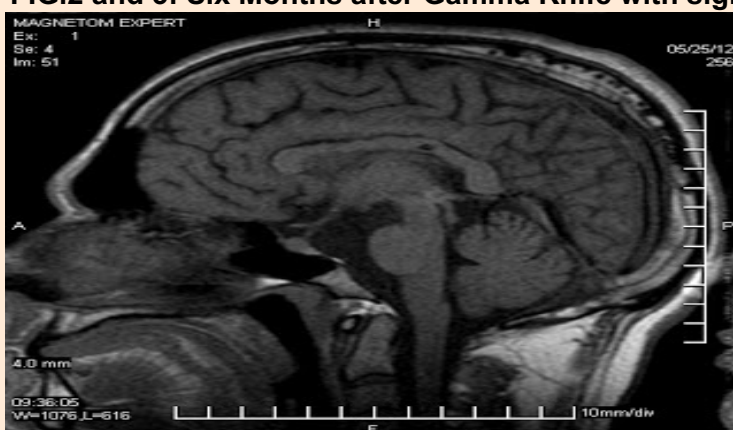


**Fig. 1 Before treatment**

This is a young man of 26 years with c/o headache vomiting and blurring of vision. MR imaging showed an enhancing mass seen in the pineal region and causing obstructive hydrocephalus. MR Spectroscopy revealed low NAA and high choline peak suggestive of neoplastic lesion. V.P shunt was placed and he was treated with Gamma Knife. Multiple isocenters with 8 & 4 mm collimators used in APS mode. It was a single day treatment as usual and patient was discharged next day. At 6 months he is back to his normal life style and the Follow up MRI shows 90% resolution of the said tumor. Now at 2 years follow patient is fine with consistent good resolution.



**FIG.2 and 3: Six Months after Gamma Knife with significant reduction in size and symptomatic improvement.**



Target	Location	Prescription	Volume
A	Pineal region tumor	14 Gy @ 50%	3.9 cm <sup>3</sup>

**Fig.4. Two years after Gamma Knife with complete resolution.**

## PET CT/SCAN

**Positron emission tomography (PET)** and **computerized tomography (CT)** are both state-of-the-art imaging tools that allow physicians to pinpoint the location of cancer within the body before making treatment recommendations. The highly sensitive **PET scan** images the biology of disorders at the molecular level, while the CT scan provides a detailed picture of the body's internal anatomy. The **PET/CT** scan combines the strengths of these two well-established imaging modalities into a single scan.

A CT scan is able to detect and localize abnormal changes in the body structure or anatomy, such as the size, shape and exact location of an abnormal growth and its extent.

A **PET scan** is very different from an **ultrasound, X-ray, MRI, or CT scan**. A **PET scan** allows the physician to distinguish between living and dead tissue or between benign and malignant disorders. Since a PET scan images the biology of disorders at the molecular level, it can help the physician detect abnormalities in cellular activity at a very early stage, generally before anatomic changes are visible.

Alone, each imaging test has particular benefits and limitations but by combining these two state-of-the-art technologies, physicians can more accurately diagnose, localize and monitor cancer, as well as **heart disease** and certain **brain disorders**.

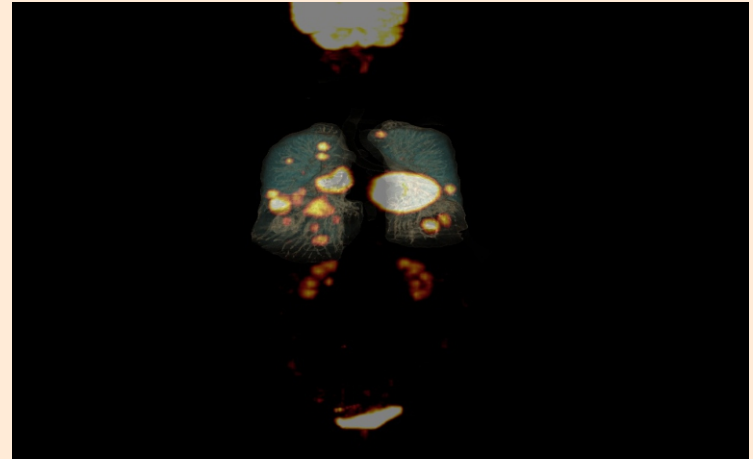
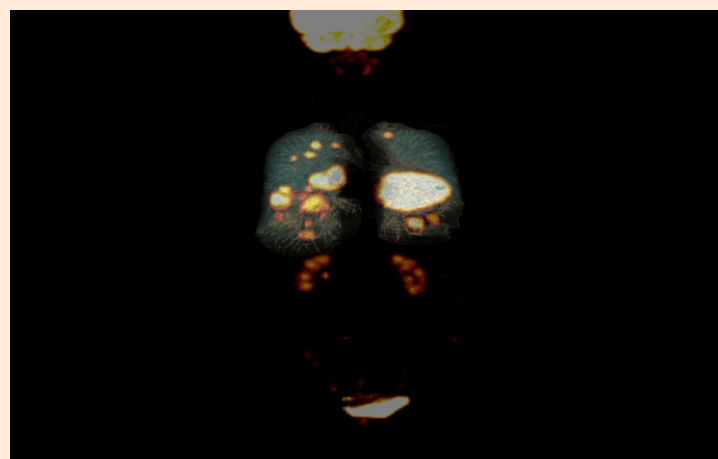
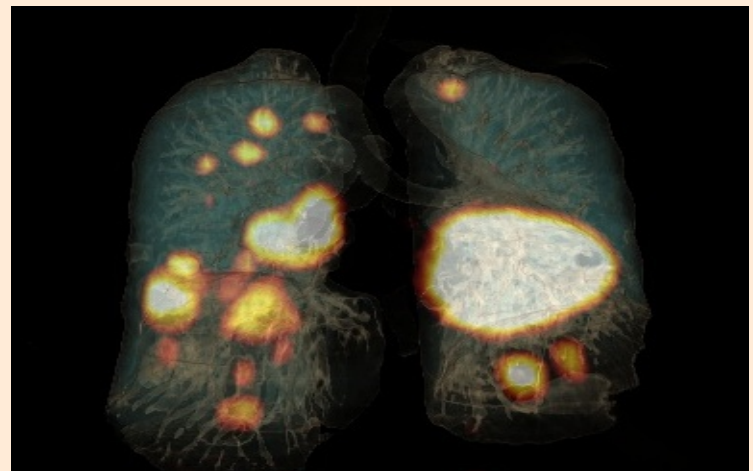
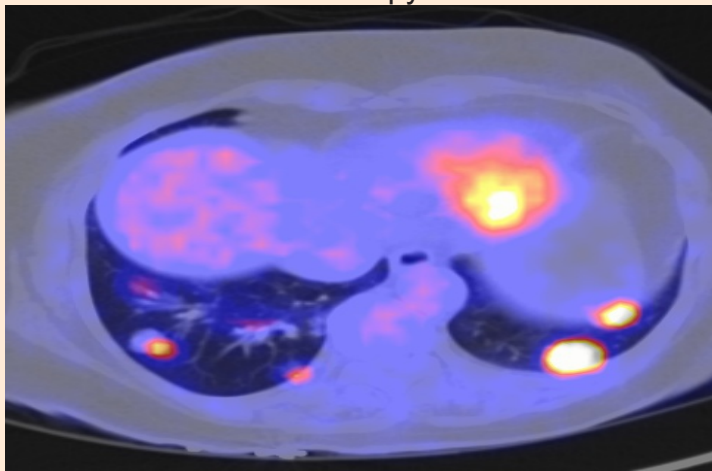
### 3D Images of PET-CT SCAN showing the lung Metastasis more than one in number

**DIAGNOSIS:**  
CA Left Breast.

**HISTORY:**  
Left MRM 2008  
02+12 Cycle of Chemotherapy 2008  
26 Fractions of Radiotherapy 2008

There are multiple large FDG avid pulmonary metastatic deposits of various sizes seen throughout both the lung fields.

NCCI Introduce first time PET/CT 3D imaging in Pakistan.



P E T C T - S C A N 3 D I M A G E S