

# Trends in Cranial Radiotherapy: A Single-Institution Experience Highlighting the Role of Stereotactic Radiosurgery

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## BACKGROUND

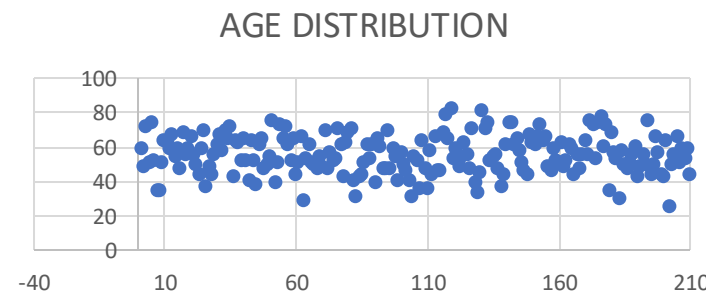
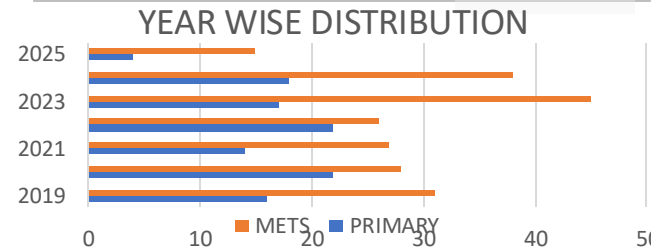
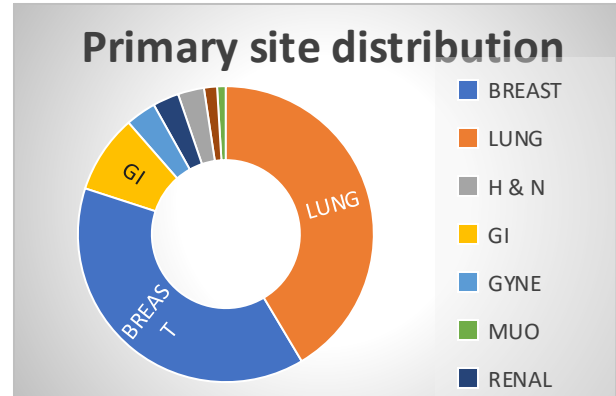
Brain metastases are the most common intracranial tumors encountered in oncology practice and are a major cause of cancer-related neurological morbidity and mortality. Improvements in neuroimaging have led to earlier detection of limited intracranial disease, thereby increasing the use of stereotactic radiosurgery (SRS) and fractionated SRS (fSRS) in appropriately selected patients.

## AIM

To evaluate the demographic and clinical characteristics of patients receiving cranial radiotherapy at our institution, with particular emphasis on those treated using SRS or fSRS.

## METHOD

We performed a retrospective analysis of all patients who received cranial radiation therapy for either primary brain tumors or brain metastases between February 2019 and July 2025. A predefined subgroup of patients treated with SRS or fSRS between February 2019 and July 2024 was analyzed in greater detail. Data collected included patient demographics, tumor histology, treatment intent, radiotherapy technique, and prescribed dose and fractionation.



## RESULTS

During the study period, 5,635 patients received radiation therapy at our center, of whom 323 (5.7%) underwent cranial irradiation. Of these, 113 patients (2.0%) were treated for primary brain tumors and 210 (3.7%) for brain metastases. Volumetric modulated arc therapy (VMAT) was the most commonly employed technique, used in 82% of cases.

The SRS/fSRS subgroup comprised 49 patients with a total of 56 treated lesions. Metastatic lesions accounted for 90% of cases, while 10% were benign intracranial tumors. Lung carcinoma was the most frequent primary malignancy (34.7%), followed by breast carcinoma (22.4%). Most lesions were located in the supratentorial compartment (63.3%). Single-fraction SRS (12–25 Gy) was delivered in 57.1% of patients, while 30.6% received fSRS (24–50 Gy in 3–5 fractions). A combination of SRS and fSRS for multiple lesions was used in 12.2% of patients.

## CONCLUSION

This institutional audit demonstrates contemporary patterns in the use of cranial radiotherapy, with brain metastases—predominantly from lung and breast primaries—remaining the leading indication. The high utilization of VMAT-based approaches and SRS/fSRS reflects an increasing emphasis on precision radiotherapy in routine neuro-oncology practice.

