

# Dr. Jyotirup Goswami

MD, DNB, PDCR

Senior Oncologist, Kolkata

Phone : Phone : 99033 88063

E-mail : radiationoncologykolkata@gmail.com

Website : radiationoncologykolkata.com, drjyotirupgoswami.com

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## Modern Radiotherapy Techniques

### **SRS/SRT (Stereotactic Radiosurgery & Radiotherapy) [Cranial]**

- Refers to extremely accurate localisation of a point in space
- Stereotactic radiotherapy refers to a technique of extremely focused radiotherapy
- It is usually delivered in a small number of fractions (1-5), with large dose/fraction (>4Gy/#), unlike conventional radiotherapy which is delivered in small doses over a long time (1.8-2Gy/#, once a day, 5 days a week for 5-7 weeks).
- Delivering a much higher dose over a shorter course of time, allows the radiation to be more effective biologically.
- The effect of stereotactic radiotherapy is akin to surgery.
- Stereotaxy was first achieved in cranial lesions, many of them benign, eg arterio-venous malformations, craniopharyngeoma, pituitary adenoma & acoustic neuroma
- These all feature treatment of a small target, adjacent to vital areas, to a dose much higher than the tolerance dose of nearby structures.
- Stereotactic radiotherapy is today, also the preferred treatment modality for brain metastases. It has been shown to be equivalent to surgery or whole brain radiotherapy.
- The first machine to deliver stereotactic radiotherapy was the Gamma knife, created by Lars Leksell (a neurosurgeon) in 1961. This machine uses 201 small telecobalt sources.
- Today, cranial stereotaxy can also be delivered by specially equipped linear accelerators (the so-called X-knife)
- Cranial stereotaxy initially was based on physically & invasively fixing a rigid frame to the patient's cranium.
- The frame was required for the accurate localisation of the target on imaging.

- In the modern day, we have come to use non-invasive frames.
- Use of sophisticated pre-treatment imaging, such as in-room Cone Beam CT, has allowed us to do away with frames altogether.

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