Management of Different Brain Pathologies with Gamma Knife

Thesis

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Introduction

The use of a single fraction of high dose ionizing radiation beams focused on the stereotactically defined intracranial target volume through the intact skull was the brain child of Dr. Lars Leksell in the 1950s, the target volume would be a tumor, a vascular malformation or normal brain to be destroyed for a functional result. The aim was to create surgical changes within the brain without significant damage along the entry pathway. The research for this goal spanned almost two decades and the result was the Gamma knife.

The Gamma Knife is a hemispherical array of 201 radiation sources focused at a small point; this protects the surrounding normal tissues from the adverse radiation effects whilst destroying any tissues in the 'focus' of the machine.

The clinical applications of Gamma Knife has largely expanded to include treatment of vascular malformations, a wide variety of benign and malignant tumors, as well as functional neurosurgical syndromes, such as trigeminal neuralgia, extra-pyramidal dysfunctions, epilepsy, pain and psychiatric syndromes.