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GAMMA KNIFE RADIOSURGERY

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ABSTRACT

Gamma Knife Radiation surgery is an alternative to traditional brain surgery and whole brain radiation therapy for the treatment of complex, difficult brain conditions. It is a non-invasive stereotactic radiosurgery instrument that involves no scalpel or incision – it's not a knife at all. Instead, the Gamma Knife uses up to 201 precisely focused beams of radiation to control malignant and non-malignant tumors, as well as vascular and functional disorders in the brain, without harming surrounding healthy tissue. It is done as an ambulatory procedure and patients can regain back to their normal routines soon after treatment.

Keywords: tumors, radiation, stereotactics, head frame

INTRODUCTION

Gamma Knife Radio surgery, also called as Stereotactic Radio surgery, is a very precise form of therapeutic radiology. Even though it is called surgery, a Gamma Knife procedure does not involve actual surgery, nor is the Gamma Knife really a knife at all as it is said. It uses beams of highly-focused gamma rays to treat small to medium size lesions/tumour, usually in the brain. Many beams of gamma radiation join to focus on the lesions, providing a very intense dose of radiation without a surgical incision or opening.

GKRS

Gamma knife Radio surgery is a radiation therapy where the beams of radiation are very precisely focused to reach the tumour/ lesion, or other area being treated with minimal effect on surrounding healthy tissue.

WORKING OF GAMMA KNIFE RADIOSURGERY

Radio surgery works in the same manner as other types of radiology: it distorts or destroys the DNA of tumour cells, causing them to be unable to reproduce and grow. The tumour will shrink in size over time. For blood vessel lesions such as an arteriovenous malformation (AVM), the blood vessels eventually close off after the therapy.

Gamma knife Radio surgery involves the following steps:

- Head frame placement
- Imaging the location of tumour/lesion
- Planning of the dosage

- Radiation treatment

INDICATIONS FOR GKRS

Gamma Knife radio surgery is used to treat certain conditions of the brain in particular:

- brain tumors
- brain cancer
- arteriovenous malformations, or AVM (a type of blood vessel defect)
- acoustic neuroma
- Gamma Knife radiosurgery has shown some promise for treating conditions such as tremor and rigidity related to Parkinson's disease, epilepsy, and chronic pain.
- Functional disorders such as trigeminal neuralgia and obsessive-compulsive disorder

RISKS OF THE PROCEDURE

- Radiation exposure during pregnancy may lead to birth defects.
- Other risks may include, but are not limited to, the following:
 - swelling of the brain
 - headache
 - nausea
 - numbness

PROCEDURE

1. Remove any clothing, jewellery, hairpins, dentures, or other objects that may interfere with the procedure, and change to gown.
2. An intravenous (IV) line will be started in order to give medications and/or fluids during the procedure. Angiogram is done prior to the procedure.
3. Skin on the head will be cleansed at the locations where the pins for the head frame will be placed.
4. A local anaesthetic will be injected at the head frame pin insertion sites and the head frame will be attached to the head with pins that are inserted into the skull.
5. After the head frame is attached, brain imaging is done so that the location of the brain tumor or lesion can be precisely identified for planning the treatment. The brain imaging procedure may be a computed tomography (CT) scan, a magnetic resonance imaging (MRI) scan, or a cerebral angiogram.
6. After the brain imaging the client will be allowed to relax while the treatment team plans for the dosage.
7. The client is made to lie down on a sliding table. A special helmet, called a collimator helmet, will be fitted over the head frame. The collimator helmet has 201 holes in it, which allow radiation beams to pass through it into your brain in a very precise pattern that is determined by a computer.

8. Once the helmet is in place, the table will slide into the Gamma Knife unit..
9. Video monitoring is done during the therapy.
10. The number of treatments will depend on the specific situation. The entire treatment session may last from two to four hours, but the length of the session will depend on the treatment plan designed for.
11. After the treatment session is over, the treatment table will slide out of the Gamma Knife machine. The head frame will be removed. The pin insertion sites will be cleaned and a sterile dressing will be applied.

AFTER THE PROCEDURE

After the procedure, the client is kept on observation you will be for a period of time.

Once the client is able to take liquids by mouth as tolerated, the IV line will be removed.

The client may feel some discomfort after the procedure, such as a headache or nausea which can be treated.

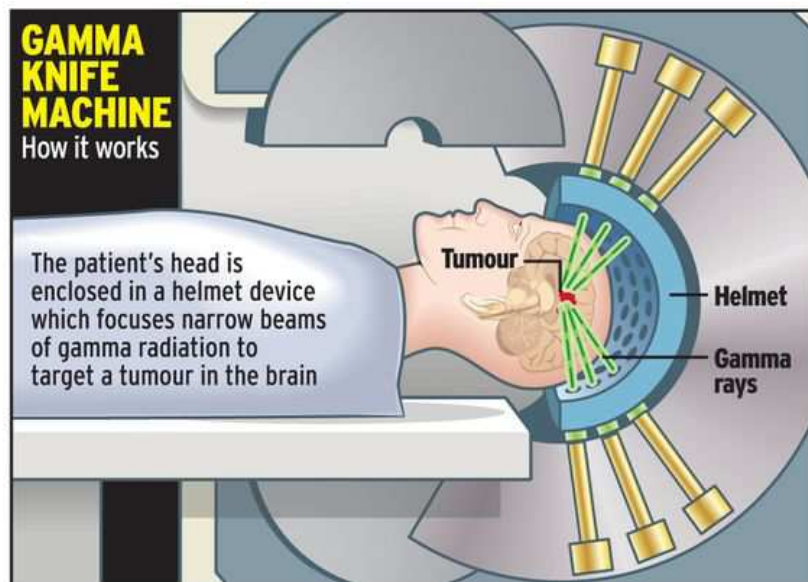
The Gamma Knife procedure is generally performed on an outpatient basis, the client may be likely allowed to go home at the end of the day.

ADVANTAGES OF GKRS

- Gamma Knife is a neurosurgical tool designed exclusively for the treatment of brain disorders.
- The lesion being treated receives a high dose of radiation with minimum risk to nearby tissue and structures.
- The cost of a Gamma Knife procedure is less than traditional neurosurgery.
- Patients experience little discomfort.
- The absence of an incision eliminates the risk of hemorrhage and infection.
- Hospitalization is short, typically an overnight stay or an outpatient surgical procedure. Patients can immediately resume their previous activities.
- Gamma Knife technology allows treatment of inoperable lesions. The procedure offers hope to patients who were formerly considered untreatable or at very high risk during open skull surgery.

CONCLUSION

Gamma Knife Surgery is recognized worldwide as the preferred treatment for brain tumours, arteriovenous malformations and brain dysfunctions such as trigeminal neuralgia. The Gamma Knife offers a non-invasive alternative for many patients for whom traditional brain surgery is not an option. Gamma Knife surgery removes the physical trauma and the majority of risks associated with conventional surgery.



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