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Short Communication Open Access

Continuity of Care Optimizing the Gamma Knife® Brain Surgery Patient Experience

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Introduction

Stereotactic radiosurgery using the Leksell Gamma Knife® (AB Elekta, Stockholm, Sweden), refers tonon-invasive brain surgery that is performed in a single outpatient procedure.This technology allows extremely precise focal radiation of intracranial targets and spares tissues adjacent to the target, using 192-201 photon beams generated from the decay of Cobalt 60 sources. Gamma Knife surgery represents a major advancement in brain surgery that now has a long track record of success. The first patient procedure was performed in Stockholm in 1967. Since then almost 1 million patients worldwide have undergone this procedure at more than 300 worldwide sites. Its development has enhanced neurosurgical options for patients with brain tumors, vascular malformations, and functional disorders such as pain, movement disorders, and epilepsy. More than 2000 publications now testify to the ability of Gamma knife surgery to provide a safe, accurate, and reliable treatment option. The Gamma Knife enables patients to undergo a non-invasive form of brain surgery without traditional surgical risks such as bleeding or infections, does not require a hospital stay, or subsequent rehabilitation.

Methods and Materials

At our center we have performed 12, 967 Gamma knife procedures during a 27 year interval beginning in 1987. We recently reevaluated the steps involved in Gamma knife surgery procedures at our center and reviewed the continuityof care planfor patients. In addition we surveyed 50 recent Gamma knife surgery patients to see if they were satisfied with our continuity of care approach.

Results

The Pre-operative Evaluation

The day prior to the Gamma Knife procedure, the patient is evaluated at our outpatient area adjacent to the gamma Knife facility. The patient is seen and examined by his surgeon and an allied health provider or resident trainee in neurosurgery in order to review the risks and benefits of Gamma knife radiosurgery. Appropriate labs are reviewed and orders are entered into the electronic medical record. During this visit the patient also meets with a dedicated Gamma Knife nurse with extensive training and experience in the procedure and all patient needs and expectations. The nurse will complete a nursing assessment and a brain imaging screening (since all patients have one or more types of medical imaging such a MRI, CT scan, or a digital subtraction angiogram to localize the brain target). During this question and answer session the nurse begins to bond with the patient as well as the patient's family members. Continuing the preoperative education of the patient, the nurse provides the patient and family members with a preprinted list of procedure day instructions. The nurse also often gives the patient and their family member's a tour of the Gamma Knife facility. Finally, the nurse addresses all of the patient's and family member's questions and concerns.

Intra-operative Care

The patient arrives for treatment at 5:30am and is greeted by the same nurse who completed their assessment the previous day. An IV is started and pre-operative medications are given. Patients initially receive 1 mg of lorazepam sublingually followed by small, carefully titrateddoses of intravenous fentanyl and midazolam prior to placement of a stereotacticframe on the patient's head. The patient is monitored closely following IV sedation using automated blood pressure measurements and pulse oximetry. After local injection of anesthetic agents (half marcaine, half xylocaine), an aluminum stereotactic head frame is applied to the head using titanium pins that attach to the outer table of the skull. This device provides great stability and reliability. The frame is anchored to the head by the neurosurgeon with the nurse assisting. The nurse next escorts and monitors the patient as they undergo brain imaging with the frame attached. All patients have one or more imaging studies that include MRI (if no contraindications to this imaging from pacemakers or other implants), CT, or digital subtraction angiography. Following completion of the imaging phase (which is critical to defining the brain target to receive gamma knife), the patient returns to the Gamma Knife suite. Patients may sleep, read, watch TV, or listen to music. Once the radio surgical team – consisting of a surgeon, radiation oncologist, and a medical physicist- finalize the Gamma knife computer treatment plan, the patient is ready to move into the Gamma knife treatment vault itself. Additional IV sedation may be used at this time. The patient is monitored by remote TV monitors by the nurse throughout the actual time of radiation administration, which may last from only a few minutes to one or more hours. The nurse will also keep in contact with the patient's family so they are kept abreast of the patient's progress.

Postoperative Management

Following the completion of the Gamma Knife procedure, the nurse assists in the removal of the stereo tactic head frame and applies a dressing to the pin sites. Rarely superficial scalp bleeding requires a suture at a pin site. Post-operative mild analgesics are administered orally as needed for headache. Most patients receive a single intravenous dose of a corticosteroid to reduce the rare incidence of post procedure swelling in the region of the brain target. As the patient recovers in the Gamma Suite, accompanying family members are reunited with the patient. Prior to departure, the surgeon and nurse meet with the patient and their family to discuss the procedure, the

time of nextfollow up, and any post procedure adjustment in medications or prescriptions. To insure understanding, the nurse reviews with each patient and the family all important discharge and follow up information. The patient is also given our Center's phone number at the nurse's station and instructed to call with any questions.

Discharge and follow up counselling

Patients are usually discharged 1 to 2 hours after the procedure. They are provided with pre- printed instructions that include what to expect following the Gamma Knife procedure. Follow up appointmentsdepend on the patient's diagnosis and typically occur between 6 weeks and 6 months after discharge. The patient's follow up instructions are transcribed onto the pre-printed discharge instructions. The nurse transports the patient to the front of the hospital for same day discharge.Since patients travel to our center from across the region, the United States, and often from abroad, we take special care to make sure that all questions and expectations are addressed.

Continuity of Care Survey

We recently completed a survey of fiftyGamma Knife patients to see if our commitment tocontinuity of care enhances their patient experience (Figure 1). As seen in this chart,patients rated their experience as excellent or good 100% of the time. They confirmed that their pretreatment nurse was the same as the treatment day nurse in >75% of patients. Ninety percent of patient's rated this dedication to maintaining continuity of nursing care as important. Additional patient comments include:

My nurse was exceptional, friendly, efficient, professional and caring.

I was well informed.

Thank you for taking extra time to make my family fell comfortable.

My Gamma Knife experience was better than I thought it would be.

Thank you so much for making my wife and I feel like people.

I had the feeling of being treated special.

My care was more than I expected.

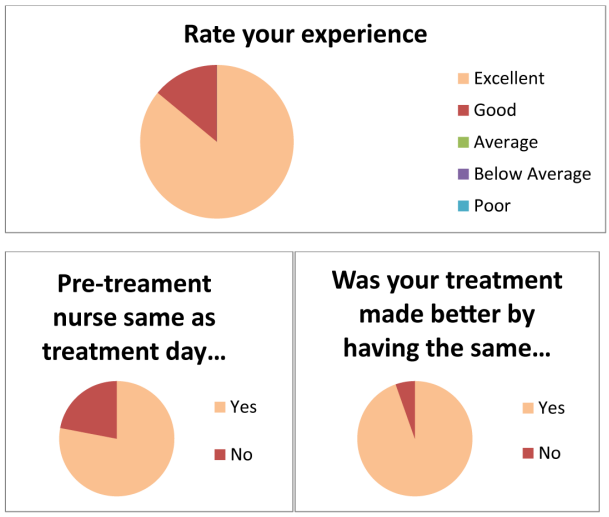

Figure 1: Patient Rating Sheet.

Discussion

Gamma Knife treatment indications include, acoustic neuromas (vestibular schwannomas), meningiomas, arteriovenous malformations (AVM), pituitary tumors, giomas, metastatic brain tumors and other malignant brain tumors. Carefully selected patients with essential or Parkinsonian tremor, trigeminal neuralgia, or severe obsessive compulsive/anxietydisorders have benefitted from Gamma knife surgery. Gamma Knife treatment is provided in four stages: Stage 1– Pre-operative evaluation, Stage 2–Intraoperative Care, Stage 3–Post-operative Management, andstage 4 – discharge and follow up counselling. At the Center for Image-Guided Surgery in Pittsburgh we are optimizing the Gamma Knife patient experience by providing continuity of care for each of these stages. Our experience in the last 26 years now approaches 13,000 patients [1,2]. At our center we currently have two Gamma knife units, the 4 C and the most recent version, the Perfexion® gamma knife. Since we brought the first clinical Gamma knife to the United States in 1987 [1], we have used the models U, B, C, 4 C, and Perfexion models [1].This continuity of nursing care from preoperative evaluation to discharge has been a major source of patient satisfaction at our center.

References

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