

Brachytherapy

Radio Active Prostate Seed Implantation

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BRACHYTHERAPY

("brachy"- Greek meaning short) the implanting of radioactive seeds either within or a short distance from a tumor of the prostate, is a widespread method of non-surgical treatment of cancer. The treatment application has increased significantly in North America due to improved access to medical care and early diagnosis of prostate cancer in large part to the development of the prostate specific antigen test (PSA). According to estimates provided by the American Cancer Society, approximately 180,000 new prostate cancer cases will be diagnosed this year. Of those, 37,000 are predicted to die as a result of the disease.

BACKGROUND

The newest method of delivery of the radioactive seeds demonstrates one of the oldest forms of radiation therapy utilized by oncologists. As early as 1900, radioactive tubes and needles were surgically inserted through the lower abdominal wall, perineum or urethra into the prostate. These highly radioactive sources were left in the patient for a prescribed period of time and removed. This method was painful, required general anaesthesia, and was not widely available to patients due to its highly invasive nature and lack of trained physicians to administer the radioactive chemistry. The procedure evolved to the point where, in the early 1990's, the seeds could be placed within the patient without surgery. A specialized delivery system resembling a conventional syringe and needle is used in conjunction with specialized imaging. This allows the physician to more accurately place the seeds for optimal effect. Further, the procedure can be performed on an outpatient basis.

CURRENT METHODS AND CREMATION CONCERNS

Typically, 50 -120 radioactive seeds of radioactive Iodine-125 or Palladium-103 are implanted. The seeds, measuring less than one-fifth of an inch and approximating the diameter of pencil lead, are placed predicated upon the extent of tumor growth of the prostate. Each seed emits an intense amount of radiation, but the field of radioactivity is approximately the area the size of a small marble. The surrounding tissue and organs act as a shield to the beta radiation. There is minimal exposure to anyone with contact with the patient unless otherwise cautioned by the attending physician. Depending upon the treatment prescribed and the stage of the prostate tumor, the seeds will be left in place from three months to one year. The seeds will "give up" in excess of 90% of their energy within the first six months. Iodine-125, one of the radioactive substances of choice and in widespread use worldwide has a half-life of 60 days. It is totally inactive in 10 half-lives, or 600 days.

According to the Nuclear Regulatory Commission (NRC), if a person dies with recently implanted seeds (approximately 2 weeks post implant) the seeds should be removed via autopsy or by qualified medical personnel. Otherwise, the presence of radioactive seeds pose little or no threat to the cremationist or to the cremation equipment, Iodine-125 is volatilized (evaporated/vaporized) during the cremation procedure and therefore, is not an issue environmentally.

Palladium-103 is rapidly replacing Iodine-125 as the preferred radioactive implant material. Palladium-103 is considered a “nuclear by-product” by the NRC and is not directly under their jurisdiction. It is created by bombarding gold in a nuclear accelerator. Palladium-103 has a half-life of 50 days. Its emitting energy drops off dramatically after its third half-life and is considered without energy after ten half-lives, or 500 days. Palladium-103 follows the course of Iodine-125 during cremation. It too is shielded by the body following seed insertion and is not considered a threat to those with contact with the patient.

THE GOOD, BAD, AND UGLY

While the above is reassuring to the issues of operator and environmental safety, there is a dangerous and dark side to the issue at hand. The cremationist needs to be aware that he/she must ask the correct questions concerning treatment methods of the deceased if Brachytherapy of the prostate is suspected. A recent case illustrates the necessity for accurate information.

The author recently received numerous phone calls from a firm asked to cremate a body with radioactive prostate seeds. The exact nature of the seeds was unknown initially but, they were believed to have been Radium-226. The author advised the firm that Radium-226 has a half-life of 400 years and is not considered without energy for 4,000 years. Further, Radium-226 does not volatilize during cremation. It is ejected from the stack and becomes radioactive fallout. With this information, the firm was instructed to inquire as to the EXACT type of radionuclide in use. Upon investigation, the radioactive source was found to be Iodine-125 and the body was cremated without incident.

It is incumbent upon the cremationist to inquire as to the type of brachytherapy seeds in use. Other implants such as gamma emitters Cobalt 60 with a half- life of five years have largely replaced Radium-226. By rule, it is to be recovered from a patient prior to dismissal from the hospital. The same is true for Cesium-137, which has a half life of 30 years. Cesium-137, also a gamma energy emitter, is a popular radionuclide in the fight against cervical cancer. While these radioactive chemicals should not pose a threat to the cremationist if proper institutional protocols are followed, consider the following anecdote: Cesium-137 is administered by a physician on a Friday. Subsequently, the patient dies from complications unrelated to the radiation therapy. The physician covering for the attending physician over the weekend, releases the body unaware that the Cesium-137 implant is still in place. The body is cremated causing great concern for all concerned.

If other than Iodine-125 or Palladium-103 is the source of the radioactive seeds, contact the releasing facility for further instruction and potential removal of the seeds prior to cremation.