DOSE DISTRIBUTION IN PERMANENT PROSTATE IODINE-125 SEED IMPLANTATION: A COMPARISON OF OPEN RETROPUBIC VERSUS CLOSED TRANSRECTAL ULTRASOUND-GUIDED TRANSPERINEAL TECHNIQUES

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PURPOSE: Two techniques have been used at our institution to implant 125I seeds in the prostate for primary treatment of early-stage prostate cancer. From 1982 to 1987, an open retropubic approach was used. Because of the concern of frequent dose inhomogeneities leading to increased local failure, this technique was abandoned. With the advent of transrectal ultrasound and the development of template techniques using transrectal ultrasound guidance in 1989, we began using a closed transrectal ultrasound-guided transperineal approach. The potential benefits included improved dose distribution in the prostate gland due to the geometry imposed by the template, and improved accuracy of the seed placement relative to the prostate gland and normal tissues due to the real-time imaging of the prostate. To test this hypothesis, twenty consecutive implants of each technique were compared.

MATERIALS & METHODS: These included dosimetric quantities which were felt to represent the adequacy of target volume, implant dimension, the volume encompassed by therapeutic dose, the continuity of minimum peripheral dose, and therapeutic volume per unit activity of 125I. In addition, quantities related to the homogeneity of the implants were compared (i.e., volume of significant overdose >200%, 150% and >120%).

RESULTS: On the basis of these comparisons, the transperineal approach was found to be a superior technique to generate therapeutic dose distribution for a treatment of prostate cancer. The superiority of this technique was based on decreased volume of overdose, increased volume included in the minimal peripheral dose and implant dimensions which more closely approximate the prostate gland.

CONCLUSION: The transperineal approach was found to create a dose pattern more amenable to that appropriate for treatment of early stage prostate cancer.

PRACTICAL REFINEMENTS OF WHOLE BODY ELECTRON THERAPY

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PURPOSE: Production of dose distribution data for whole body electron treatment phantoms of different elliptical shapes and sizes for a simplified system of predicting approximate doses in a patient. Small fields are being measured to use supplementarily. The relative performance of multiple static and rotation treatments have been studied.

MATERIALS AND METHODS: Phantoms are constructed of tissue equivalent waxes. The measurements are made with thin window pancake ion chambers and supplemented by TLD measurements. The electrons are produced by a Varian 2100 Accelerator (6 MeV) with a high dose rate option of 800 CGy/min at isocentre. Two treatment jigs are available; a jig for multi-angle static fields, and a rotation jig whose speed can be adjusted during the treatment. The treatments are given at 300 cm SSD and split into upper and lower fields for both fixed and rotational modes. No absorbers are used at the machine except for lead sheets to produce small field modes as dose modifiers is being investigated.

RESULTS: For severely asymmetric shapes, the dose distributions differ significantly between fixed multifield (6) treatments, and rotation treatments. Hence the systematic use of elliptical shapes. The problem of irregular shapes remains for both modes, but to different extents. Small fields have been measured and reveal marked dosimetric differences from the wide beams. The lead collimation may be contributing despite the long SSD. The use of these fields as dose modifiers is being investigated.

CONCLUSIONS: Rotational electron therapy does produce a more uniform dose in asymmetric phantoms when compared with fixed fields. However, partial compensation can be achieved by altering the relative weights of the fixed fields. This is not always too specific, hence the interest in small fields. We vary rotational speeds to equalize doses without losing the advantage of rotational therapy - short treatment times.