A CT guided technique for prostate brachytherapy has been developed which can be performed on patients with large glands and which allows real time evaluation and modification of implant geometry. The patient is positioned prone and radioactive Pd 103 or I 125 seeds are implanted through the transischiorectal space. Needles are inserted through a Teflon template which is nominally positioned at 26 degrees due to anatomical necessity. The CT gantry is rotated to be orthogonal to the template. The oblique geometry between the CT gantry and couch translation must be considered during treatment planning, implantation and post treatment evaluation. These considerations are presented along with discussion of relevant quality assurance procedures and tolerances.

Treatment planning and implantation are performed in the same session. Here, the discrepancy between the table translation increment and the image plane separation must be corrected. During post implant evaluation, source and calculation point positional errors can be as high as 34 % resulting in dose calculation errors of up to 80 %. Two correction methodologies have been tested, one using a unique digitizing strategy and one using an analytical method. Both methods were verified experimentally.

The mechanical and radiological tolerances of the CT scanner must be consistent with the high level of precision required in radiation therapy. Special emphasis was placed on gantry laser and image plane alignment, sensitivity and radiation profiles, and spatial accuracy of image reconstruction, table translation and gantry tilt .