

Purpose: The newly installed OBI system consists of a kilo-voltage (KV) X-ray source and a flat-panel detector mounted orthogonally to the megavoltage portal imager (MV) in Varian 21EX machine. These devices are linked to the OBI workstation which provides a platform for acquisition/analysis of images and auto couch motion for repositioning the patient. This paper presents our clinical procedures for patient setup verification using OBI.

Method and Materials: In phase I, two sets of orthogonal MV/MV and KV/KV images were acquired to confirm the accuracy of the KV system by comparing daily KV images to traditional MV images and corresponding Digital Reconstructed Radiographs (DRRs). The phase II study acquired only one set of orthogonal MV/KV portal images for daily patient setup verification. An anterior MV and lateral KV images were obtained without gantry rotation. The OBI workstation provided the tools to match the images with DRRs and to analyze the shifts to be made for patient setup correction based on either implanted and/or anatomical markers. The treatment couch was moved automatically based on this analysis. Post-shift MV/KV images were acquired to reconfirm patient positioning. All images and positioning data were electronically saved and reviewed.

Results: Four prostate IMRT patients were included in phase I study. The isocenter alignment of the two sets of images (MV/MV and KV/KV) was found within 2mm relative to DRRs during the entire treatment courses. The phase II study included 30 prostate IMRT patients. The review of post-shift MV/KV images showed an average of 2 mm deviation relative to DRRs. All procedures could be completed within 3-5 minutes.

Conclusion: Phase I study proves that KV images are as reliable as MV portal images with better image quality. Phase II study verifies that matching/analysis tools and auto-couch motion provide fast and accurate patient positioning.