Purpose: To evaluate prostate edema and seed migration through seed position change determined from post-implant CT scans on three different model sources.

Methods: On day-0 and day-30, patients with permanent seed implant brachytherapy acquired CT scan, from which seed coordinates and an average coordinate center were determined,

Weighted distance was the measured distances to the center by applying a weighting factor based on the number of seeds at that same distance (rounded to the nearest 0.3 cm).

The distance between a seed from the first slice to all seeds at other slices was also used as an index for seed migration and edema evolution.

In addition, at each slice, the polygon area \( (A_i) \) outlined by the seeds was calculated using summation of \((x_i y_{i+1}) - (x_{i+1} y_i) f\), where \( x_i \) and \( y_i \) were the \( i \) th and \( (i+1) \) th coordinates of the seeds on the polygon. The volume \( (V_i) \) between two slices contoured by \( A_i \) and \( A_{i+1} \) was \( (A_i + A_{i+1} + (A_i A_{i+1})^{0.5}) h_i/3 \), where \( h_i \) was the distance between the two slices.

Results: Average weighted distance to the theoretical prostate center was 2.1 cm on day-0 and 2.0 cm on day-30. The distance from a seed on the first slice to other seeds on other slices showed seeds moving toward each other in the subsequent CT scans. The magnitude of the edema, expressed as the ratio of the volumes of all seeds contoured on day-0 to those on day-30, ranged from 1.3 to 1.7.

Conclusion: Post-implant edema increased the prostate volume by factors ranging from 1.3 to 1.7. The results showed that the distance index method was consistent with that of volume calculation in the evaluation of the edema change. The methods proposed in this study can be used to evaluate seed migration and edema change.