

# An assessment of inter and intrafraction prostate mobility using Gold Anchors during prostate cancer patients volumetric modulated arc radiotherapy (RapidArc).

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## PURPOSE:

The patient positioning using Gold Anchors and 2D/2D kV image-guided technique during prostate cancer radiotherapy enables the prostate localization and reduces margins. Implementation of Rapid Arc technique shrinks the time of irradiation, what could cause the decrease of an intrafraction mobility. The main aim of this study was an evaluation of inter and intrafraction prostate mobility.

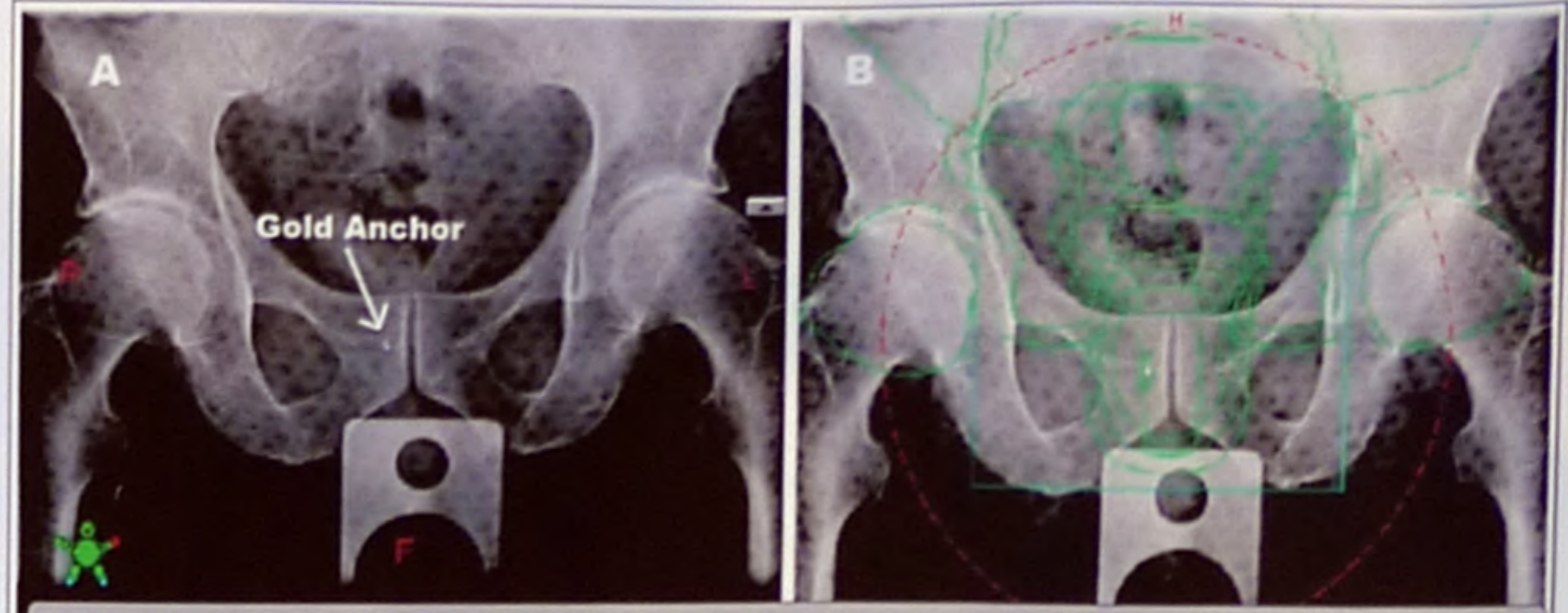


Fig.1. Kilovoltage images with Gold Anchor. A– without contours, B– with overlay contours

## MATERIALS AND METHODS:

Eleven prostate cancer patients were treated with a RapidArc technique. They were lying in supine position with an immobilization (thermoplastic masks) The method of patient positioning was 2D/2D kV. Verification was based on the Gold Anchor location, which was compared to the contour of a marker taken from the treatment planning system. After setup and irradiation, two kilovoltage images in anterior-posterior and lateral projection was performed to assess intrafraction prostate mobility. Analyzed material comprises 243 measurements.

### INTRAFRACION PROSTATE MOBILITY

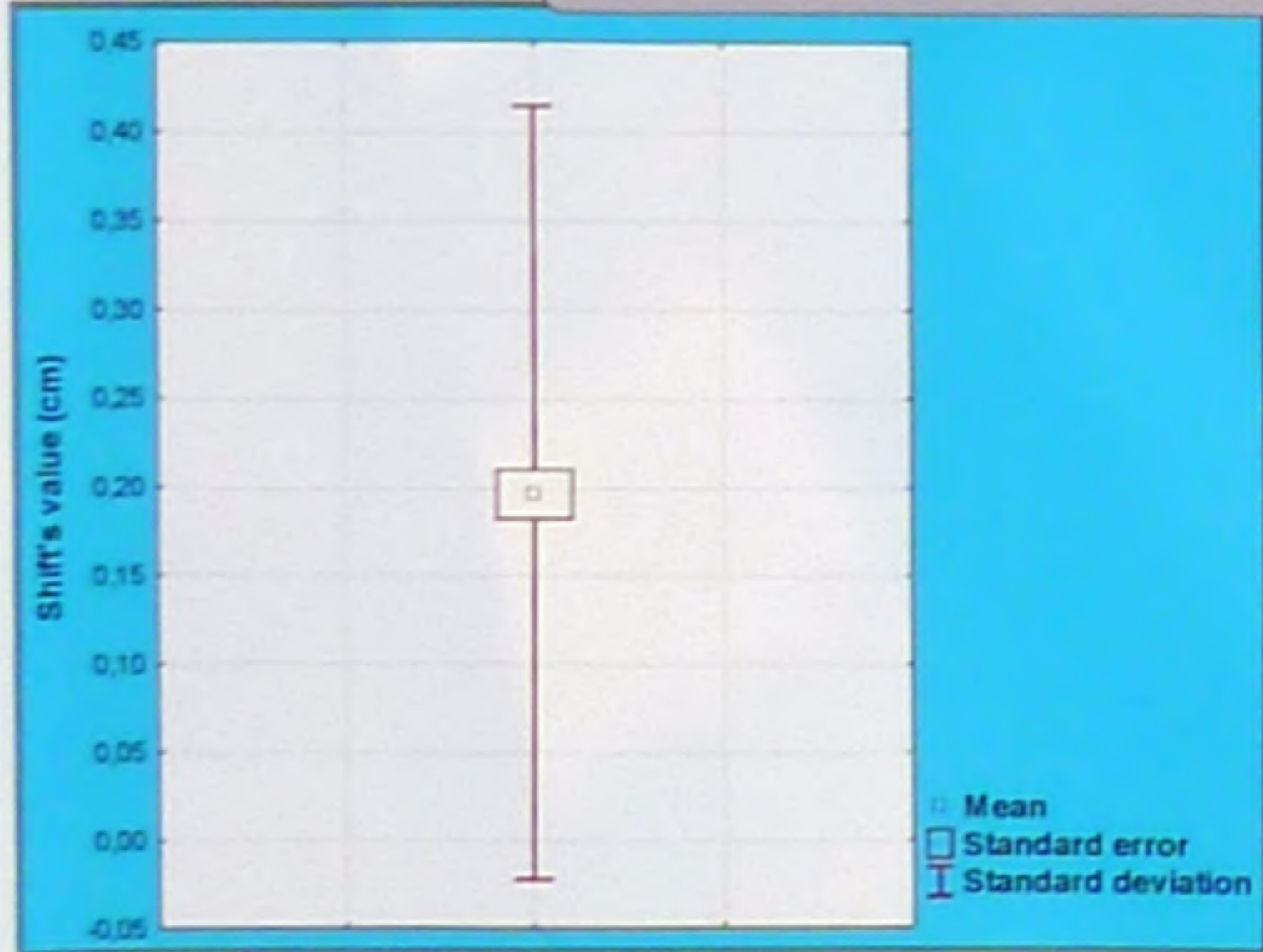


Fig.2. Mean, standard deviation, standard error in anterior-posterior (AP) direction

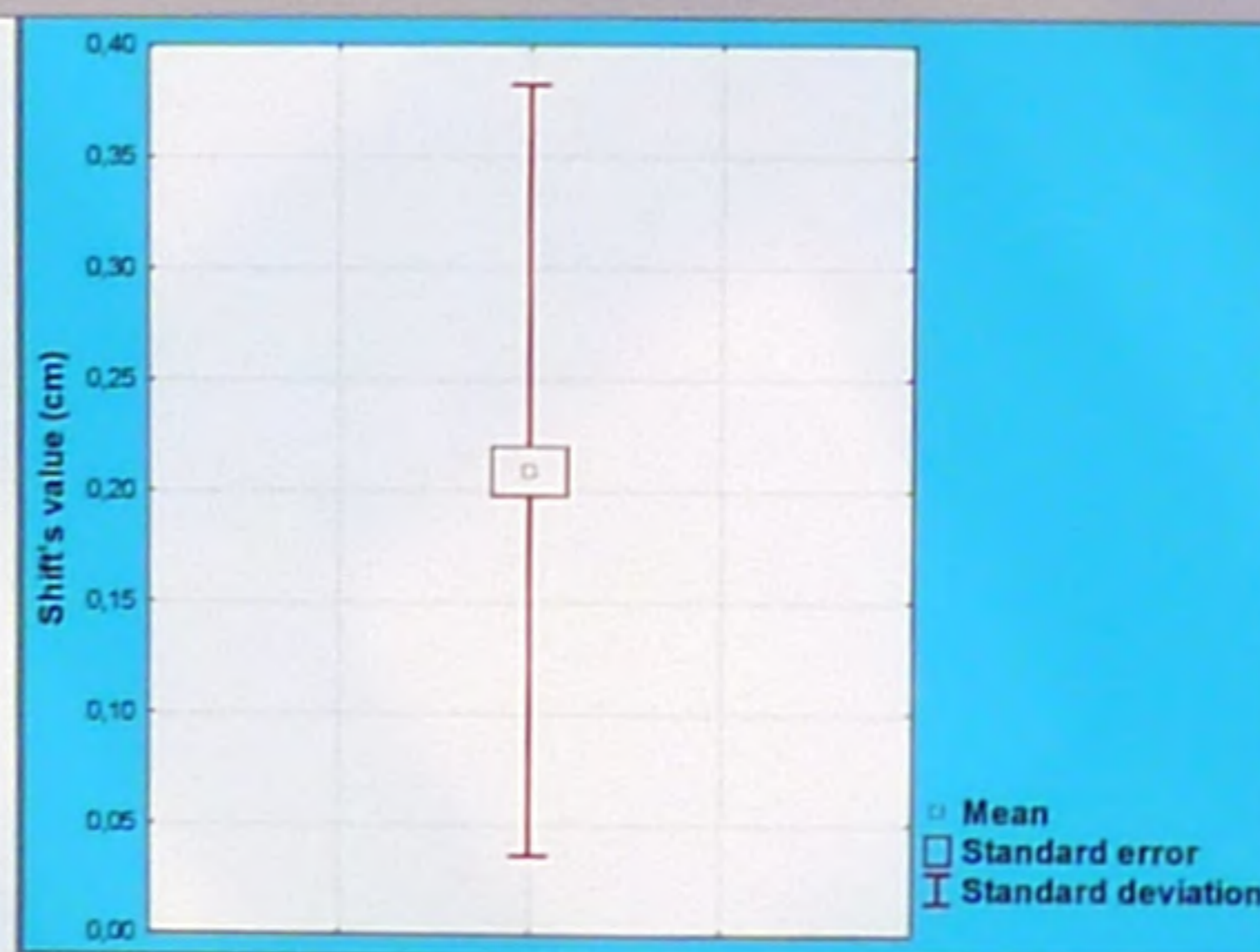


Fig.3. Mean, standard deviation, standard error in superior-inferior (SI) direction

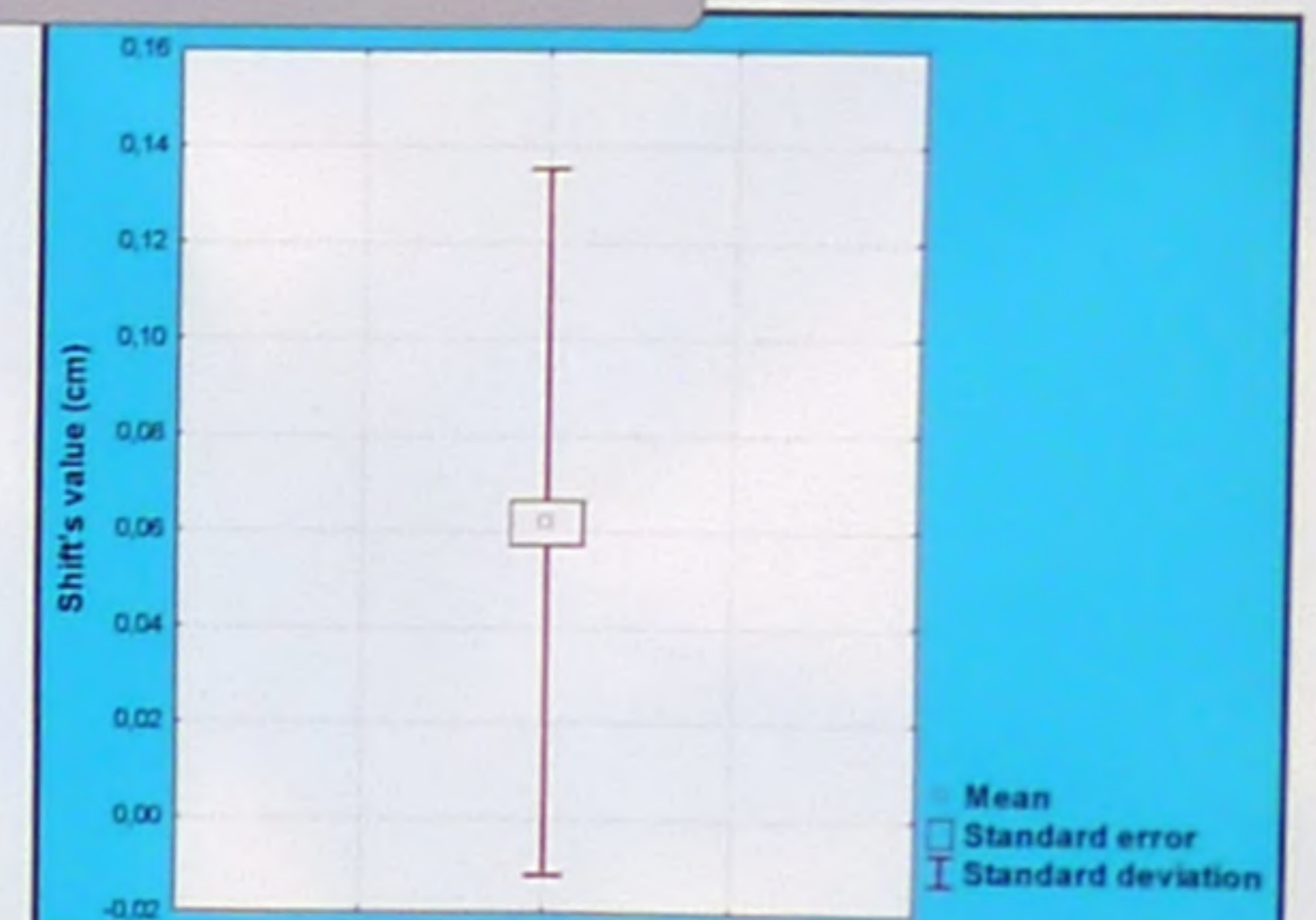


Fig.4. Mean, standard deviation, standard error in left-right (LR) direction

## RESULTS:

Mean, minimum, maximum and standard deviation of absolute values of shifts (cm) measured using 2D/2D kV and Gold Anchors before treatment were: 0.31, 0.0, 1.1, 0.21 in anterior-posterior direction (AP), 0.45, 0.0, 2.5, 0.40 in superior-inferior direction (SI), 0.16, 0.0, 0.6, 0.14 in left-right direction (LR) respectively. The same values after irradiation were: 0.2, 0.0, 1.0, 0.22 in AP, 0.21, 0.0, 1.0, 0.17 in SI and 0.06, 0.0, 0.5, 0.07 in LR. The intrafraction prostate mobility in vertical, longitudinal and lateral directions in 95% of cases were: < 0.7cm, < 0.5cm and < 0.2cm respectively.

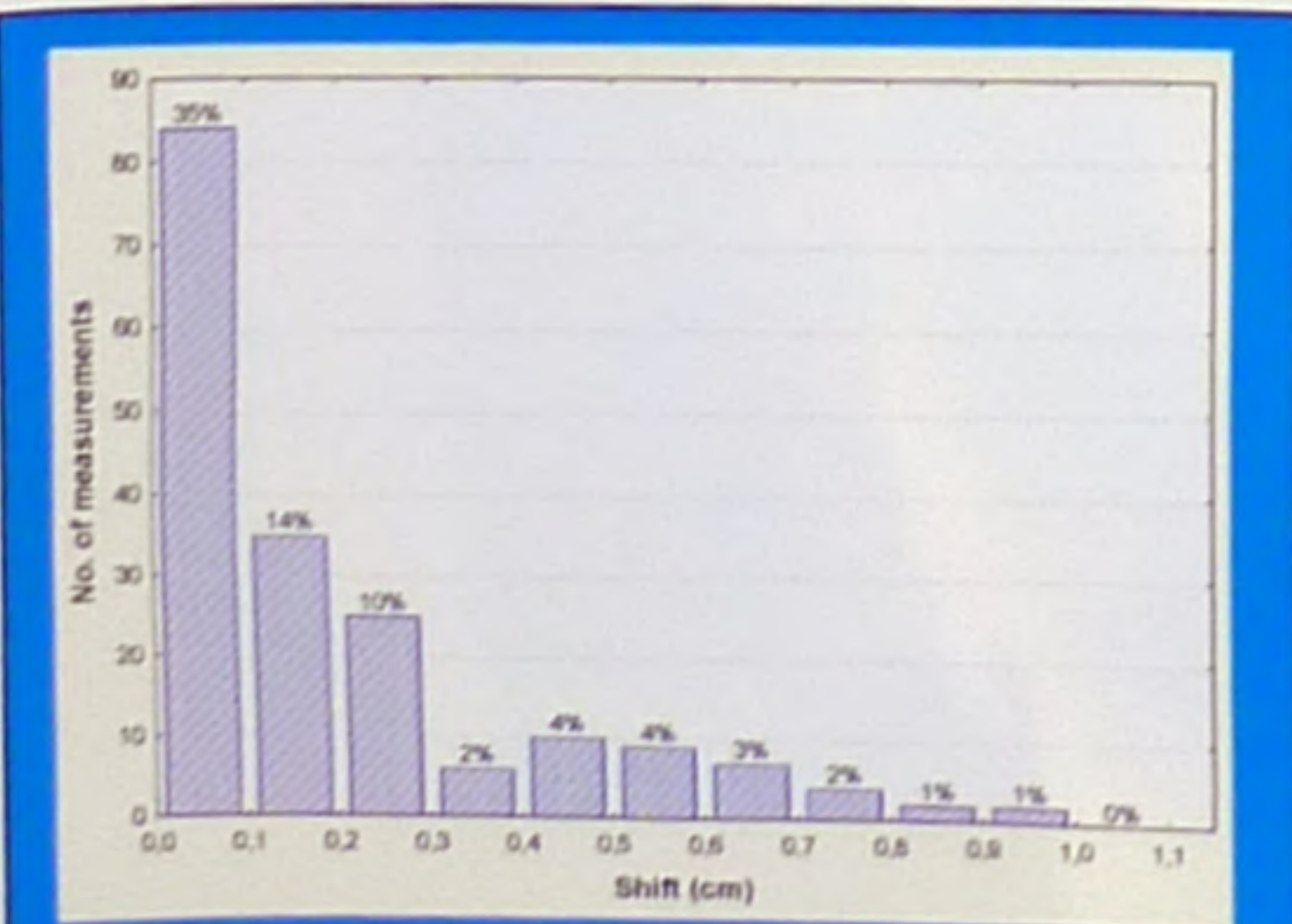


Fig.5. Intrafraction prostate mobility in anterior-posterior direction

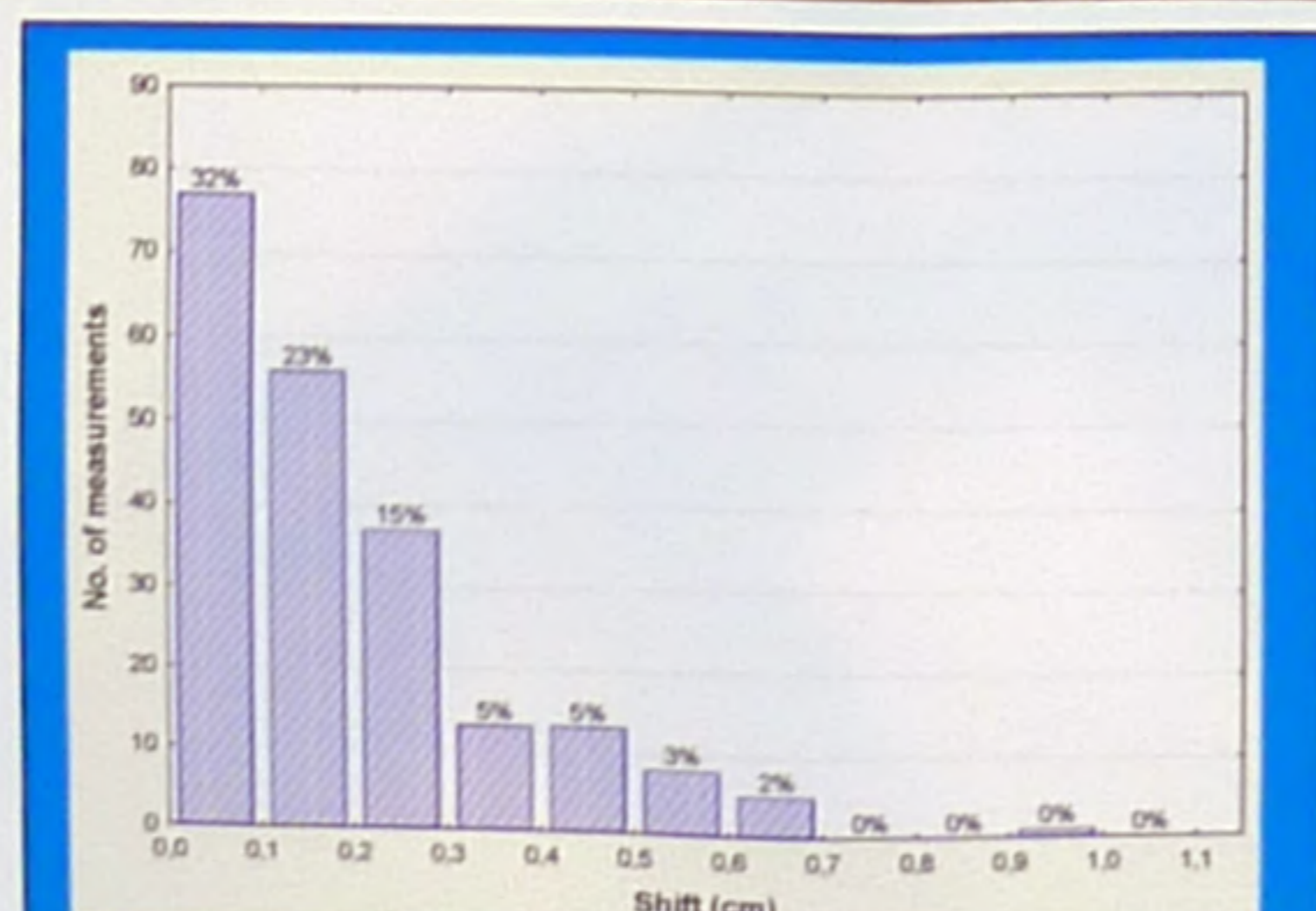


Fig.6. Intrafraction prostate mobility in superior-inferior direction

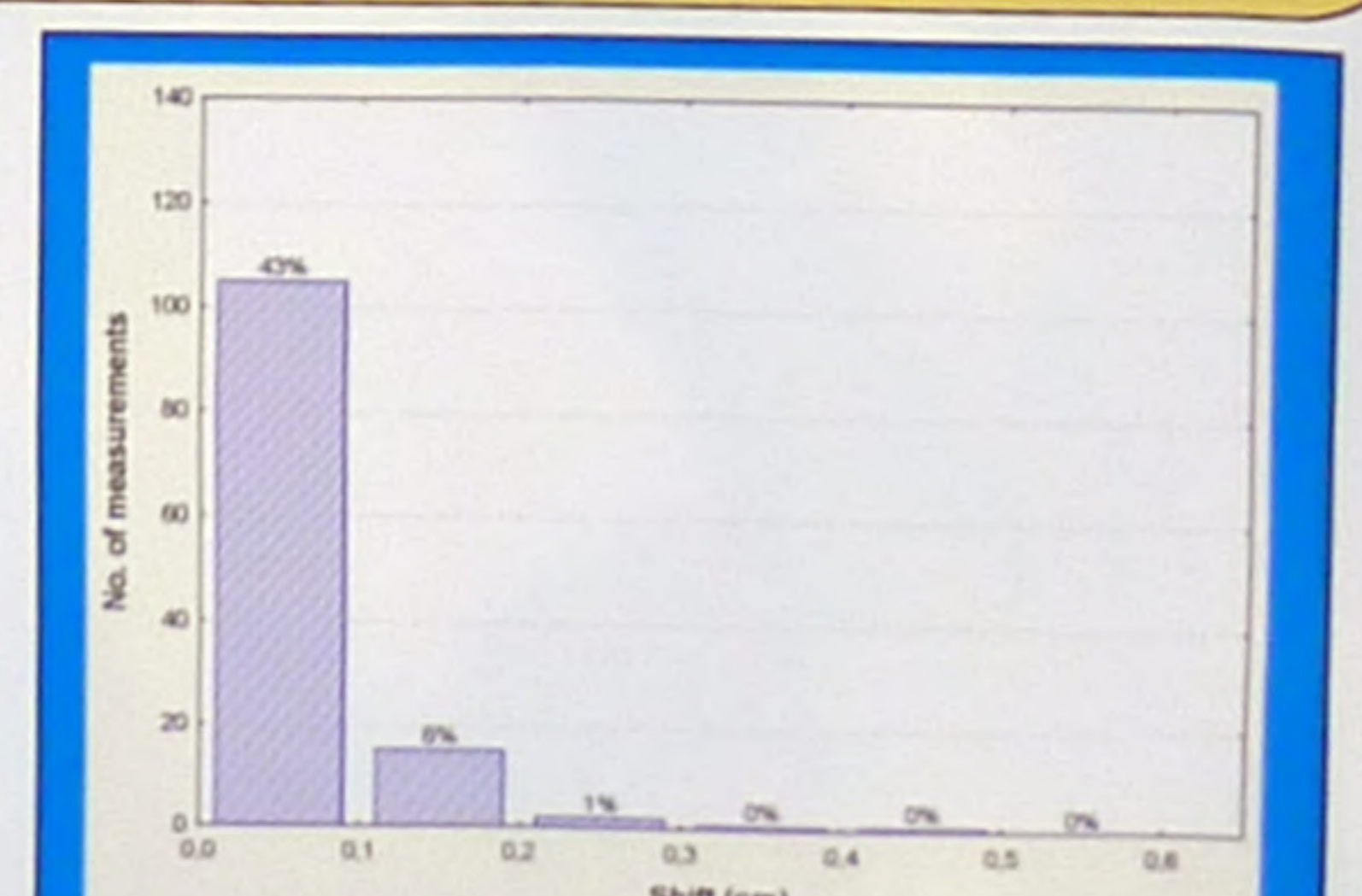


Fig.7. Intrafraction prostate mobility in left-right direction

## CONCLUSION:

The patient positioning using 2D/2D kV and Gold Anchors increases the setup precision and enables to reduce margins. Because the prostate motion during the course of radiotherapy can be significant, margins for the PTV should include the intrafraction prostate mobility.



Fig.8. The Gold Anchor's position after irradiation