

AbstractID: 7496 Title: Study of treatment couch leveling and sagging related to patient weight and couch longitudinal positions

Purpose:

The weighted couch appears leveling and sagging inheriting from its design and material used. The amount of leveling and sagging depend on longitudinal position and patient weight since the couch experiences different amounts of torque. This phenomenon could affect patient setup accuracy, especially for stereotactic radiosurgery.

Material and Method:

An infrared camera based ExacTrac system (BrainLab) of high accuracy was used to measure the leveling and sagging. Four infrared reflecting makers were placed on a piece of graphic paper attached on the couch-top, with a 10 cm separation in superior/inferior direction, and 6cm in lateral direction. Couch base is ExactCouch (Varian) with a new fiberglass couch top (Brainlab). The measurements were taken at a 5cm increment step on longitudinal direction in a range of 80cm couch movement, repeated with weight loads of 40LB and 60 LB on the couch front end. The graphic paper was repositioned for each couch movement so that the center of the four markers was always at the isocenter. The average horizontal position change of four markers represented the sagging, and the position difference between the superior and inferior markers represented the leveling.

Result:

Couch sagging was $Z(\text{mm}) = 0.011*Y(\text{cm}) + 0.26$ for zero load , $Z(\text{mm}) = -0.0048*Y(\text{cm}) + 0.08$ for 40Lb, and $Z(\text{mm}) = -0.011Y(\text{cm}) + 0.03$ for 60Lb, where Y is the amount of couch longitudinal movement. The maximum sagging was 1.9mm compared the difference between 60Lb loading and 0 loading. Couch leveling was $0.316 \pm 0.084\text{mm}$, $0.58 \pm 0.12\text{mm}$, $0.71 \pm 0.059\text{mm}$, for three different loading with the range of 11 cm around the isocenter, however, it changed little with different couch position.

Conclusion: Couch sagging depends on its longitudinal extension and the patient weight. The maximum sagging at isocenter position was about 2mm. Couch leveling only depend on the weight of loading.