Purpose:
In split-field head and neck radiation therapy, image guided alignment of the superior IMRT field may result in large setup errors in the supraclavicular field. The goal of this study was to quantify geometric and dosimetric effects of residual setup error on the cord and larynx using the split-field technique.

Methods:
Cord and larynx contours of 27 patients were propagated from a planning CT onto daily in-room CTs using deformable registration. Cord contours were divided into superior and inferior structures at the match plane. Interfractional variations in the position of the larynx, superior cord, and inferior cord centroids were measured.

Deformable registration allowed the calculation of cumulative dose delivered for each patient. The discrepancy between planned and delivered doses was compared for the maximum dose to the superior and inferior cord, mean dose to the larynx, larynx V50 and D60.

Results:
The group mean error, systematic error, and random error of the larynx centroid positions were 0.12cm, 0.06cm, and 0.08cm, laterally, and 0.15cm, 0.06cm, and 0.08cm in the anterior-posterior direction. The lateral values for the superior cord were 0.04cm, 0.01cm, and 0.03cm, and for the inferior cord were 0.17cm, 0.06cm, and 0.12cm. Lateral and anterior-posterior margins were 0.22cm and 0.20cm (larynx), 0.05cm and 0.08cm (superior cord), and 0.22cm and 0.35cm (inferior cord).

Maximum cord dose was 43.8Gy. The average change in maximum dose was 0.3Gy (max=1.8Gy) for the superior cord, and -0.6Gy (max=1.2Gy) for the inferior cord. The increases in larynx mean dose, V50, and D60 averaged 1.6Gy (SD=2.5Gy), 3.24% (SD=3.52%), and 4.7Gy (SD=6.1Gy).

Conclusions:
While the inferior cord demonstrated the largest motion, it remained within the cord block. The increase in maximum cord dose and mean larynx dose were no more than 1.8Gy and 5.1Gy, respectively.

The split-field technique remains clinically viable.