Purpose:
Simultaneous integrated boost (SIB) fractionation schemes for the treatment of head and neck cancer have become widespread. This usually results in increased total dose to elective regions of the neck. We hypothesized that a sequential boost plan (SEQ) using a lower total dose to the elective neck at a standard fractional dose would result in improved dosimetry to normal tissues.

Methods:
Nine patients with locally advanced head and neck cancer with primaries in the oropharynx and larynx were selected for this study. SEQ radiotherapy plans were generated to compare with SIB plans. Normal tissue and target dose constraints were kept identical, except for dose to the elective neck target (56 Gy vs. 45 Gy). SIB dose fractionation schema to planning target volumes (PTV) included 70 Gy / 2 Gy fractions to PTV_High, 63 Gy / 1.8 Gy fractions to PTV_Intermediate, and 56 Gy / 1.6 Gy fractions to PTV_elective. SEQ dose fractionation schema included 50 Gy / 2 Gy fractions to PTV_High, 45 Gy / 1.8 Gy fractions to PTV_Intermediate, and 45 Gy / 1.8 Gy fractions to PTV_elective, followed by a boost of 20 Gy / 2 Gy fractions to PTV_High and 18 Gy / 1.8 Gy fractions to PTV_Intermediate.

Results:
SEQ plans were more likely to have higher percent coverage of the PTV_elective at the 110% and 100% (p < 0.01) prescription dose levels, but not at 95% or 93%. Mean doses to the contralateral parotid, larynx and inferior pharyngeal constrictor were lower with SEQ (p<0.05).

Conclusions:
The use of SEQ intensity modulated radiotherapy with a previous standard lower total dose (45 Gy in 25 fractions) for treatment of the elective neck in locally advanced head and neck cancer patients may improve the ability to spare normal tissues such as the parotid, larynx, and inferior pharyngeal constrictor.