Purpose/Objective(s): RTOG protocols have proposed limiting doses to the Organs At Risk (OAR) for patients undergoing IMRT to the head-and-neck region. While efforts have focused on evaluating spinal cord tolerance when treating spinal column metastases, no recommendations exist for other adjacent OAR such as the brachial plexus or oropharyngeal region when performing spine radiosurgery (SRS) in the cervico-thoracic region. We evaluated the dosimetry as well as the acute and delayed effects of SRS to these adjacent but less well studied regions.

Materials/Methods: 14 consecutive patients (7 males) with cervico-thoracic spine tumors were treated with single fraction SRS using the Novalis® platform between 2006-2009. Mean age at presentation was 61.3 (range 35 - 78); mean KPS = 80. No patient had neurological or oropharyngeal deficits at initial presentation. PTV in 6/14 patients involved 1 vertebral body (VB); 3/14 involved 2 contiguous VBs; 3/14 3 VBs; 1/14 4 VBs and 1/14 5 VBs to a mean prescribed dose 15.1 Gy (range: 12 - 16 Gy). Spinal cord, brachial plexus, larynx, trachea and esophagus were delineated as OAR on CT and MRI imaging in the actual treatment plans and dosimetrically evaluated.

Results: Patients were followed weekly for 1 month and every subsequent 3 months to assess treatment response and side effects of therapy. Mean patient follow-up was 9.3 mos (range: 1 - 33 mos). Mean cord dose was 6.1 Gy (max. 13.4 Gy) to a mean volume treated (MVT) of 4.2 cc (range: 1.79-7.42 cc); mean brachial plexus dose 7.7 Gy (max 18.2 Gy) with a MVT of 15.46 cc (range: 2.93-37.41 cc); mean laryngeal dose 4.9 Gy (max 18.1 Gy) with a MVT of 39.0 cc (range 0 - 76.77 cc); mean tracheal dose 4.5 Gy (max 17.0 Gy) to a MVT of 12.55 cc (range 0 - 37.37 cc); mean esophageal dose 5.8 Gy (max 18.6 Gy) to a MVT of 4.0 cc (range 0 - 14.14 cc). For each OAR, dose to 0.1 cc, 1 cc, 2 cc, 5 cc and the volume receiving > 10 Gy will be presented at the meeting. Clinically, no patient developed hoarseness, dysphagia, strictures, esophagitis, or evidence of a brachial plexopathy. There was also no myelopathy or radiculopathy documented.

Conclusions: Data exists evaluating the impact of radiation therapy on OARs in the cervico-thoracic region with conventional fractionated regimens for head and neck, lung and breast cancer. To our knowledge this is the first published report evaluating the impact of single fraction spine radiosurgery on these same anatomic structures. From our analysis, the current SRS doses used at our institution are safe and well tolerated. Although this preliminary data may not be surprising, it provides us with bench-mark OAR tolerances in the cervico-thoracic spinal region. As the field of SRS evolves toward dose escalation, larger studies evaluating not only treatment responses, but also OAR dosimetry and clinical tolerance should be pursued.

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