Single Session Robotic Radiosurgery and Quality of Life Analysis for Glomus Jugulare Tumors: A Long-term Monocentric Investigation of 53 Cases

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Objectives: The main objective of this retrospective, monocentric study was to evaluate and report the long-term efficacy, safety and impact on quality of life for single session robotic radiosurgery (SRS) in the management of glomus jugulare tumors.

Methods: 53 consecutively treated patients with glomus jugulare tumors have been included in this retrospective, monocentric study. They were treated between July 2005 and November 2018. Medical history, previous treatments and clinical symptoms were obtained during the first patient consultation. Moreover, health-related quality of life was assessed before treatment and during follow-up visits using the 12-item health survey questionnaire (SF12v2,© 1992, 2000 Health Assessment Lab, Medical Outcomes Trust and QualityMetric Inc., German Version 2.0). Local tumor response, clinical symptoms and adverse events were evaluated clinically and by magnetic resonance imaging. All treatments were delivered in an outpatient setting using the CyberKnife robotic radiosurgery system (Accuray Inc., Sunnyvale, CA, USA). In all patients, the 6D-Skull tracking software (Accuray Inc., Sunnyvale, CA, USA) has been used to track the patients' position, while custom-fitted plastic face masks were used for non-invasive fixation. SF12v2 data were transformed into a continuous scale ranging from 0 to 100 and analyzed using STATA 15.1 (StataCorp, College Station, TX, USA). Statistical significance was set at a p-value equal or less than 0.05. This study received the approval of the local institutional review board. Informed and written consent was obtained by all patient's prior data collection and analysis.

Results: The median patient follow-up time was 38 months (range 3 - 160 months) with a crude local tumor control rate of 98.1%. The median tumor size was 4.3 cm2 (range 0.12 - 31.61 cm2). Prescription doses ranged from 13.5 to 18.15 Gy (median 16.5 Gy). 33 patients were primarily treated with SRS, 20 patients had undergone either surgery, radiotherapy, tumor embolization or a combination of them before SRS treatment. Pulsatile tinnitus (52%), partial hearing loss (47%), dysphagia (45%), dysarthria (35%) and vertigo (28%) were the most common symptoms before the treatment. In 71% of the patients, the symptoms either improved (32%) or fully resolved (39%). In 13 cases (24%), the pretreatment deficits remained unchanged after the treatment. One patient developed an edema adjacent to the tumor causing pain which was successfully treated with dexamethasone. One patient was symptom-free before treatment delivery but developed tinnitus and a discomfort feeling around the tumor region afterwards. Paired t-tests of the transformed SF12v2 data revealed a statistically significant improvement in bodily pain (p=0.04) at the first follow-up visit (median time to first follow-up: 6.1 months), while mental health and physical functioning showed a trend towards post-treatment improvements during subsequent follow-up visits (both p=0.06, median time to last follow-up: 38 months).

Conclusions: The results of this study prove the efficacy and safety of SRS for glomus jugulare tumors. Patients treated at our center showed a significant symptom improvement, underlined by the SF12v2 results. We consider this treatment as the primary and secondary treatment modality for the management of glomus jugulare tumors given its high local control and non-invasive, time-saving treatment delivery compared with often challenging surgical resections.